A MODEL OF USER ACCEPTANCE OF LEARNING MANAGEMENT SYSTEMS: A STUDY WITHIN TERTIARY INSTITUTIONS IN NEW ZEALAND

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ABSTRACT

Digital technologies are revolutionizing the practices of teaching and learning at colleges and universities all around the world. With the emergence of internet and web technologies, tertiary institutions are increasingly exploring the potential use of e-learning technologies to cater for the ever growing demands of flexible teaching needs in distance education. The teaching institutions are making significant efforts in e-learning development and investing significantly in associated information technology infrastructure with the expectation of high return on their investment. However, in spite of this effort and investment the teachers and faculty do not always use the technology as expected and more often e-learning systems continue to be underutilised.

This research investigates the factors that influence or inhibit the adoption of e-learning systems in the universities, institutes of technology and polytechnics in New Zealand. A cross section of teaching staff from different tertiary institutions was surveyed to ascertain their views on adopting learning management systems (LMS) in their teaching process. The survey questionnaire is based on factors that are being advocated by well known practitioners and academics, which were identified through a literature review.

The study reveals three key groups of factors: individual, system and organisational, affecting the adoption of e-learning systems in the tertiary institutions. The report introduces a theoretical framework for user acceptance of e-learning systems and presents a detailed analysis for factors relating to: (a) individual characteristics (b) individual perceptions (c) LMS system characteristics (d) external system characteristics (e) organisational support and (f) organisational characteristics.

The results show that whilst individual factors have significant contribution to the LMS adoption, the system and organisational factors are most crucial for user acceptance in e-learning systems. The users ranked that release time for staff, the ease of use of LMS, perceived usefulness of LMS, training and support to develop online content and the reliability of information and communication technology infrastructure are the five most essential factors for staff uptake in e-learning systems.

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Chapter One

INTRODUCTION

1.1 Background

Economic, social and technological forces are placing enormous demands on tertiary educational institutions and call for increasingly flexible and diverse systems to cater to an ever growing range of learning needs. Flexible approaches aim to provide learners with greater choice over when, where and how they learn by adopting various flexible delivery strategies such as distance education, online learning, mixed mode delivery, self paced or self directed learning strategies.

Traditionally, tertiary institutions delivered their flexible teaching programmes to students with the aid of print based course material and with limited information technology support such as email and electronic discussion lists. However, with recent advances in the digital technologies, institutions are increasingly seeking the potential use of information and communication technologies (ICT) to facilitate their flexible teaching needs. In particular, with the emergence of internet and web technologies, tertiary institutions around the world have been seeking to exploit the use of e-learning technologies to support their distance teaching. Among the diverse e-learning technologies, the learning management system (LMS) is a popular e-delivery medium within institutions. Smith and Rupp (2004) assert that with response to growing needs of the student population, online education is increasingly common in tertiary education.

For some time now the tertiary sector in New Zealand has been investigating the potential uses of the e-learning medium for distance education. Over the past few years the universities and polytechnics in New Zealand have been investing in e-learning technology development and associated ICT infrastructure to embrace this new online delivery medium in their institutions. The preliminary survey conducted within the Association of the Polytechnics in New Zealand (APNZ) in 2003 confirms that all ten institutes of technology and polytechnics (ITP's) which participated in the survey used an e-learning

application or a LMS to facilitate online teaching (Nichols, 2003). There are government strategies to influence the uptake of e-learning technologies within the sector and there is a special collaborative e-learning development fund for New Zealand universities and polytechnics pursuing e-learning development (Ministry of Education, 2003). Whilst studies have shown that e-learning technologies extend the quality of face to face teaching (Bates, 2000), the introduction of e-learning technology in teaching institutions has often been complex and teachers and faculty do not always use technology as expected. With regards to online teaching, the US National Centre for Education Statistics reported that during Fall 1998, only 6% of faculty staff taught at least one distance education class (US Department of Education, 2002). In Australia, statistics from the National Centre for Vocational Education Research (NCVER) 2000 student outcomes study showed that only 2.2% of all graduates completing their studies had experienced some form of online delivery (NCVER, 2000). In New Zealand, the preliminary survey conducted in 2003 within ten ITP's confirmed that only 8% of their face-to-face courses had some form of online support (Nichols, 2003). A 2005 study within all ITP's, facilitated by the Ministry of Education e-learning research fund, found that over half (51%) of the 817 survey respondents were not involved in any e-learning course development. The study further found that, of the 49% staff that were involved, 20% were either developing or delivering only one online course (Mitchell, Clayton, Gower, Barr & Bright, 2005).

The literature on academic staff's attitudes towards adopting e-learning technologies highlights various individual, system and organisational factors affecting the system adoption in their teaching and learning environments (Graves, 2001; Vrasidas, 2004; Levine & Sun, 2003; Hitt & Hartman, 2002). The common issues highlighted are: lack of knowledge required to develop online content; lack of reliable infrastructure and support to deliver content; individual perception towards e-learning; lack of flexibility in student administrative and support systems to complement the online delivery; lack of organisational support and incentives for staff; and lack of organisational direction and leadership for e-learning development. Further, educators claim that LMSs have functional limitations and they can not be adapted into their varying teaching needs. Clearly e-learning systems will not be readily embraced by the teaching staff in New Zealand's tertiary sector unless their concerns are addressed. It is therefore important to obtain the views of the teaching staff in order to implement a system that would meet the requirements of all users.

1.2 Research objectives

This research aims to achieve two objectives. Firstly, the study intends to identify the factors that are significant for e-learning system adoption, in particular the LMSs, in New Zealand universities and the polytechnics. The research results will assist to determine the most significant factors, including the most essential, for e-learning system adoption which in turn will provide an insight to New Zealand academic communities and institutional leaders to address any barriers to user uptake.

The second objective of the study is to introduce a theoretical framework for user acceptance in e-learning systems. The study intends to build a framework integrating the factors that are directly relevant for e-learning adoption as well as the factors from recognized information systems user acceptance models. It is therefore anticipated the proposed framework, embedded with theories from information systems acceptance, would provide a credible source for academic institutions to understand all key drivers for user acceptance in order to proactively design interventions (including system characteristics, training and support) targeted at populations of staff that may be less inclined to adopt, resulting in higher uptake and higher return on their e-learning technology investment.

The study was carried out within universities and ITP's in New Zealand. A total of ninety five teaching staff from a cross section of different academic programmes were surveyed to ascertain their views on adopting a LMS in their teaching practice. The survey questionnaire was based on the factors contributing to e-learning adoption as well as the factors from information systems user acceptance models that were identified during a literature review from various journal articles and publications by well known practitioners and the researchers in the field.

1.3 Research questions

This study considers two facets of e-learning during its system adoption by institutions: content development and content delivery. Each aspect will have different stakeholders, cultures and technologies and the study seeks to answer the following questions:

1. What is the current organisational setting in relation to e-learning development in New Zealand tertiary institutions?
2. What is the current degree of e-learning technology, including LMS adoption rate within the tertiary sector in New Zealand?
3. What are the key determinant factors for LMS adoption?
4. What could be the appropriate framework for LMS system acceptance?
5. What are the individual characteristics that staff see as important for online content development and delivery process?
6. Does individual perception and organisational culture towards e-learning influence the staff uptake in e-learning systems?
7. Could the degree of flexibility and functionality attributes within LMS have an impact on staff uptake?
8. Do flexible student administrative and learning support systems within the institution influence the staff uptake in LMS?
9. What are the organisational support factors that could influence the individual uptake in LMS?
10. What are the organisational characteristics that could influence the individual uptake in LMS?
11. What are the most significant factors that staff see as essential for their e-learning system adoption?
12. What conclusion could be reached on the validity of the LMS acceptance framework introduced?
13. What approach should institutions take when deploying e-learning systems?
14. What measures should institutions take to address barriers to e-learning system adoption?

1.4 Research area: technology innovation and user acceptance

With rapid advances in digital technologies many innovative systems and solutions appear in the market with the promise of enhancing the business competitiveness and productivity of their users. Organisations are making significant investment and commitment to adopt new technologies in their workplace with the expectation of a high return on their investment. However despite remarkable advances in technologies they often fail to meet business objectives and systems continue to be underutilized (Venketash & Davis, 2000). Research on technology adoption in the workplace indicates that lack of user acceptance has been one of the major barriers to overcome when deploying newer technologies in organisations.

The authors of Unified Theory of Acceptance and Use of Technology (UTAUT), Venkatesh, Morris, Davis & Davis (2003) assert that "the presence of computer and information technologies in today's organizations has expanded dramatically. Some estimates indicate that, since the 1980s, about 50 percent of all new capital investment in organizations has been in information technology (Westland & Clark 2000). Yet, for technologies to improve productivity, they must be accepted and used by employees in organisations".

Venketash and Davis (2000) assert that information systems adoption, and use in the work place remains a central concern of information research and practice. He noted that despite impressive advances in hardware and software capabilities, the troubling problem of underutilised systems continues. Low usage of installed systems has been identified as a major factor underlying the "productivity paradox" surrounding low returns from organisational investments in information technology (Sichel, 1997).

The successful use of information technologies is dependent on many factors of end users. There has been considerable research on the factors that predict whether individuals will accept and voluntarily use information systems. The literature in user acceptance of technology identifies various theoretical models and frameworks on how users come to accept and use a technology. The commonly cited models in the literature are: (1) Technology Acceptance Model (TAM) (Davis, 1993), (2) TAM2 (Venkatesh & Davis,

2000), (3) The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al, 2003) and (4) Diffusion of Innovation by Everett Rogers (1983).

The TAM suggests that when users are presented with a new software package, a number of factors influence their decision about how and when they will use it. The most notable are perceived usefulness which is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" and perceived ease-of-use which is defined as "the degree to which a person believes that using a particular system would be free from effort" (Davis, 1993). Venkatesh and Davis extended the original TAM model to explain perceived usefulness and usage intentions in terms of social influence and cognitive instrumental processes. The extended model is referred to as TAM2 (Venkatesh & Davis, 2000). The Unified Theory of Acceptance and Use of Technology (UTAUT) presented by Venkatesh et al (2003) explains that four constructs would play a significant role as direct determinants of user acceptance and usage behavior: performance expectancy, effort expectancy, social influence, and facilitating conditions.

The Diffusion of Innovation framework published by Everett Rogers (1983, 2003) states that an innovation was conceived of as an object with five perceived attributes—relative advantage, compatibility, complexity, trailability and observability—that help one to explain its adoption.

These models express that there are various social and organisational factors influencing the user acceptance of technology and it signifies that such factors should not be considered in isolation from technical aspects. This is particularly important when deploying complex inter organisational systems, such as e-learning systems or distributed systems which cut across various user groups and units within the organisation.

1.5 Current practices in adopting e-learning technologies in tertiary institutions

Institutions are adopting e-learning technologies for two purposes: 1) to enhance the flexibility of traditional classroom based face to face courses with web access to syllabi, materials and discussions or 2) as a sole channel of distance education modality that eliminates or reduces "on-ground" classroom time (Graves, 2001).

Educators rarely have all the technological skills needed to develop custom web sites for online classes. Therefore, many educational institutions have adopted online course-building applications, or a LMS to facilitate online learning (Vrasidas, 2004). The popular LMS systems in use are Blackboard, WebCT and Moodle applications. Vrasidas (2004) described that two major functionalities associated with LMS are course administration and management and course pedagogy, teaching and learning (Vrasidas, 2004).

Staff development

All staff involved in flexible and online learning requires a wider scope of knowledge. However the literature suggests that relatively few institutions have organisation wide staff development programmes in place to provide for varying skill development needs for their staff (NCVER, 2000). Well developed skills in writing, communicating, interpreting, conveying and providing logical concise information, are just as important as technological skills such as ability to use email, internet and power point applications. In addition staff need to acquire organisation and administrative skills to design and develop online courses. More importantly, faculty need to understand new pedagogy for teaching online, that is, most effective practices for teaching when much of the learning environment is online.

It is common in large institutions to establish a well developed learning technologies unit to assist staff in teaching online. These units provide instructional development services including training faculty members to use e-learning software, assisting them in understanding online pedagogy, assisting them with instructional design, helping them develop courses and so on.

Individual perception and faculty culture

Individual perception and faculty culture plays an important role in tutors acceptance or rejection of e-learning systems. Faculties express much apprehension towards online education. In particular they perceive that online dialogue will replace the face to face interaction. There is also a concern that online teaching would be mandated rather than a supplementary option for faculty and students.

Information and communication technology infrastructure

Sound information and communication infrastructure play a key role in successful delivery of online content to distance students. Lack of reliability, performance and timely support on infrastructure could inhibit both tutor and the student from accepting this technology. More often institutions have at least core ICT infrastructure needed to support distributed learning. However developing online courses will require additional equipment and specialised software, for example, additional servers and a course management system. Student access requires network bandwidth and modem pools or internet service provider connections. These facilities need to be well managed and maintained to achieve a high degree of reliability.

Access to flexible administration systems and services

With the increase in courses being delivered fully online, students today expect much more than online access to course material or to courses. They expect access to both academic and administrative services. Graves (2001) asserts that most institutions have adopted e-learning technologies, however, they lack sufficient integration to other administrative systems within the organisation. He stresses the importance of integrating academic and administrative services on the web through a single and personal point of contact for students, instructors and other stakeholders.

In addition to providing online courses, the institutions needs to provide electronic access to student services such as distance library services, course enrolment, student advice and support services, financial aid and the book store. Britin, Liber, Perry and Rees (2004) assert that many current student support systems in teaching institutions are designed to

support the on-campus students and that organisations shifting to deliver online courses need to revamp their existing administrative systems to support students with single sign-on to all learning and administrative resources.

Staff time for distance teaching

While distance learning provides a host of teaching and learning practices that may be convenient for students, it is far more labour intensive than traditional face to face teaching practice; creating courses, maintaining discussion forums and responding to e-mails from students around the clock requires far more time than effort from educators. Educators point out lack of time to design, develop, maintain and support online classes is a major barrier in adopting e-learning systems.

Institution strategy in e-learning

Institutions are investing a large amount of money in e-learning development with little progress towards organisational outcomes (Graves, 2001). Organisations lack an enterprise-wide strategic approach for e-learning development across the organisation. There are random acts of progress or "pockets of excellence" within various faculty units by those who are keen on this technology. Graves (2001) claims " Far too often the idea is to throw technology onto the playing field and cheer for those who pickup the ball and run with it. Relatively few institutions take a strategic approach to ensure a pay off at the institutional level". He points out that to achieve real progress, e-learning development should tie back into the institution mission, and that institutions must have strategies that are enterprise-wide in scope.

1.6 Current status of e-learning technology development within the tertiary sector in New Zealand

A recent study conducted within all 20 ITP's in New Zealand found that e-learning is a reality for all of the institutions, although each institution is at different stages of their development (Mitchell et al, 2005). The results of the survey in 2004 with e-learning managers from 18 ITP's highlighted that almost half (8) of the institutions manage their e-learning development centrally, with another one third of institutions (6) opting for a model of devolved responsibilities within institution wide integration. Two institutions are making progress with the initiatives of individual staff members and another two institutions have planned the development, however, they have not commenced the work at the time of the study (Mitchell et al, 2004).

In terms of technology adoption, the 2004 study found that all ITPs are using a LMS to facilitate e-learning in their institutions. The most common LMS was Blackboard (within 8 ITPs), followed by Moodle (within 4 ITPs), WebCT (within 1 ITP) and a further five institutions are using other LMS systems. The study identified that two institutions had decided to move to Moodle at the time of the study. The report further highlighted that with recent improvements, it is likely that Moodle LMS will become the preferred system within the ITP sector in New Zealand in the near future. (Mitchell et al, 2004).

Of the eighteen e-learning managers who responded to the 2004 survey, the majority (12) believed that the e-learning adoption rate was slowly increasing within their institutions. Four managers considered that the rate was rapid and two considered that it was plateauing, while none thought it was decreasing.

In relation to e-learning knowledge within teaching staff, the results of the 2005 survey found that of the 809 staff who responded, almost half (46%) of tutors had an understanding of e-learning tools and that they used a selection of them (Mitchell et al, 2005). They were in the process of exploring the LMS and were mainly focused on transmission of the content. Another one third (33%) of staff was identified themselves as having limited grasp of e-learning and were willing to explore the benefits of e-learning further. Twelve percent of tutors identified themselves as having advanced knowledge of

e-learning and thorough expertise in LMS. They believed that they used e-learning to transform their teaching as much as possible (Mitchell et al, 2005).

In terms of tutor involvement in e-learning courses, the 2005 study indicated that over half (51%) of the 817 survey respondents were not involved in any e-learning course development. The study further found that, of the 49% staff that was involved, 20% are either developing or delivering only one online course (Mitchell et al, 2005).

This study made an attempt to include the e-learning development status of the New Zealand universities. Unfortunately, the researcher did not find any suitable literature to determine the overall status of e-learning development across the university sector in New Zealand.

It is noted that there has been no study done to date in the New Zealand tertiary sector to investigate e-learning system adoption factors within the context of information systems acceptance. Analysis of existing publications in this topic suggests that the current studies do not appear to be based on the frameworks incorporating the theories from information systems user acceptance. Thus, the empirical research in information systems user acceptance provide well founded theoretical models with valid elements that predict whether individuals will accept and voluntarily use information systems. This study addresses this need and therefore it is envisaged that the findings of this study would be useful for the wider communities in the tertiary sector in New Zealand.

1.7 Thesis structure

The research report is structured into six sections. Section two provides a detailed literature review on factors that would influence or inhibit the adoption of e-learning in teaching institutions. Section three presents the methodology that was used to conduct the research and section four presents the results of the research. Section five is the analysis and discussion of results and finally section six concludes the report with the summary of outcomes of the research with recommendations to address barriers to e-learning development in tertiary institutions.

Chapter Two

LITERATURE REVIEW

Before any discussion occur on factors contributing to the adoption of e-learning, it is useful that the reader be made aware of what e-learning actually means. At the same time it is also useful to understand the construct and the functionality of a Learning Management System (LMS).

2.1 Definition of E-learning

E-learning is defined as education delivered via internets or intranets, which are synchronous, and enables anytime, anyplace learning (Ministry of Education, 2001). More generally, e-learning includes any learning which makes use of computer technologies and digital tools, particularly those associated with internet (online) or CDROM (Ministry of Education, 2004).

2.2 Definition of Learning Management System (LMS)

A LMS is a software application or Web-based technology used to plan, implement, and assess a specific learning process. Typically, a LMS provides an instructor with a way to create and deliver content, monitor student participation, and assess student performance. A LMS may also provide students with the ability to use interactive features such as threaded discussions, video conferencing, and discussion forums (Search CIO, 2005).

2.3 Factors for e-learning adoption

The adoption of e-learning technologies in educational institutions has been researched and studied exclusively by academics and by practitioners. This study selected various publications and research papers that have identified factors that would influence or inhibit the adoption e-learning systems in organisations. A wide range of source was used to cite the published research papers and articles on e-learning adoption which included: (a) The

communication of ACM Journal (b) ACM interactions (c) International e-learning journal (d) Educause Quarterly Journal (e) American Journal of Distance Education and (f) Australian flexible learning web site www.ncver.edu.au.

The literature identifies various factors which would inhibit the adoption of e-learning technologies including: (a) lack of tutor knowledge and skills required to design and develop online classes (b) lack of training and support required to plan online instructions (c) lack of flexibility in LMS to support different teaching needs (d) lack of staff time and incentives needed to motivate faculty to teach online (e) lack of reliable and secure information and communication technology (ICT) infrastructure and delivery mediums to deliver online classes (f) the need for flexible administration support systems (g) individual and faculty perception towards e-learning and (h) lack of organisation support, direction and strategy for e-learning development.

Analysis of the literature into e-learning reveals that while there are many publications and articles highlight a piecemeal of factors for e-learning adoption, however they lack any integrated framework for user adoption of e-learning systems. This study addresses this need and introduces an integrated framework presenting major factors for user acceptance of e-learning technologies in tertiary institutions.

This review presents the factors that impact on user acceptance of e-learning technologies. Firstly it presents factors regarding users. The system factors are discussed next and then there is a review of organisational factors. The chapter concludes with a brief analysis of common technology acceptance models and finally introduces an integrated framework for user acceptance of e-learning technologies.

2.3.1 Individual factors

Knowledge and skill requirements

Authors have identified various aspects of knowledge required to develop and deliver online courses including (a) understanding of emerging online pedagogy for course design; (b) understanding theories of learning when teaching online; (c) knowledge in information and communication technologies (d) knowledge in Learning Management Systems (LMS) and their associated tools and (e) skills required to work within multidisciplinary groups and project teams.

Inglis, Ling and Loosten (1999) assert that there is an emerging pedagogy for online learning. They say that online pedagogy promotes democratic learning styles and that institutions moving to a new paradigm of higher education offering "anytime-anyplace" education should be well aware of this new teaching pedagogy. Gulati (2004) asserts that formal education traditionally relied on the objectivist view of knowledge where it is assumed that knowledge can be imparted from the teacher to learner through instruction, lecture and practice. However, she states the new pedagogy for online learning advocates the use of online collaborations for constructivist learning. In the constructivist view, online learning encourages diverse learner needs and promotes democratic learning (Mason, 1998; Laurilled 1994). Mason (1998) says that constructivist thought could be encouraged through learner participation in structured online discussions, collaborative online activities, online assessment, interactive course material and interaction between tutors and students. He claims that tutors move from a 'sage on the stage' to a 'guide on the side' role. Students learn as they interact together with the tutor as a facilitator. He says that tutors need to learn how to do this, through training and opportunities to practise, develop and evaluate.

Graves (2001) points out that the changes underway are not about putting content online. They are about finding ways for instructors to create instructions focusing on learning and less about teaching.

Levine & Sun, (2003) believe that many academic staff do not understand the new pedagogical knowledge for distance education. They say when educators understand the new pedagogy they could effectively develop distance-teaching materials catering for various individual learning styles. Levine and Sun (2003) point out that faculty need to know more about interactive and individualized pedagogy, whether they become intimately involved in distance learning or simply continue to teach traditional courses. They say that knowledge of the new pedagogy will be essential if colleges expect success in distance learning. If traditional students participate in distance learning, it is likely they will expect the same quality of teaching in their on-campus courses.

The training guide "Guiding principals for staff and student support", prepared by Neil (2004) for the Institutes and Polytechnics in New Zealand (ITPNZ) that are participating in e-learning development describes several staff capability needs for institutions to progress e-learning. The guide points out that staff need to be confident users of technology within their institution. Staff need to build confidence in general skills such as word processing, producing slide presentations, using email and searching the web, before moving into e-learning specific skills. The guide also identifies the importance of staff training in the use of learning related technology such as the LMS and its associated tools.

Varsidas (2004) asserts that educators do not have all the technological skills needed to develop custom websites for online classes and that institutions moving to online education increasingly adopting LMSs. He describes the two main functionalities associated in LMS as course administration and management, and course pedagogy, teaching and learning. The course administration functionalities include: setting-up of structured course syllabus, announcements, discussion forums and quizzes etc. He describes that tools to design online course pedagogy are: tools to design the knowledge in multiple ways, allow authentic assessment tools and visualization tools etc.

Levine and Sun (2003) highlight the importance of knowledge in two aspects of LMSs: content authoring and course management. They explain that authoring is a process to develop the e-learning content, and in this aspect the knowledge covers pedagogical, psychological and didactic issues as well as technical questions. The course management aspect not only includes the functionalities of course or class deployment on the basis of existing teaching material but also all aspects of structuring and sequencing courses. He

states that during the course management process the interfaces to external information sources are addressed as well as the integration of practice, test and feedback modules.

Neil (2004) points out that quality online learning requires quality online material. To enable this, new skills are needed within the institutions to develop online resources. These are: creating hyper text markup language (HTML) material, HTML pages; multimedia development; and quality assurance of material for example, design, editing, usability, maintenance and consideration of interoperability. Neil (2004) stresses the importance of institutions recognising the need to consider how far to develop these skills in each tutorial staff member and when to use specialist learning designers.

The ITPNZ training guide further advocates that in terms of learning design, tutorial staff need to understand the new tools and what they do well, and what they do not do well, and whether this is relevant for their students and learning outcomes in their programs. This includes, understanding theories of learning; understanding students' needs; new ways of working with students that technology makes possible; the changing role of the teacher and the student in online learning communities; the importance of interaction between students and tutors, students and students and students and material; different forms of assessment; and evaluation of the online learning experience.

Development and delivery of online courses requires educators to work in multidisciplinary groups and project teams. Educators need to acquire interpersonal skills together with organisation, planning and project approaches to effectively plan and deliver online classes (Bates, 2000). Neil (2004) asserts that the development of online material beyond basic files and discussion forums means working in a team of at least a tutor and multimedia developer, and often a learning designer as well. This requires project management approaches, including prioritization and planning the use of shared resources across the institution.

Bates (2000) assert that the biggest problem with the project management approach is that it is often alien to academic environments, where teachers and instructors are used to working as autonomous individuals, especially with regard to their teaching. He says that educators see the project management approach as a bureaucratic, expensive and

unnecessarily complicated process and a process that restricts the freedom and autonomy of the teacher.

Effectiveness in online distance learning requires the instructor to not only have knowledge in content area, but also good interpersonal skills to effectively communicate with their student online (White & Weight, 2000). Instructors will be assuming a broader role as planners, designers, guides, mentors and facilitators and will no longer be seen as leaders and lecturers (Gillespie, 1998; Young, 2002).

Individual perceptions

Oblinger, Barone and Hawkins (2001) note that faculty express many apprehensions about online education. They highlight that less human interaction within distributed education is sometimes cited as a concern, particularly when faculty perceive that online dialogue will replace face to face interaction. They say some faculty members fear that they themselves might be replaced with the introduction of online teaching. The authors note that there is also a suspicion that distributed learning will be mandated, rather than put forward as an option for faculty and students. If faculty concerns are not addressed, it will not only stall the distributed education initiatives but also can be career threatening to the administrator who promotes them (Oblinger, Barone & Hawkins, 2001).

In some cases, particularly with state supported institutions, there are political barriers to distributed learning (Oblinger, Barone & Hawkins, 2001). They note that as new funds for e-learning programs are often accompanied by demands for accountability, institutions need to identify relevant measures for success and reasonable timeframes for producing results. They note that the difficulty of managing campus expectations for distributed learning may be magnified many times when dealing with a board of trustees or with state legislators.

Oblinger, Barone and Hawkins (2001) state that one of the fundamental challenges with distributed learning may be a matter of values. They claim that today's higher education leaders have particular definition, and experiences from the 1950s, '60s, and '70s. They are now dealing with the first generation of students who have never known life without PCs (created in the '70s) or the internet (largely a '90s phenomenon). They claim that in some

instances the higher education leaders are unaware of the potential value of technologies in supporting the needs of this new generation of students.

2.3.2 System factors

Limitations in LMSs

While LMS adoption and use has increased over the years in teaching institutions, there are many criticisms on its pedagogical aspects towards online teaching. Vrasidas (2004) argued that commercial LMS do not allow the use of constructivist learning strategies and that most LMS replicate the sterile traditional face-to-face instruction. Berge (1997) notes that most faculty who teach online prefer to use technical options that are consistent with traditional face-to-face modes of teaching.

The major factor for not employing constructivist learning principles in online education is the lack of LMS tools needed to engage in constructivist learning (Vrasidas, 2004). He claims that the most important barriers to constructivist learning are inherent in the LMS design and include lack of: (a) tools and affordances to allow learners to represent the knowledge in multiple ways (b) tools to support authentic assessment (c) distributed tools for meaningful learning – audio, video, multimedia production tools, laboratory experimental tools (d) visualisations tools for learners to express and construct meaning and (e) communication tools for learners and teachers to seamlessly interact.

ICT infrastructure

Although most institutions have at least some elements of the technology infrastructure needed to support distributed learning, developing online courses will be likely to require additional equipment and specialised software for example, additional servers and a course management system (Hitt & Hartman, 2002). Hitt and Hartman (2002) stress the importance of maintaining sufficient network bandwidth and modem pools or internet service provider connections for student access. They say that all technology infrastructure should be well managed and maintained to achieve a high degree of performance and reliability.

Hitt and Hartman (2002) also stress the importance of implementing sound operating procedures to address the requirements of distributed learning. They say that although much of the required infrastructure may already be in place, distributed learning imposes unique demands that institutional leaders must understand, especially regarding the system performance, scalability and reliability. They say that the infrastructure should support all online students at peak demand, it should accommodate the load without degrading the performance and that online course servers should be accessible at all times when students need to access their courses.

From a leadership perspective, infrastructure is primarily a budgetary decision. Leaders must know that distributed learning comes with its own technical resource requirements, and failure to provide a high-quality, reliable infrastructure is akin to barring the classroom door (Hitt and Hartman, 2002).

McLaughlin (2002) suggests that online instructors should be facilitated with associated equipment and IT services should embrace the distributed technologies. He suggests that staff should be provided with internet connections from home as well as access to appropriate compatible computer hardware/software so that they can benefit from the 'convenience' of the online course as well.

Helpdesk facilities

Distributed learning often forces institutions to create a broad array of electronic student services, 24-7 help desks, and special support materials for online students (Hitt & Hartman, 2002; Bates 2000). The authors stress that support services for online students are a critical success factor for distributed learning programs and that institutions must first recognise the need, then plan accordingly and invest resources in providing such services online. Hitt and Hartman (2002) say that providing a full range online student support services could be a complex task as it involves many departments and service units across the organisation.

Access to flexible administration services

Britain, Liber, Perry and Rees (2002) point out there is a common belief that internet aware software applications can provide 'Virtual Learning Environments" (VLE's) that extend the capabilities of traditional physical campus environments. However, they stress that unless VLE's are firmly integrated with a variety of institutional administrative systems, they are not effective for distance students. They assert that unlike any other technology development in the campus, e-learning development should involve the whole system: academic, administration, service and support.

Graves (2001) notes that students today expect much more than online access to course material or even courses. He asserts that students expect online access to both academic and administrative services. He maintains that today's challenge is to integrate academic and administrative services on the web, presenting a single and personalized point of contact for student, instructors and other stakeholders.

Hitt and Hartman (2002) say that online learners who are seldom or never physically present on campus need the same access to networked library resources and services as on-campus students. They say that an extensive array of electronic library resources, especially full-text resources coupled with electronic library services are required to meet the needs of distance learners and for the faculty to enhance information access. They say that while institutions are obligated to provide online access to resources required for course participation they also should provide electronic access to services such as registration, advising, financial aid, and the bookstore. Further, they point out that students would need distance assistance in course specific support, guidance in navigating the course management system, proper configuration of their computer to access the campus network, or resolution of ISP issues.

2.3.3 Organisational factors

Staff training and support

Developing online material requires multidisciplinary skills and faculties will need the assistance of instructional technology and information and communication technology training and support (Bates, 2000 & Graves, 2001). The studies highlight that lack of training and support available for faculties to plan, design and deliver online courses is a major barrier in adopting e-learning systems. A national survey on faculty attitudes towards distance education revealed that the more faculty knew about technology, the more highly they rated it for use in their teaching (Clarke, 1993; 1999; Dillon and Walsh, 1992).

McNeil (1990) found that even faculty who are most personally motivated to teach distance education will refrain from participating if they do not receive adequate technology support and training.

Rodriguez (2001) says that integrating technology into curricula is a time consuming and complex process that requires innovative approaches to pedagogical practice. McKnight (2004) points out that despite the fact that distance learning has gained momentum in higher education, limited guidance is available to faculty and collaborators who use the web to enhance or deliver courses. He points out developing an online course involves multiple elements, including design, content presentation, interaction, graphic design, coding, and testing.

McKnight, (2004) says individual faculty may exhibit little or no ability in these areas, and in any event they are likely to be too busy to devote time to learning or applying these skills. He says that faculty will need the assistance of instructional technology and IT practitioners to achieve quality and consistency in their online courses. He further stresses that an institution will need to assemble a team of instructional designers, digital media specialists, programmers, and software engineers to provide faculty members with a level of support.

McLaughlin, (2002) argues online technical issues are not the responsibility of the instructor. He points out that it is the instructor's responsibility to deliver content and

learning, and he or she is not in the business of delivering technology. A full time technical support person should be considered for providing online, face to face and telephone support for students and faculty. He further describes that the technical support person should also be the co-designer of online courses since consistency of appearance is important, as is consistency of personnel. The responsibilities for this position will be primarily to take the work of the instructor and translate it into an online course. As more and more courses use OLE's (online learning enhancements) the demands for technical design support will increase.

Lack of time, incentives and rewards

Another major barrier in adopting e-learning systems is the lack of time to plan, design and teach online by educators. Levine and Sun (2003) assert that although distance learning entails a host of teaching and learning practices that may be convenient for students, these are far more labour intensive than traditional college practices. Creating courses, maintaining chat rooms, and responding to e-mails from students around the clock requires far more time and energy from faculty than traditional face to face courses. He says distance learning comes with a new language and different expectations, including "anytime, anyplace learning," "24/7 advising," and "round-the-clock availability of instructors." They point out this new level of service raises potential barriers in terms of staffing, course loads, advising expectations, faculty support, teaching assistant roles, and so forth.

A survey undertaken by Moskal and Dziuban (2001) on faculty who taught online web-enhanced or web-based courses, reported that eightyfive percent of participants noted that teaching online requires additional investments of time. The survey conducted by Care (2002) on planning and managing the development of courses for distance delivery noted that all faculty participants agreed that designing distance courses was time consuming and impacted upon their ability to fulfill other scholarly responsibilities. As one faculty respondent stated, "My workload wasn't adjusted. It's more work than designing an in-class course" (Care, 2002).

In his study Care (2002) reported that faculty staff lacks time for designed distance courses and they have to carry out designing tasks during their regular teaching assignments. He noted that this affected faculty receptiveness to take on course conversion to distance

delivery and that this activity was not fully recognised as a priority for promotion and tenure purposes. He recommended providing faculty with release time from their regular teaching assignment if designing distance courses so that faculty time for research and publication would be protected.

In response to faculty comments about the amount of time required, a method must be identified to factor development of courses for distance delivery into workload assignments (Care 2002). Care (2002) says a reasonable approach for calculating workload would be to assign distance course development a factor worth three credits hours of classroom teaching (3 hours per week) for theory course development and six credit hours (6 hours per week) when developing a practical course.

Distance delivery is a time-consuming task and, as such, needs to be valued within the university system (Reinert & Fryback, 1997). Reinert and Fryback (1997) say faculty, especially those who want to advance through the university ranks, will be reluctant or will not participate in distance delivery because of the lack of rewards for this activity within the university system. In their study, faculty reported having little or no time for research or publications when they were involved in developing courses for distance delivery. Therefore, recognition of developing or teaching in distance delivery courses as creative work, must be included in the criteria for tenure and promotion. Reinert and Fryback, (1997) stress that the administration must ensure that processes are in place to have this issue sufficiently addressed by tenure and promotion committees.

Faculty culture

O'Quinn and Corry (2004) asserts that aside from intrinsic rewards, faculty attitudes are also influenced to a certain extent by extrinsic factors. Gilcher and Johnstone, (1989) discovered that faculty who were most satisfied with their distance education roles received support from faculty within their academic department who they deemed to be important. Stinehart (1988) found that faculty attitudes are also influenced by (a) awareness of distance education teaching (b) their perceptions of how technology should be used in teaching (c) experience they or their colleagues have had with technology and pedagogy (d) the quality of materials they have had the opportunity to use in their distance teaching (e) the support they have received from their institution for their efforts in

teaching, and developing courses, and (f) the logistics of course delivery and the control they have had over the distance education courses they have taught.

Institutional support

Faculty who are willing to work collaboratively with their colleagues to design and deliver distance education courses need to receive support from their institutions in terms of faculty training, mentoring with colleagues, administrative, clerical, and technical assistance (Dillon & Walsh, 1992). The success of faculty who choose to embrace distance education is largely dependent upon the degree of support that institutions are willing to give them (Beaudoin, 1990). Astin (1985) noted "... true excellence lies in the institution's ability to ... affect faculty favorably, to enhance their intellectual and scholarly development, and to make a positive difference in their lives ... the talent development conception of excellence focuses on changes ... [that] occur along such dimensions as teaching ability, mentoring ability, scholarly ability and productivity."

Betts (1998) addressed the issue of support in her survey of faculty and deans at George Washington University. Faculty responses to questions addressing suggestions for faculty development programs included (a) a need for more financial, administrative, and technical support in distance education course development; (b) workshops that enable them to develop specific skills for facilitating distance education courses, and using and selecting appropriate technology for specific lessons, and (c) release time to attend distance education training workshops. Dillon's (1990) findings of faculty's common needs of support reinforced Betts' (1998) findings that faculty sought assistance in (a) preparing course materials (b) clerical support (c) coordination in communicating with students at off-campus sites (d) assistance in marketing their distance education programmes, and (e) assistance in distributing materials to students enrolled in their distance education courses.

Care (2002) asserts that success in teaching and learning requires re-thinking how to best present the learner content contributing to student success. A high quality online course is much more than a web page with a syllabus and lecture notes he notes that prior experience from many institutions suggests that faculty can best make this transformation when institutions provide them with well designed faculty development opportunities.

Institutional leadership

One of the barriers for successful adoption of e-learning technologies in educational organisations is the lack of institutional leadership promoting e-development across the organisation. Versidas (2004) stress the importance of top-down leadership along with bottom-up enthusiasm and innovation for institutions perusing e-learning development. He says e-learning is really an academic opportunity and institutional leaders cannot simply defer to the IT person or person who is running the centre for teaching and learning. E-learning has to be viewed and supported as the fabric of a strategy advancing the institution's future and it has to cut across all academic and administrative offices across the campus and be viewed as a common good.

Oblinger, Barone and Hawkins, (2001) note that distributed learning brings multiple leadership challenges for institutional leaders. These range from traditional academic issues to change management to financing information technology. They say one of the first challenges faced by the institutions leader is to find the time to understand distributed learning in sufficient detail to lead their institutions. They say that leaders need not be experts on the subject, however it is important for them to have enough background knowledge—and time for reflection—to be comfortable with the subject and associated issues. They say that the distributed environment and technology options associated are rife with hype and hyperbole and point out that leaders lack avenues for the right advice as well as sufficient time to devote to learn about the emerging technologies.

Hitt and Hartman (2002) say that institutional leaders must decide whether investments in technology will be strategic or tactical. They point out that as there is a significant technological investment, distributed learning initiatives should be truly strategic. They stress that investments in IT of this magnitude need the support across the organisation and that all stakeholders should engage in the planning process. They point out that the planning process needs to be viewed in the strategic context and it needs to be embedded in the fabric of the institution's strategy.

Hitt and Hartmans (2002) say that the strategic planning process should be integrated with the resource-allocation process ensuring that they actually allocate the needed resources, otherwise, the plan may end up having little to do with the institution's future. Hitt and

Hartman (2002) point out that while it is important to integrate the distributed learning direction in the strategic plan, leaders must communicate the potential power that technology can exert if the organisation is expected to use it in an effective and integral way.

Hitt and Hartman (2002) say that it is crucial that the president, as well as members of the executive team, understand and own the institutions ICT issues, rather than assume that these are exclusively under the purview of the chief information officer (CIO) or technology officer. The president needs to be personally aware of the costs of ICT, the risks and opportunities. Moreover, the president must create the expectation that other executive leaders—such as the chief academic officer, chief business officer, and deans—share the responsibility of understanding technology's role in the life of the institution, own ICT issues, and partner with the CIO in making ICT decisions.

To gain success in distributed learning, it is critical to build the right leadership team within the institute (Hitt & Hartman, 2002). As stated previously, they say that the president needs to find task oriented, team oriented, competent people and then trust them to do the job. They say that while the traditional governance within the academy has been made up of the executive leadership and the faculty leadership, with the uptake of distributed technologies the new governance structure should incorporate the IT leadership into the executive team. Having the IT leadership within the executive team should play a major role in facilitating institutional transformation adopting new technologies. Hitt and Hartman (2002) say that institutional leaders must work appropriately with the campus IT leader, ensuring his or her active membership on the executive team.

Oblinger, Barone and Hawkins (2001) assert that leaders must take responsibility for designing a process that will allow all individuals in the institution to feel that they have a role in crafting the institution's solution to distributed learning. They assert that cultural change is one of the most significant challenges that institutional leaders will face. For faculty who are most comfortable with autonomy and often averse to risk it is quite a challenging task for leaders to make the cultural transformation and for teams to become entrepreneurial and nimble to embrace the new opportunities.

Oblinger, Barone and Hawkins (2001) assert that it is important that institutional leaders raise troublesome issues to the national level as well. They say some of the challenges

associated with distance education for example, financial aid, accreditation, and articulation, may require regional or national action. They believe that distributed education can move forward when the challenges are addressed collectively by the leaders.

Institutional policies and funding

Hitt and Hartman (2002) assert that academic administrators, including deans, need to reach consensus on the institution's goals, instructional models, faculty engagement strategies, and above all, intended audiences and programs. They assert that there are many issues surrounding faculty roles, rewards, and workload and there needs to be clear processes, policies and guidelines in place for those who become involved in distributed learning. They assert that decisions needs to be taken on how distributed learning achievements are rewarded and how they should be incorporated in the faculty tenure and promotion process.

Release time for faculty to develop distance delivery courses has resource implications. "Funding is an issue for distance learning programs " (Reinert & Fryback, 1997). As previously stated in their study they found that three of the seven programs they investigated had to find financial support for the programme out of their baseline budgets. However, they concluded that faculty must receive financial support if distance education offerings are to succeed in the long term.

Organisation direction and strategy

Hitt and Hartman (2002) say that senior administrators in universities and colleges must invest in a strategic plan for distance education. Management must provide leadership in developing this plan for the institution as a whole. They say unit administrators such as Deans, Directors, and Department Heads, can then adopt the strategic directions that best suit their needs. According to Bates (2000), this "plan should be concrete, with a detailed vision statement, goals identified for action over the next three to five years, action steps or implementation strategies, and measurable or easily recognisable "deliverables" or outcomes, all needs to be clearly specified".

Bates (2000) highlights that the strategic plan needs to build on the unit's strengths and minimize its limitations. He says that once the plan is established it needs to be shared

widely with faculty and staff. He asserts that dissemination and participation contributes to acceptance and adherence to the future directions of the unit.

Hitt and Hartman (2002) say that although there has been much talk on the use of IT in higher education for decades, it is only now that technology is enabling or causing substantive, pervasive changes to the institutions. They highlighted the significance in connecting the institution's strategic plans with IT initiatives, resources, and management.

Hitt and Hartman (2002) claim a new organisational model emerging within many institutions that are pursuing large-scale distributed learning initiatives. They say the new model combines the traditional IT units with an instructional technology perspective, to facilitate the development of distributed learning technologies across campuses. Hitt and Hartman say that the main characteristics of this new distributed learning support unit are the central prominence of instructional designers, the use of support teams for faculty and course development, and the use of instructional systems design methodologies. They further emphasise the role of the institutional leadership for developing such specialized units to respond to all faculties and staff involved in e-learning development.

Summary

The literature review points out that there are multiple factors associated in staff adoption of an e-learning system including: (a) skills, knowledge and support required to design and develop online content (b) access to sound information and communication technology infrastructure and services to deliver online content (c) availability of other flexible student support systems and services (d) individual perception (e) influence in faculty culture; (f) incentives and reward schemes to increase uptake and (g) the organisation leadership, direction and strategy towards e-learning development.

2.4 Framework for user acceptance of e-learning technologies

The literature into the user acceptance of information systems identifies various technology acceptance models and frameworks for factors influencing user adoption. The four frequently cited models in the literature are: (1) Technology Acceptance Model (TAM) (Davis, 1993) (2) TAM2 (Venkatesh & Davis, 2000) (3) The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al, 2003) and (4) Diffusion of Innovation by Everett Rogers (1983).

Davis' TAM model 1993 proposes that perceived usefulness and perceived ease of use are fundamental factors influencing the user acceptance as they influence the user's attitude towards the system. He defined perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance" and perceived ease of use as "the degree to which a person believes that using a particular system would be free from effort" (Davis, 1989).

In 2000, Venkatesh and Davis extended the original TAM model to explain perceived usefulness and usage intentions in terms of social influence process and cognitive instrumental processes. The extended model is referred to as TAM2 (Venkatesh and Davis, 2000).

In TAM2 the social influence process highlights the impact of three inter-related social forces impinging on an individual facing the opportunity to adopt or reject a new system: (a) subjective norm, defined as a "person's perception that most people who are important to him think he should or should not perform behavior in question" (b) voluntariness and (c) image factor for user acceptance.

In cognitive instrumental process, the TAM 2 highlights the individual's job relevance and output quality. Results demonstrability and perceived ease of use are other fundamental determiners of user acceptance.

In 2003, Vekatesh et al assessed the similarities and the differences of eight prominent technology user acceptance models. With the outcomes of this analysis, they formulated the Unified Theory of Acceptance and Use of Technology (UTAUT) based upon the conceptual and empirical similarities across models. The eight models reviewed are: theory of reasoned action, the technology acceptance model, the motivational model, the theory of

planned behaviour, a model combining the technology acceptance model and the theory of planned behavior, the model of personal computer utilisation, the innovation diffusion theory, and the social cognitive theory.

The UTAUT theory presented by Venkatesh et al (2003) states that four constructs play a significant role as direct determinants of user acceptance and usage behavior. They are: performance expectancy, effort expectancy, social influence, and facilitating conditions. The authors defined the performance expectancy as the degree to which an individual believes that using the system will help him or her to attain gains in job performance. The effort expectancy is defined as the degree of ease associated with the use of the system. The social influence is defined as the degree to which an individual perceives that important others believe he or she should use the new system. Facilitating conditions are defined as the degree to which an individual believes that an organisational and technical infrastructure exists to support use of the system (Venkatesh et al, 2003).

Diffusion of Innovation framework published by Everett Rogers (1983), states that an innovation was conceived of as an object with five perceived attributes: relative advantage, compatibility, complexity, trailability and observability. These attributes help one to explains its adoption.

The literature review of the factors relating to e-learning adoption suggests that all factors could be framed around three key factors: individual, system and organisational. Analysis of these factors suggests that each key factor could be further framed around sub factor groupings. The sub factors under the individual factor are individual characteristics and individual perception. The individual characteristics highlighted in the literature are the skills and knowledge needed to develop and deliver online courses. The aspects relating to the individual perception are: influence of colleagues, the system relationship to the quality of face to face teaching, the system relevancy to face to face teaching and the effects of school culture for e-learning technologies.

The sub factors under the system factor are LMS characteristics and external system characteristics. The LMS characteristics identified are: the availability of appropriate functionalities, flexibility and content design tools of the LMS, its usefulness and its user friendliness. The external system characteristics are: the availability and capacity of ICT

infrastructure, reliability of ICT infrastructure and availability of other administrative systems such as online enrolment, distance library services, distance student support services, online assessment and a secure medium to post student results to complement the delivery of online classes.

The sub factors for the organisational factor are organisational support and organisational characteristics. The organisational support factors are: training and support to design and deliver online content, staff time allowances, incentives and rewarding mechanisms, ICT training and helpdesk support. The organisational characteristics factors identified are; the need for faculty wide e-learning strategy, organisation culture towards e-learning, institutional leadership and institution wide strategy and funding priority for e-learning development.

The study assessed the established information technology user acceptance models to identify their suitability to adopt in the study. A conclusion of this analysis was that while the established models had elements that are relevant to e-learning user acceptance, none of the models consist of all factors - individual, system and organisational, that have been identified for e-learning system acceptance. This study therefore did not consider using the established IT user acceptance models; instead the study developed a new unified framework for e-learning user acceptance (Figure 2.1), incorporating the factors that are directly relevant for e-learning as well as the appropriate information systems user acceptance elements from published technology acceptance models such as TAM, TAM2 and UTAUT.

The factors from TAM, TAM2 and UTAUT models were included into all three factor groupings of the proposed e-learning framework. The social influence aspect from TAM2, individual perception, is included into the individual factor grouping of the framework. The user perception of system characteristics, ease of use and the usefulness of the system from TAM, are included in the system factor grouping. The facilitating conditions from UTAUT) organisational support factors such as staff training, time incentives and so on. are included in the organisational factor groupings. The overall framework for user acceptance in e-learning system is summarized in Figure 2.1.

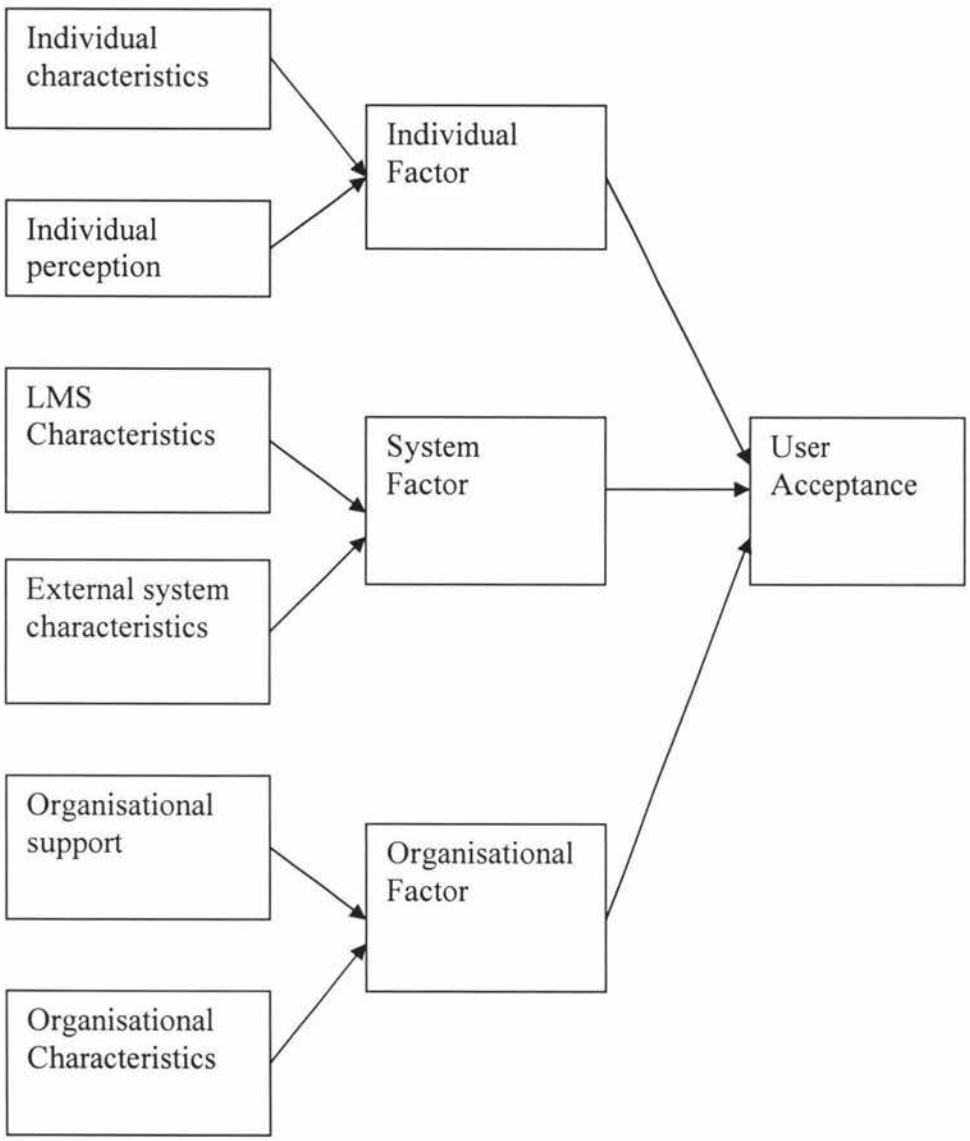


Figure 2.1: Framework for user acceptance of LMSs

Chapter Three

METHODOLOGY

The research into the factors that influence or inhibit the adoption of an e-learning system was carried out using a study sample comprising tertiary staff in New Zealand. A total of 95 teaching staff from eight tertiary institutions (two universities and six institutes of technology and polytechnics (ITP's) took part in the study giving their opinion on the factors for LMS system adoption.

In preparing for the study, different research approaches were considered and evaluated for their strengths and weaknesses. The research approaches considered were: structured interview, case study and the survey questionnaire.

On review of the structured interview method, it was determined that the questions in the interviews could be prepared in an orderly manner following a set pattern along with study themes. This ensures the consistency of questions and responses are maintained with an ease of use for comparison purposes. It was further found that the structured interview method is more beneficial to gain easy engagement with the interviewee and would reduce the potential risk of non response (Anderson, 1990). The methodology also provided an opportunity for the interviewer to clarify and probe answers from the respondents to obtain more complete information sets. The structured interview approach was, however, suited to administer a small research sample. This was one of the major draw backs for consideration of this method for this study. Since the study was to gather large volumes of data from a large research sample, the structured interview method was not appropriate and therefore was not used for this study.

The study also evaluated the potential to use the case study method to conduct this research. The advantage of the case study method is the fact that it could study the given situation in detail however with a narrow focus. The case study usually deals with contemporary events, it investigates one situation at a time and it studies issues which worked well within that situation. Due to this fact, the knowledge of this situation is not be

easily transferred to other situations. The factors affecting adoption of e-learning deals with a number of issues and therefore this study did not select the case study approach.

The evaluation of methods determined that the survey questionnaire method was best suited in this research situation to gather information on factors for LMS adoption. The evaluation of the strengths of the survey questionnaire approach was that it can be structured and administered to a large sample. The surveys would gather large volumes of data within a short time frame. The data gathered by the survey method was able to be statistically analysed and therefore the questionnaire is useful for quantitative data analysis (Anderson, 1990). However, a few drawbacks were also seen in the survey method. It was found that the development of the questionnaire had an important requirement that the questionnaire be clearly written to ensure it achieved the desired level of responses and did not confuse the intended respondents. Further, a weakness of the survey questionnaire was that low response rates were possible. Nevertheless, since this study was to gather a large volume of data from dispersed locations and within a short time, the conclusion of the evaluation was that the survey approach was the best suited to conduct this research study.

The research survey was conducted using an online questionnaire via the web medium. It was determined that the use of the web based questionnaire had several advantages over the paper based questionnaire in this study situation. It was established that the majority of tertiary staff are familiar with online survey questionnaires and that it could be forwarded to the majority of institutional staff via email. It was further found that communicating and administering high volumes of survey questionnaires within widely dispersed staff over the electronic medium was easier and more cost effective for this survey than the paper based method. However, while the online questionnaire was the preferred medium, the staff were also offered printed questionnaires if required. Having offered both mediums ensured the higher response rate from the staff participating in the survey.

Several drafts of the survey questionnaire were made during a period of three weeks from the suggestions made by the research supervisor. It was decided that the survey questions should be developed based on the factors identified in the theoretical framework introduced (see Figure 2.1) in Chapter two. It was further decided that, in order to validate the factors identified in the framework, the survey questions should be formed in a manner that would ascertain the degree of acceptance or rejection of each factor in the framework.

The final draft of the questionnaire (Appendix Three) that was agreed upon with the research supervisor contained a series of questions relating to two facets of e-learning: content development and content delivery. The questions followed the order of the e-learning framework with questions clustered into individual, system and organizational factor groupings.

Primarily the questionnaire was structured into three parts. The first part asked questions relating to demographic details such as, the name of the institution, staff job title, subject area, teaching experience, highest qualifications, age and gender. This section further included questions relating to computer literacy rate, current knowledge in e-learning, level of LMS training attended and the types of teaching methods adopted to deliver current course modules or papers. The second section investigated the factors for LMS adoption. The section was divided to sub sections, incorporating questions pertaining to different aspects of system adoption. The sub sections were: individual characteristics, individual perception, LMS characteristics, the external system characteristics, organizational support and organisational characteristics. All questions in these sub sections contained response categories anchored to a five point Likert scale to ascertain staff opinion on LMS adoption factors. Finally, in part three, all e-learning adoption factors that were investigated in part two were presented to identify the most critical factors for LMS adoption. In this section the respondents were asked to select the five most critical factors for system adoption and asked to rank them (one to five) in their order of significance.

In preparation of the survey a web site (see Appendix Four) was created assembling all useful information relevant for the study. The web site included the objectives of the research, intended outcomes, benefits for various e-learning stakeholders within institutions and provided a brief outline of how this study would stand out from other similar studies conducted in New Zealand. The site further provided the details of the survey including its commencement, the mediums used to conduct the survey, types of questions, time taken to complete the survey, the importance of receiving responses from staff with different e-learning adoption levels and how the staff would be contacted to participate on the survey.

In order to enhance the credibility of the research, it was decided to invite a wider group of teaching staff from many New Zealand universities and ITP's to take part in the study.

Prior to the commencement of the survey, the e-learning managers of five universities and fourteen ITP's in New Zealand were contacted to seek their interest in their institution taking part in the survey. The managers were provided with all information relevant to the study giving links to the study web site. Of the nineteen institutions contacted, eight institutions, (two universities and 6 ITP's), responded confirming their interest in participation in the survey. With discussions with these e-learning managers, it was agreed that they would forward the invitation to participate in the survey to their respective institutional teaching staff. It was further agreed that the participation in the survey by all teaching staff within faculties and schools would be encouraged so that respondents would include staff from different e-learning adopter groups: non adopters, partial adopters and full adopters. In particular it was highlighted that more participation from non adopter or partial adopter groups would be useful to ascertain their barriers for system adoption.

The survey participants were invited to participate in the survey through an email with a covering note (see Appendix One) giving links to the survey information sheet (see Appendix Two) and the online questionnaire. The information sheet provided respondents with details relevant to the research study, why the research was being conducted, types of questions asked and a time estimation to complete the survey. The information sheet further communicated to the respondents on expected research outcomes, how they could obtain the research report and provided them the assurance of preserving the confidentiality of their responses. At the bottom of the sheet, a statement from Masssey University Research and Ethics Committee regarding this study was presented for their information.

The staff invitations to participate in the survey were managed by the e-learning coordinators of the respective institutions. The managers chose their own method to solicit the staff involvement. As a result of obtaining the local support, the researcher did not know the exact nature or size of the sample. It should therefore be pointed out that the final sample collected may not represent the overall staff population of the institutions or the exact proportion of respondents from different e-learning adopter groups: non adopters, partial adopters and full adopters.

The survey within eight tertiary institutions was conducted during a period of three months from September 22nd to December 22nd 2005. All responses received were recorded in a database for data analysis.

Chapter Four

RESULTS

During the survey within institutions a total of ninety five staff completed the questionnaires. The results have been summarised and presented in table form and where appropriate illustrated as graphs below.

The presentation of the results follows the order of the questions structured in the survey questionnaire. The chapter begins with presenting the results of the demographic characteristics and the organisation setting of the survey respondents. The results of the staff opinions on LMS factors are presented next and the chapter concludes by presenting the results of the most significant factors for LMS adoption.

Statistics for each question are included with the response number and where appropriate its percentage. The question number is given in brackets e.g. [q1].

4.1 Demographic characteristics and organisation setting

The section begins with Table 1. presenting the total number of returns received from each institution. The summaries of total returns from all institutions are presented next in Table 2. and then the staff job positions and the subject areas taught are presented in Table 3. and Table 4. respectively.

Teaching experience and the highest qualification gained by the staff are presented in Figure 1. Then in Figure 2. the age and the gender distribution of the survey sample is presented. The study examined the staff literacy levels and the e-learning knowledge by age, gender and then by the types of institutions. The results of the analysis are presented in Figures 3. 4. and 5. respectively. The study further examined the response patterns between staff qualification levels, their subject areas and their teaching experience by their

e-learning knowledge. The outcome of this analysis is presented in Figures 6.7. and 8. Figure 9. shows staff attendance in LMS training and then Table 5. presents the level of LMS training programme they have attended. The section concludes by presenting the papers taught by teaching methods (Figure 10) and then finally, in Table 6., presents the number of papers that could be supported by a LMS from all non LMS supported papers at present.

[q1] Your institution?

Returns to the survey were received from the teaching staff from six ITP's and two universities.

Table 1. Distribution of sample by institutions

Institution	**Number of Returns**
ITP 1	1
ITP 2	4
ITP 3	4
ITP 4	11
ITP 5	19
ITP 6	20
University 1	17
University 2	19
Total	95

Table 2. Distribution of total returns between ITPs and universities

	Number of returns	**Return %**
ITPs	59	62
Universities	36	38

[q2] Your job title?

Table 3. Distribution of job roles

Job Title	N	%
Tutor/Lecturer	39	41.1
Senior Lecturer	24	25.3
Programme Coordinator	14	14.7
Group Leader	6	6.3
Head of School	6	6.3
Professor	3	3.2
Assistant Lecturer	3	3.2
Total	95	100

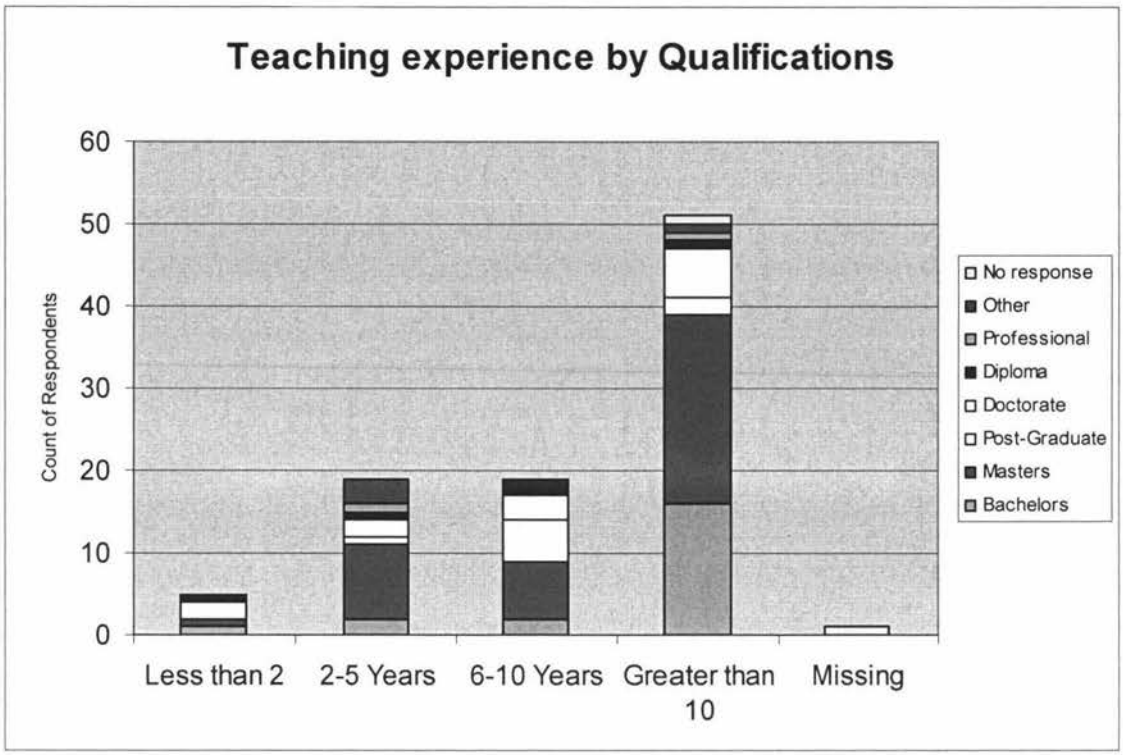
[q3] What is your subject area?

Table 4. Distribution of sample by the subject area

Subject Area	N	%
Business	19	20.0
Education	14	14.7
Information Technology	12	12.6
Arts/communications	9	9.5
Information Management/Systems	8	8.4
Technology	8	8.4
Science	8	8.4
Health	5	5.3
Social Science	4	4.2
Other	4	4.2
Maths	2	2.1
No response	2	2.1
Total	95	100

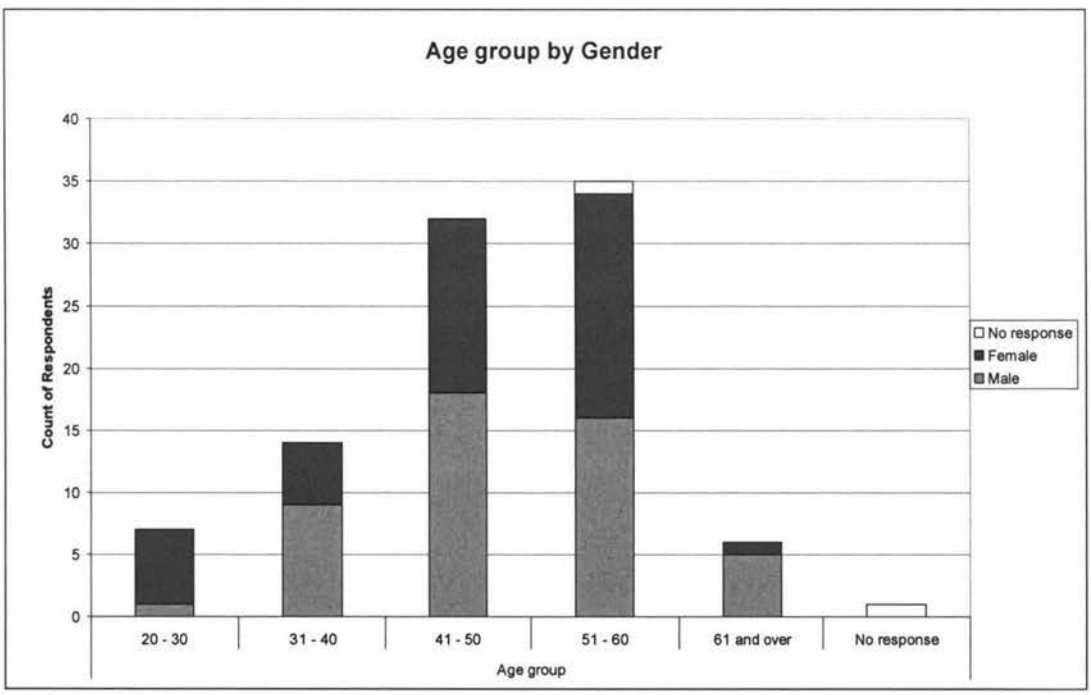
[q4] Years of teaching experience? and [q5] your highest tertiary qualifications?

Figure 1. Teaching experience and qualifications



[q6] Your age group? and [q7] your gender?

Figure 2. Age group and gender



[q8] Your current computer literacy rate? and [q9] e-learning knowledge? by age

Figure3. Current computer literacy and e-learning knowledge

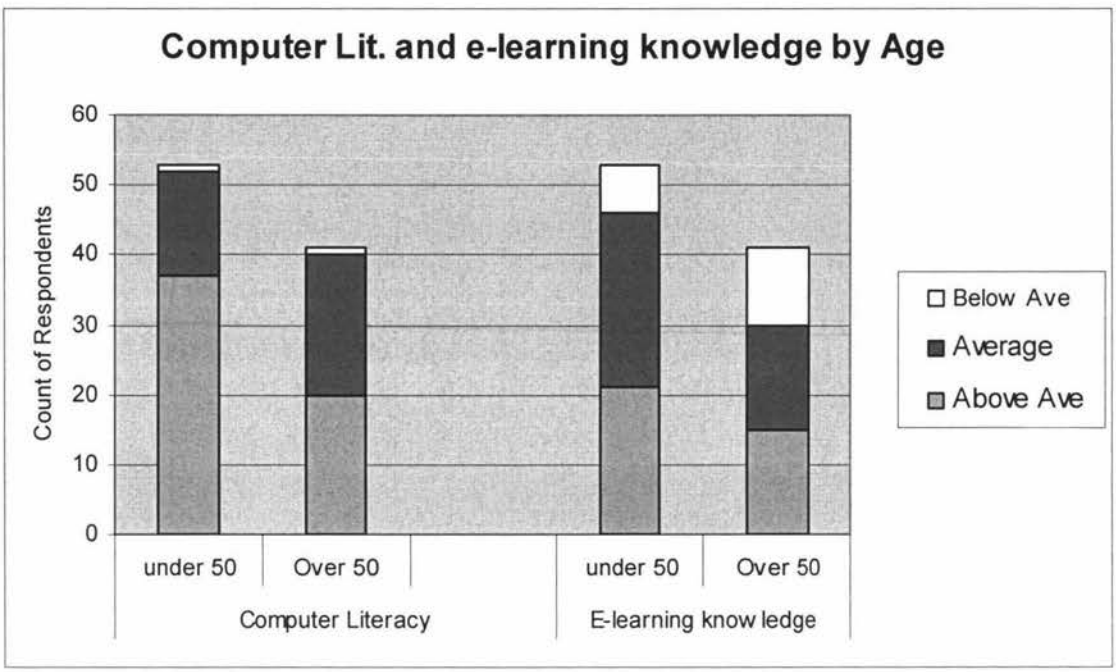


Figure 4. Current computer literacy and e-learning knowledge by gender

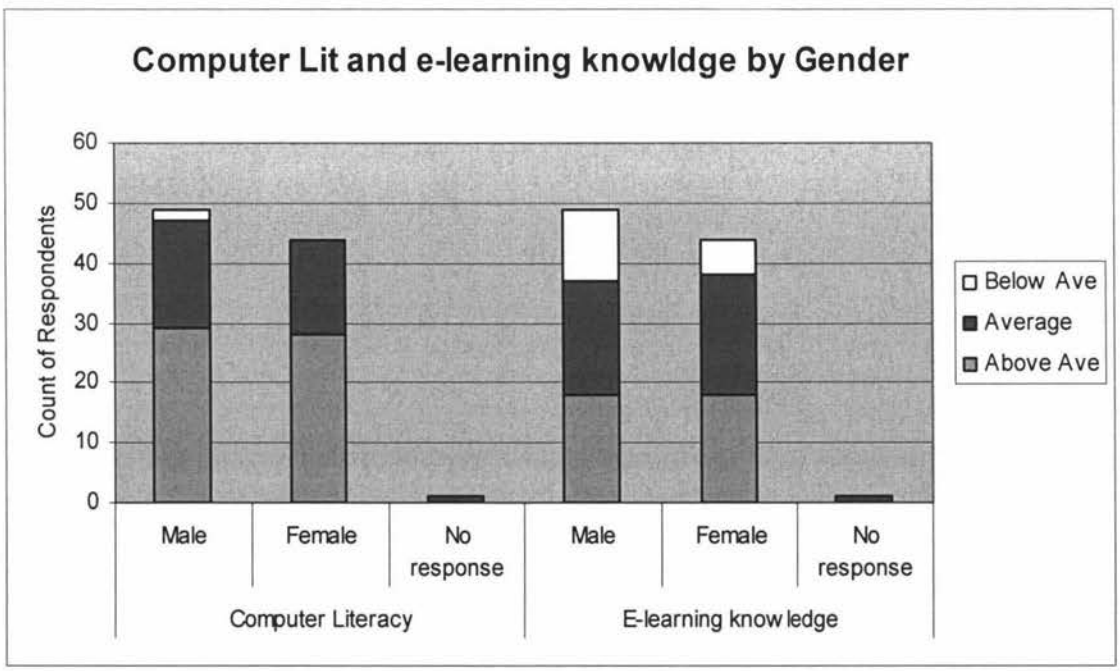


Figure 5. Current computer literacy and e-learning knowledge by institution

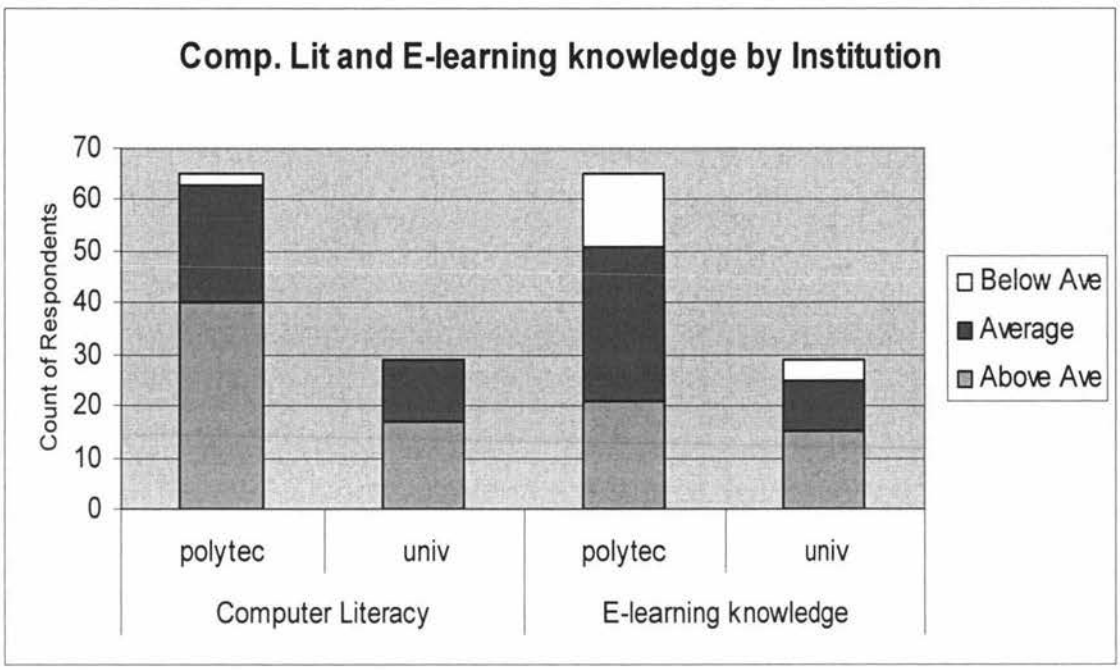


Figure 6. Highest qualifications by e-learning knowledge

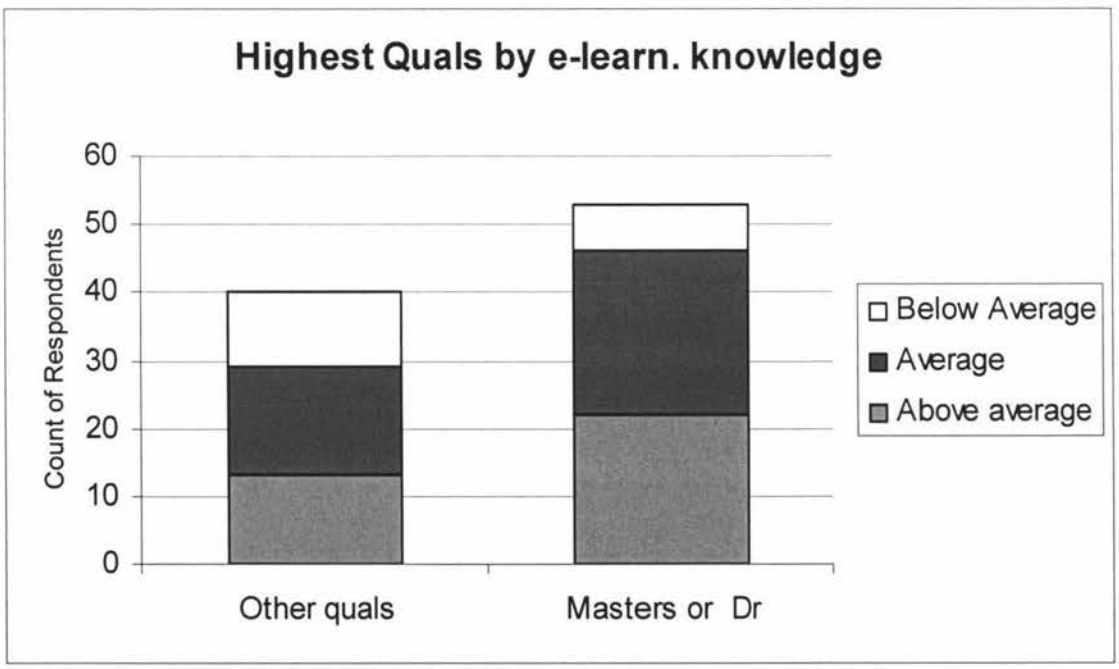


Figure 7. Subject area by e-learning knowledge

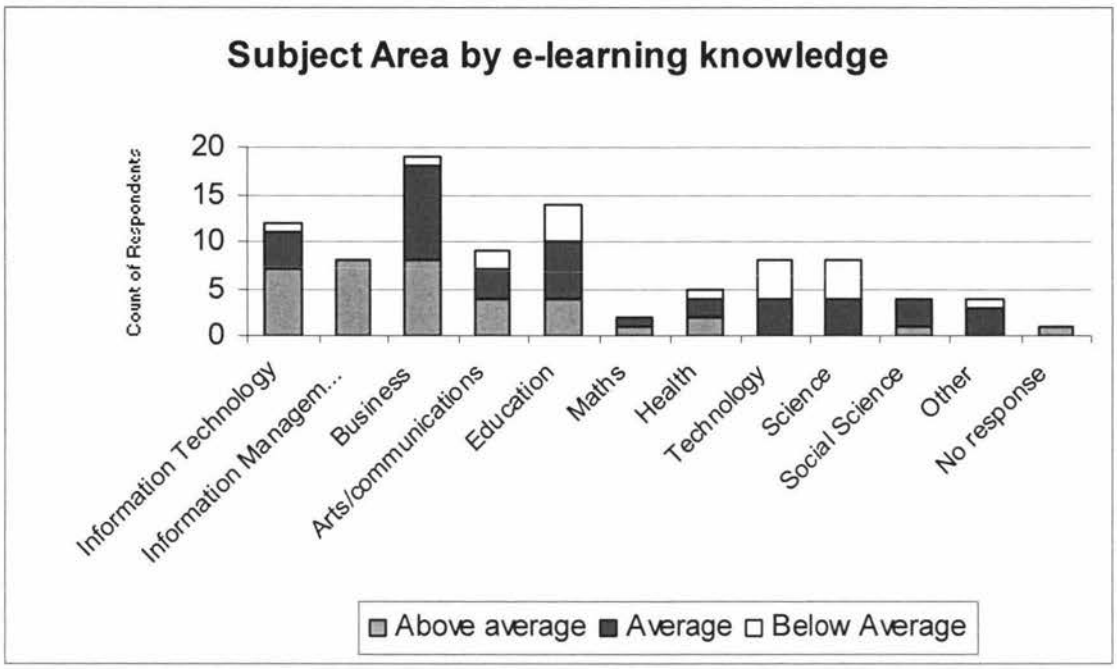
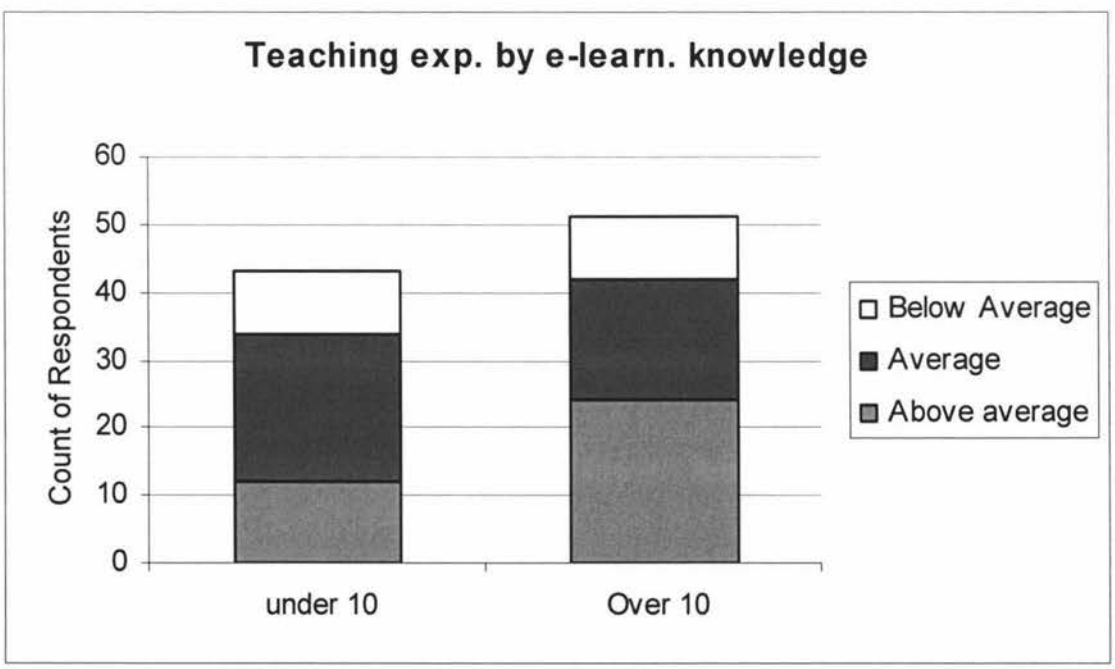
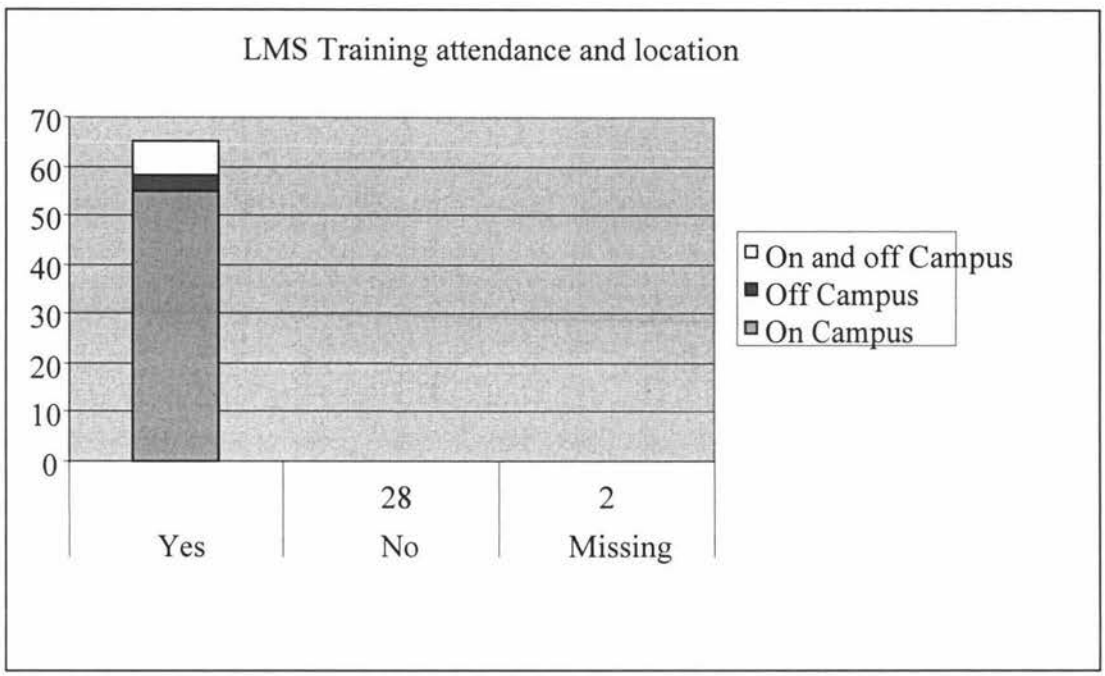


Figure 8. Teaching experience by e-learning knowledge



[q10] Have you attended any LMS training programs? and [q11] Where did you attend?

Figure 9. LMS training attendance and its location



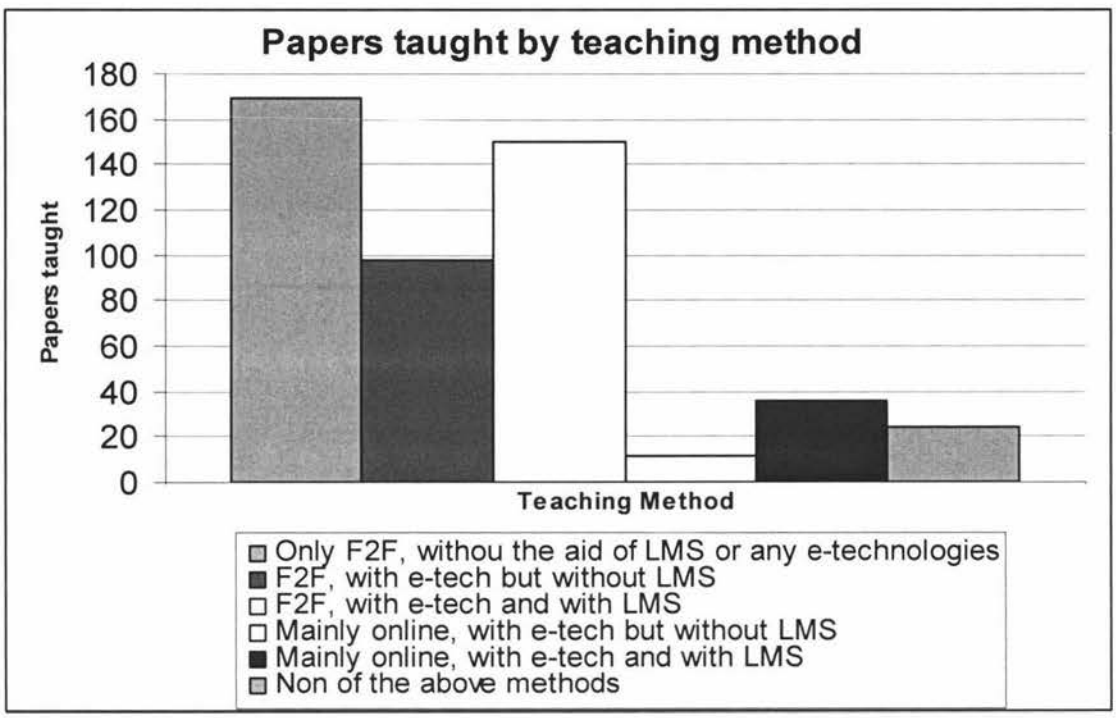
Q[12] What is the level of the most recent LMS training you attended?

Table 5. Level of LMS Training attended

Level of LMS Training	**Total**	**%**
Basic	30	46%
Intermediate	30	46%
Advanced	5	8%

[q13] Total number of papers taught and [q14] their teaching method?

Figure 10. Papers taught by teaching method



[q15] Do you consider that any of your current non LMS supported papers could be supported by a LMS? If Yes, How many papers?

Table 6

Total number of Papers	192

The Table 6 presents that, of all non LMS supported papers taught at present, 192 papers could be supported with a LMS.

4.2 Factors influencing LMS user adoption

The presentation of the analysis of the factors which influence the adoption of LMS (Figure 11 to Figure 32) is structured as per the theoretical model of user acceptance (Figure 2.1) in Chapter Two. The section begins with presenting the results of individual factors. The results of the system factors are presented next and at the end it presents the results of the organisational factors.

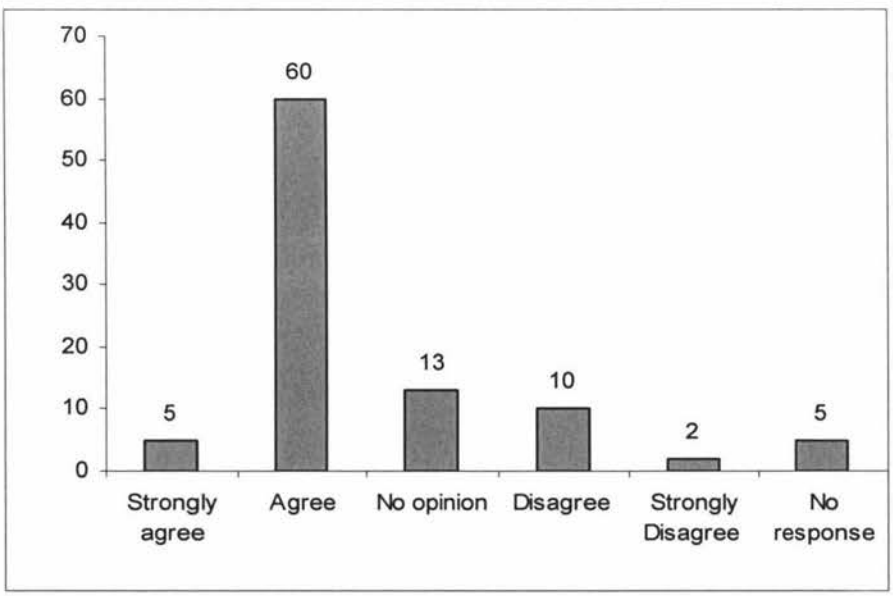
The analysis of staff opinions on each factor (q16-q41) is presented using graphs, where the X axis represents the scale of opinion and the Y axis represents the count of respondents for each scale. In addition a statistical analysis (chi-squared and t-test) was carried out to ascertain the statistical significance of results. See Appendix Five for tables providing means, Standard deviation, t-test scores for the factors analysed.

4.2.1 Individual factors

Individual characteristics

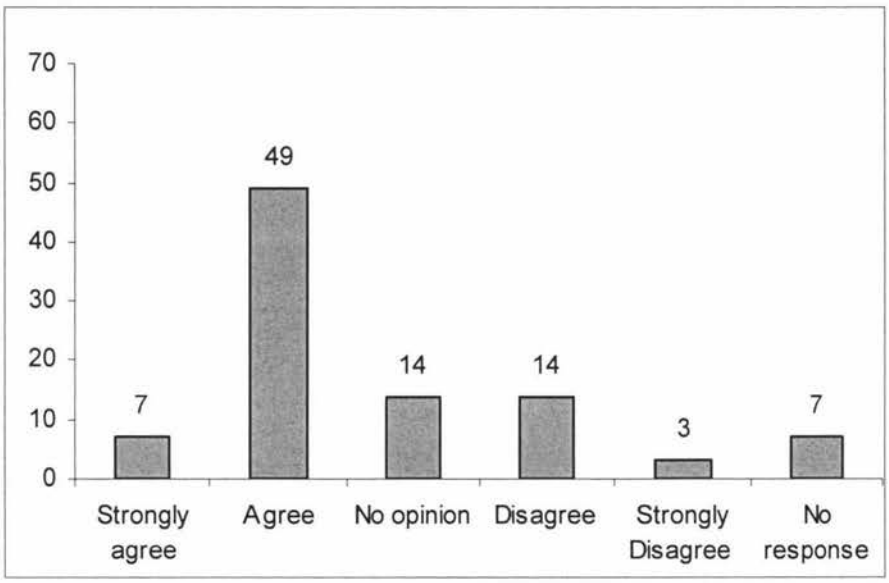
[q16] I would be more likely to adopt a LMS if my content design and development knowledge is high

Figure 11.



[q17] I would be more likely to adopt a LMS if my content delivery knowledge is high

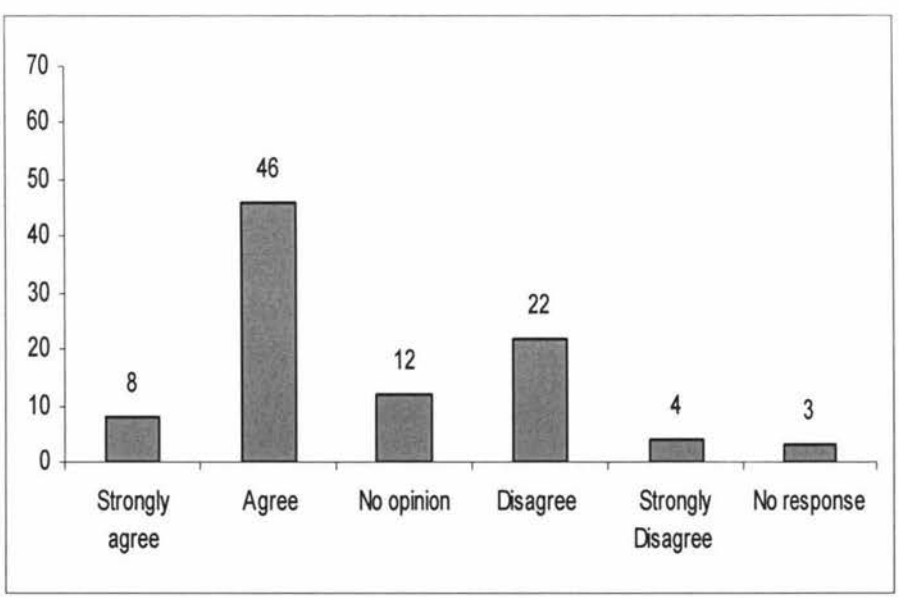
Figure 12.



Individual perception

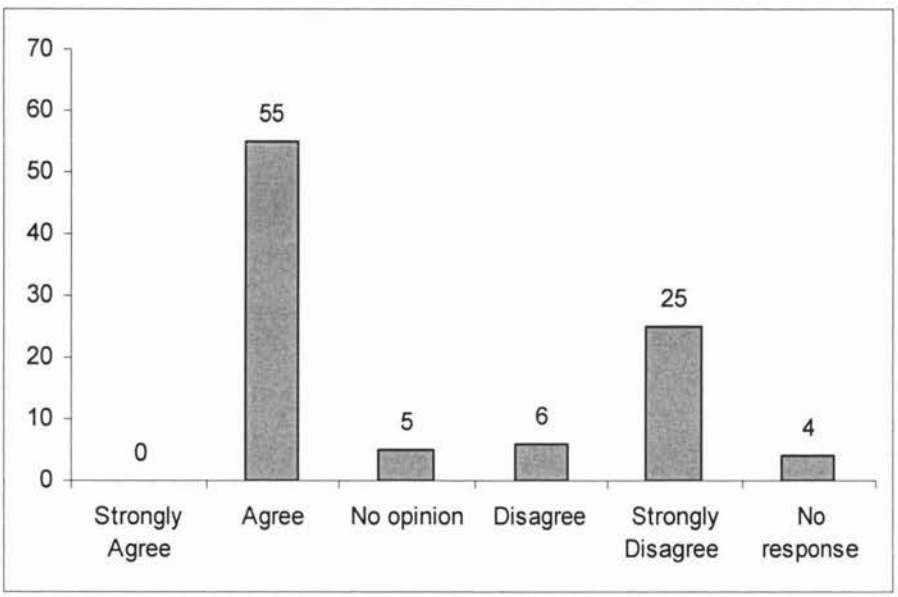
[q18] My decision to adopt or reject a LMS could be influenced by my colleagues

Figure 13.



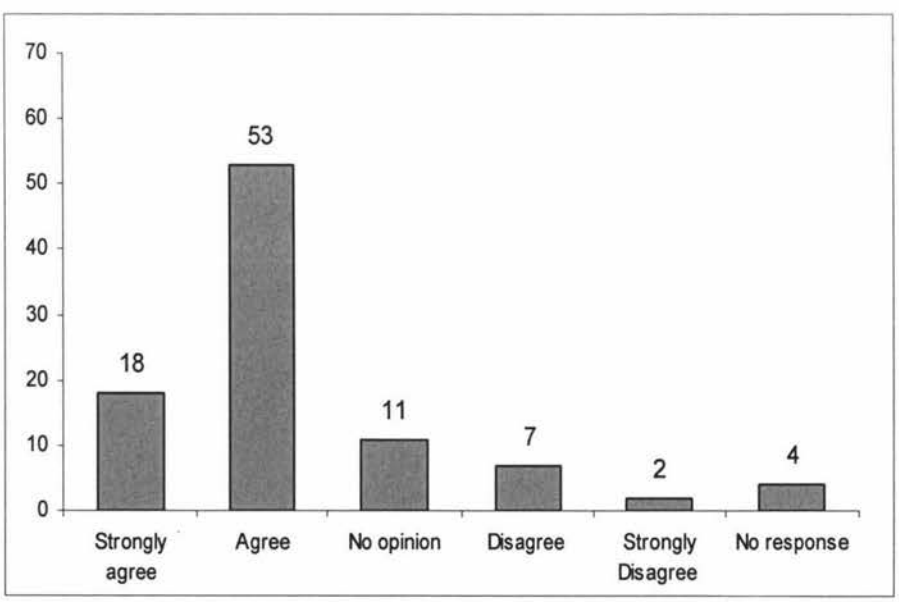
[q19] I would be more likely to adopt LMS if I perceive it will improve the quality of my face to face teaching

Figure 14.



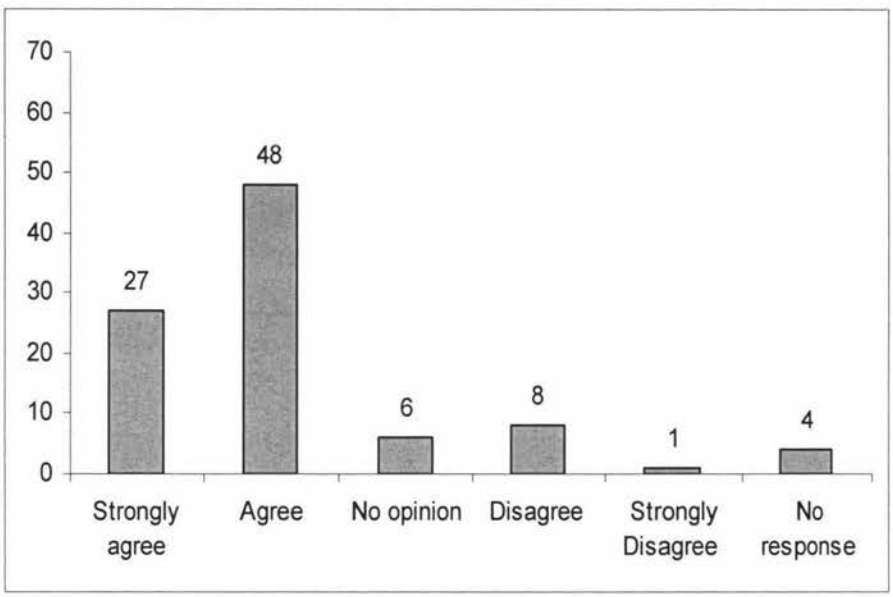
[q20] I would be more likely to adopt LMS if it is relevant to my face to face teaching

Figure 15.



[q21] I would be more likely to adopt LMS if my faculty or school culture is positive towards e-learning

Figure 16.

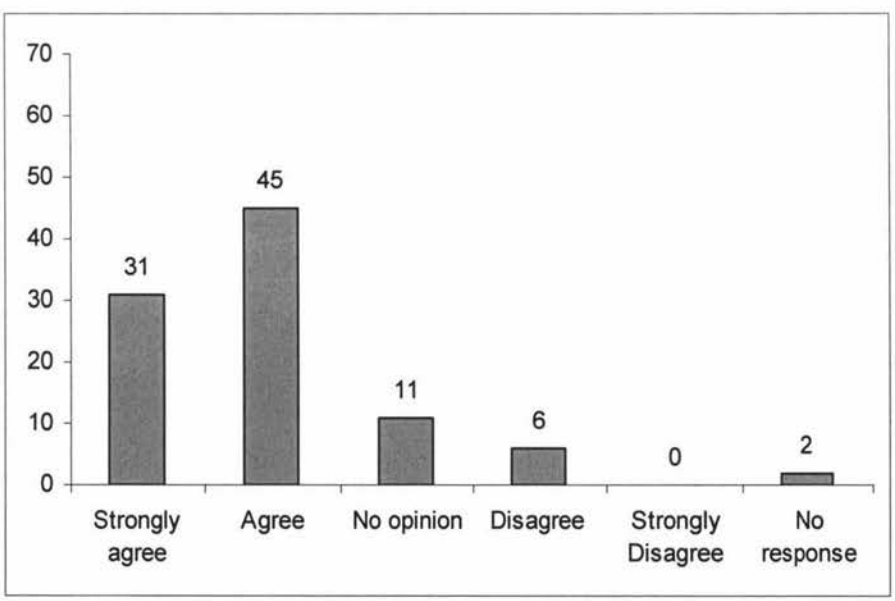


4.2.2 System factors

LMS System characteristics

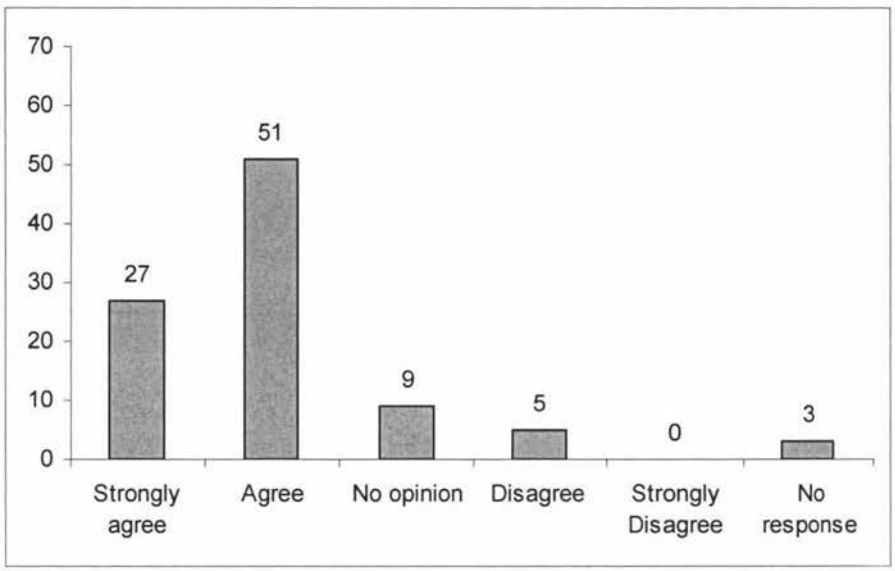
[22]I would be more likely to adopt if the LMS provides appropriate flexibility and functionality to teach online

Figure 17.



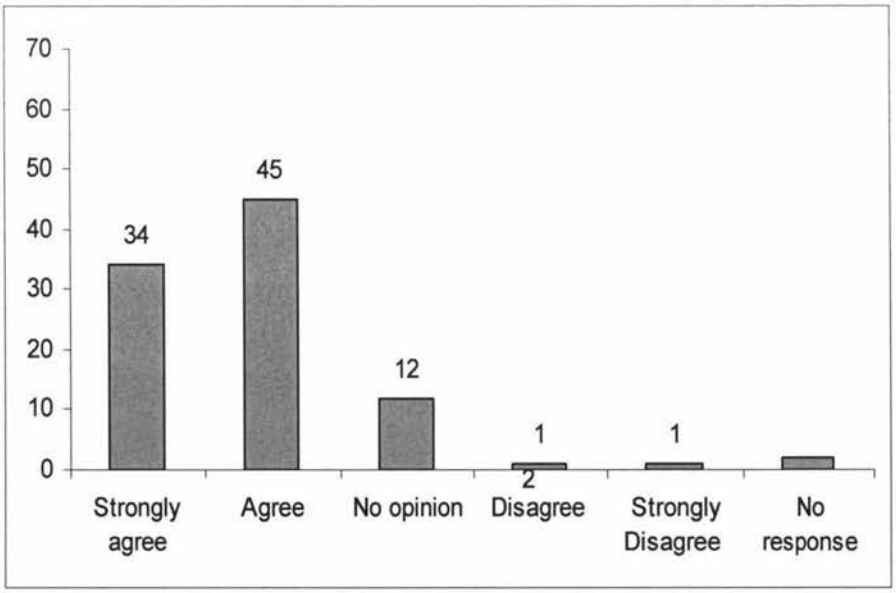
[q23] I would be more likely to adopt if the LMS provides appropriate course content design and development tools

Figure 18.



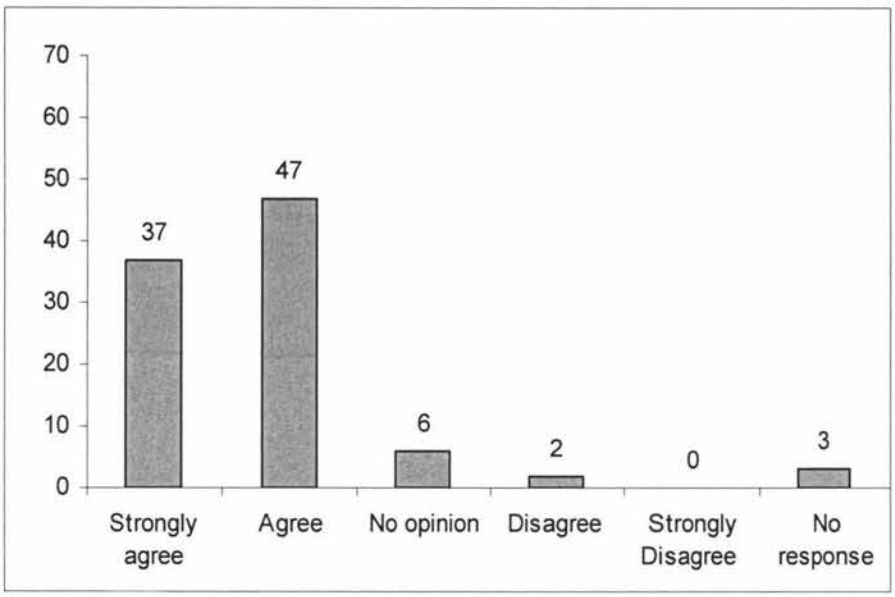
[q24] I would be more likely to adopt if the LMS improves my work performance

Figure 19.



[q25] I would be more likely to adopt if the LMS is easy to learn

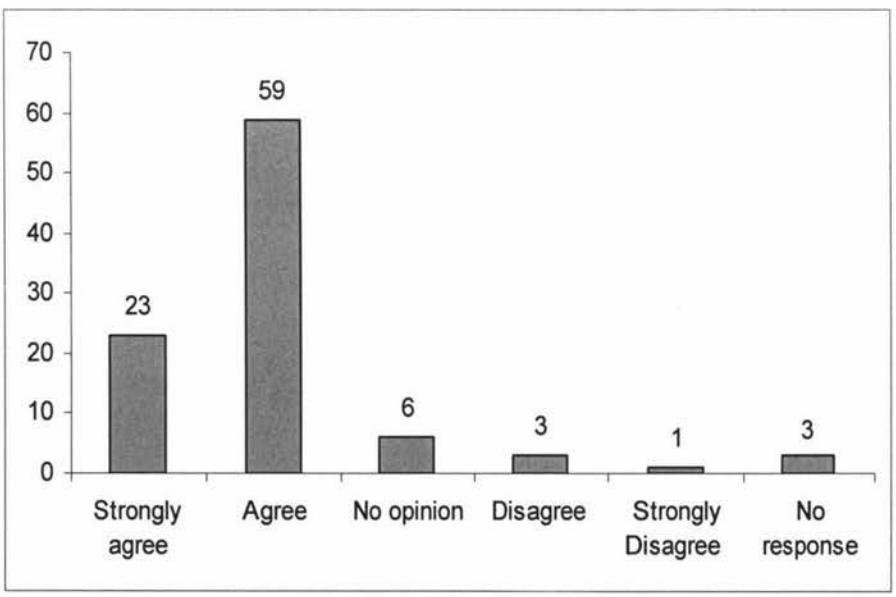
Figure 20.



External system characteristics

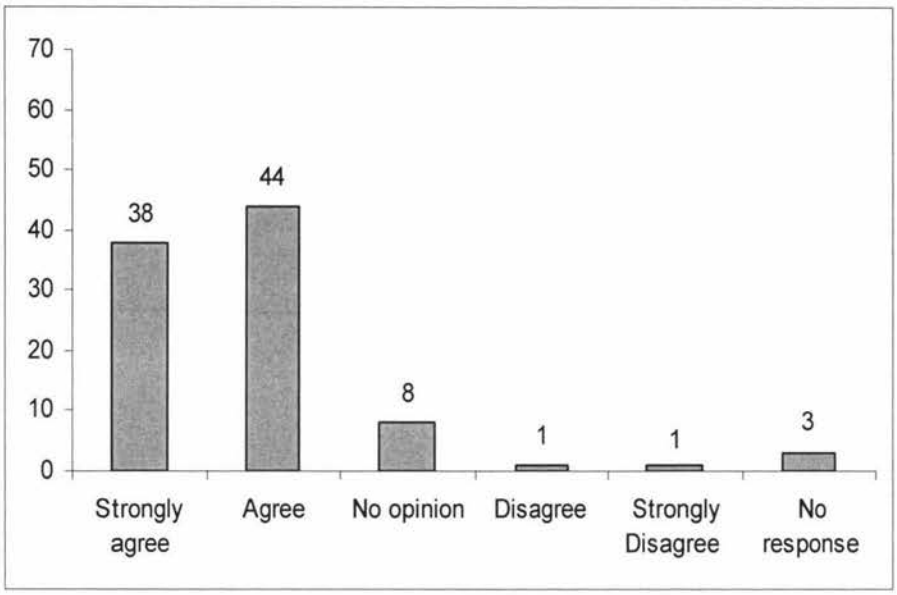
[q26] I would be more likely to adopt if there is sufficient ICT infrastructure available

Figure 21.



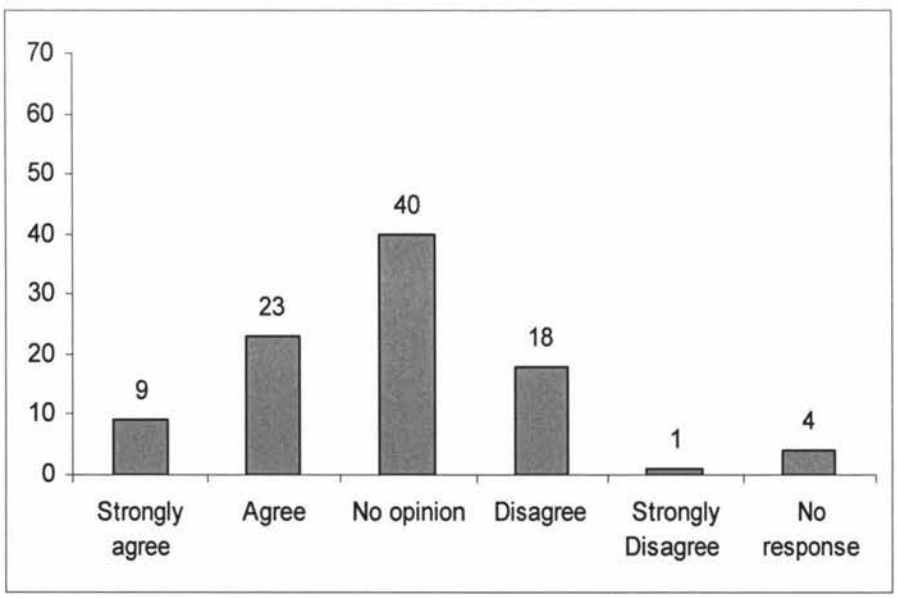
[q27] I would be more likely to adopt if the ICT infrastructure is reliable and efficient

Figure 22.



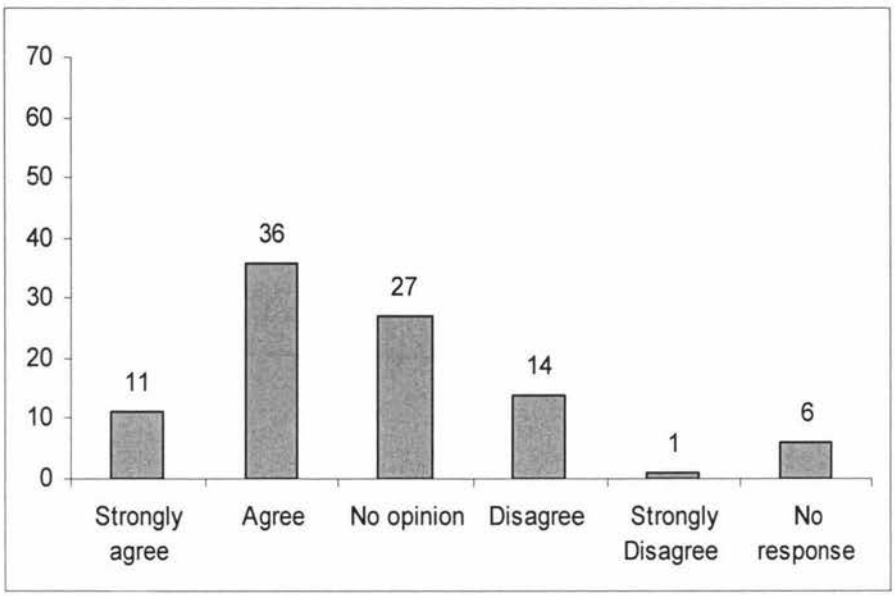
[q28] I would be more likely to adopt if an online enrolment system is available

Figure 23.



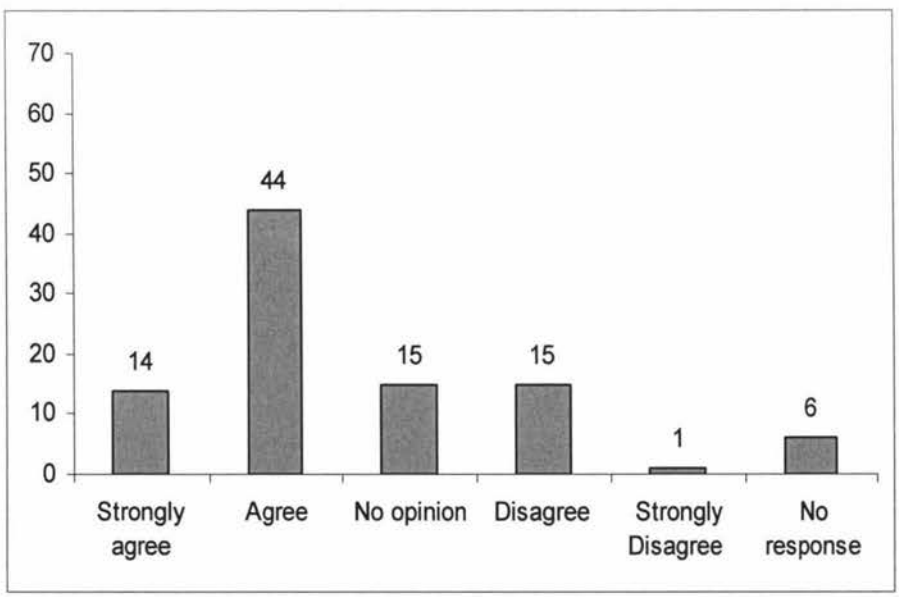
[q29] I would be more likely to adopt if distance library services are available

Figure 24.



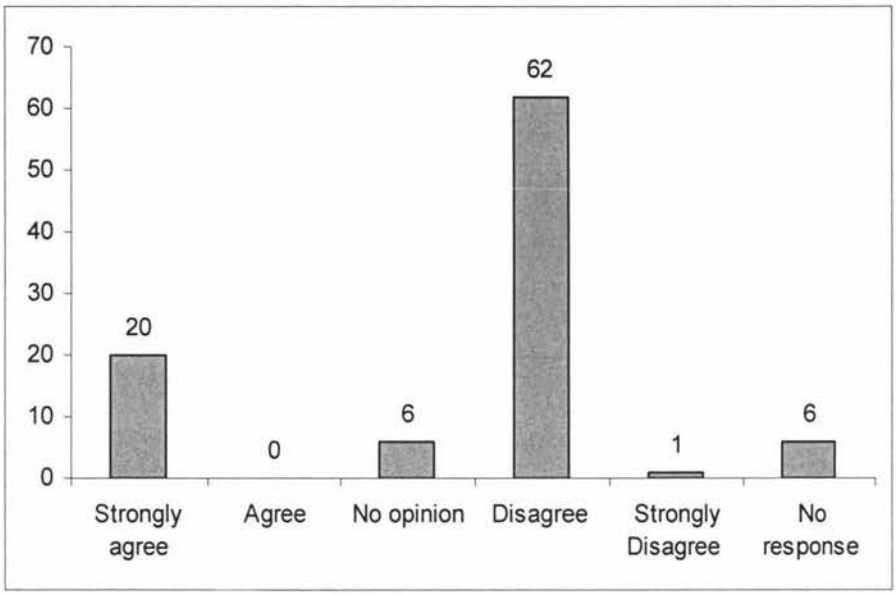
[q30] I would be more likely to adopt if distance student support services are available

Figure 25.



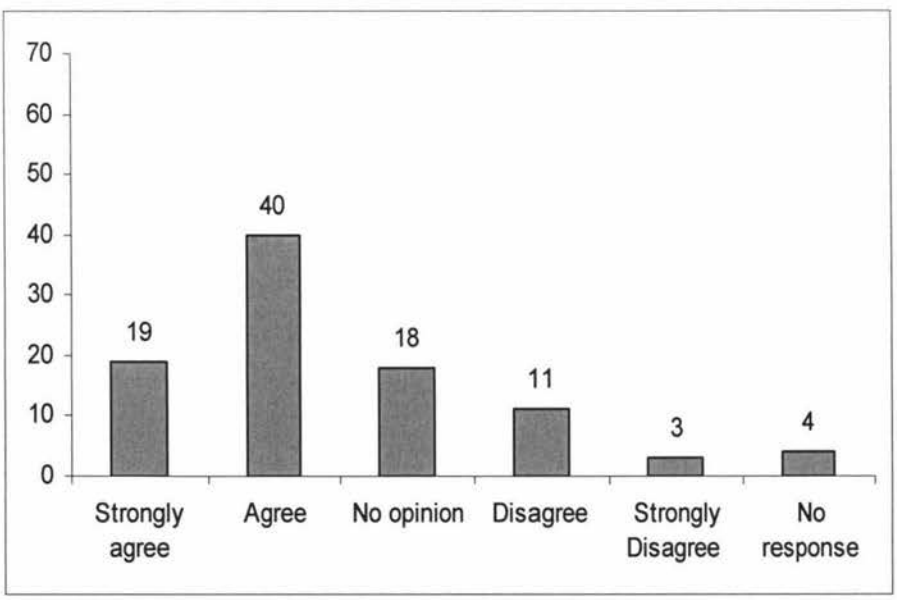
[q31] I would be more likely to adopt if online assessments are reliable and secure

Figure 26.



[q32] I would be more likely to adopt if a secure medium is available to post student results

Figure 27.

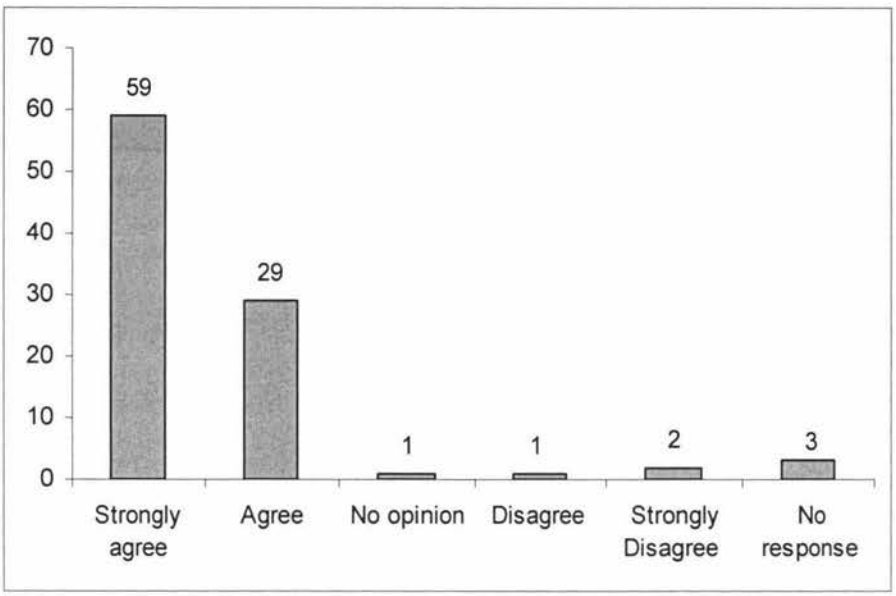


4.2.3 Organisational factors

Organisational support

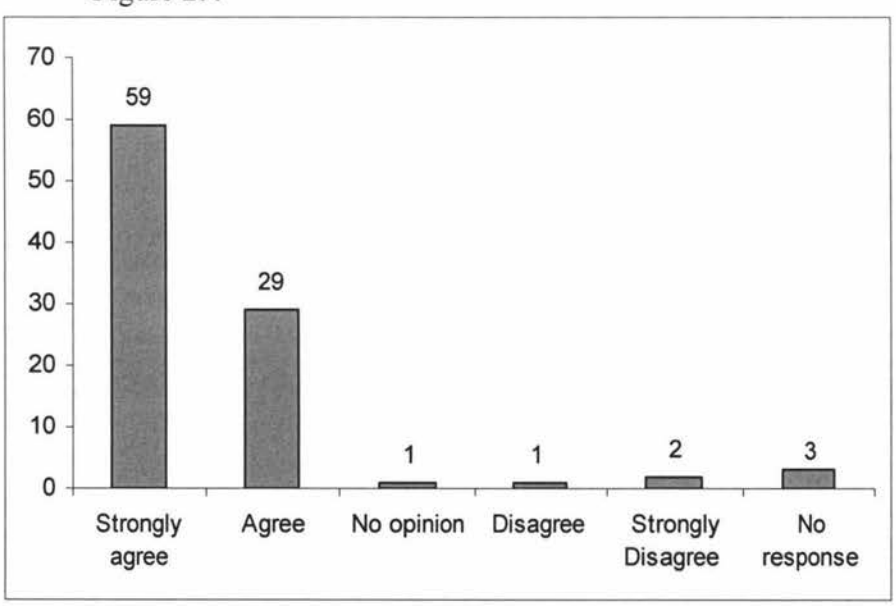
[q33] I would be more likely to adopt if adequate training and support is available to design and deliver online papers

Figure 28.



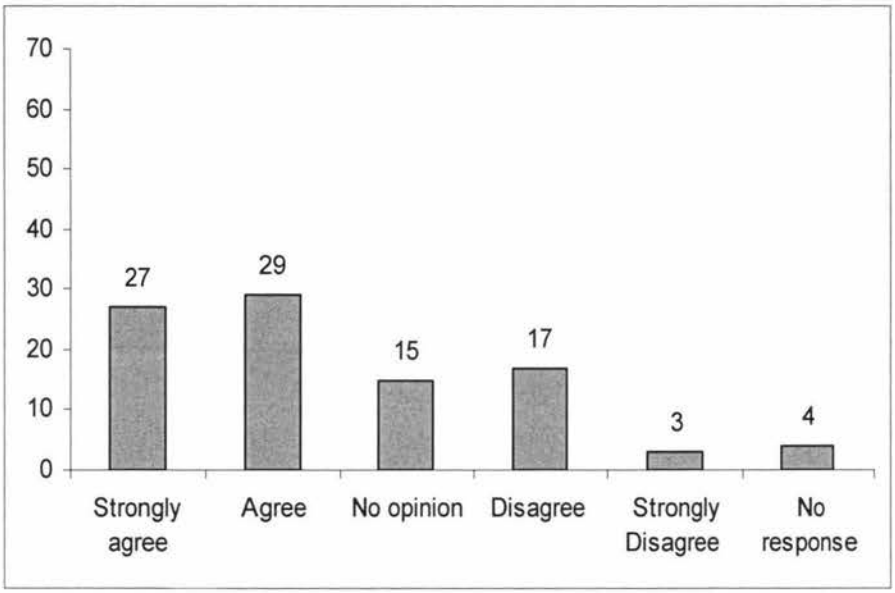
[q34] I would be more likely to adopt if I was given sufficient time to design and deliver online papers

Figure 29.



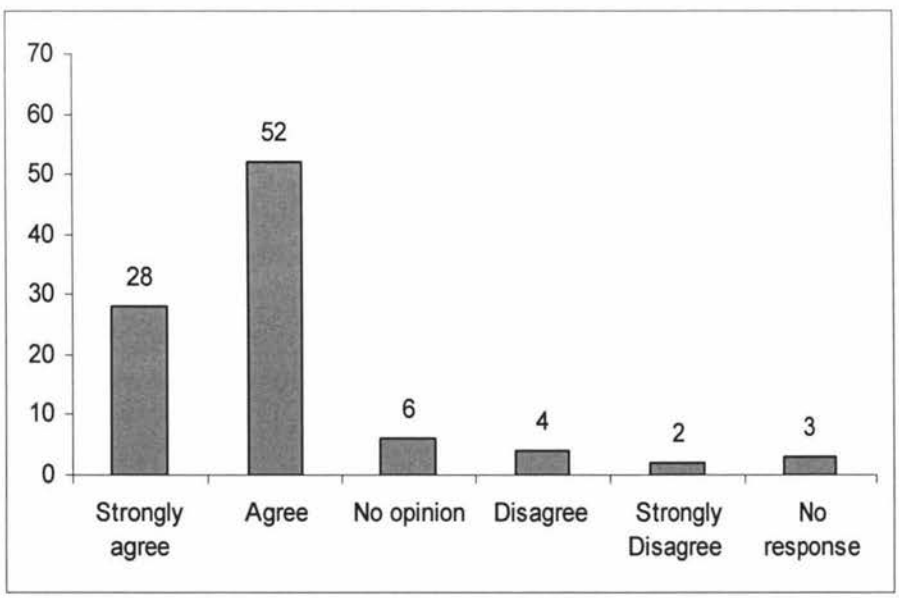
[q35] I would be more likely to adopt if I was offered incentives to teach online

Figure 30.



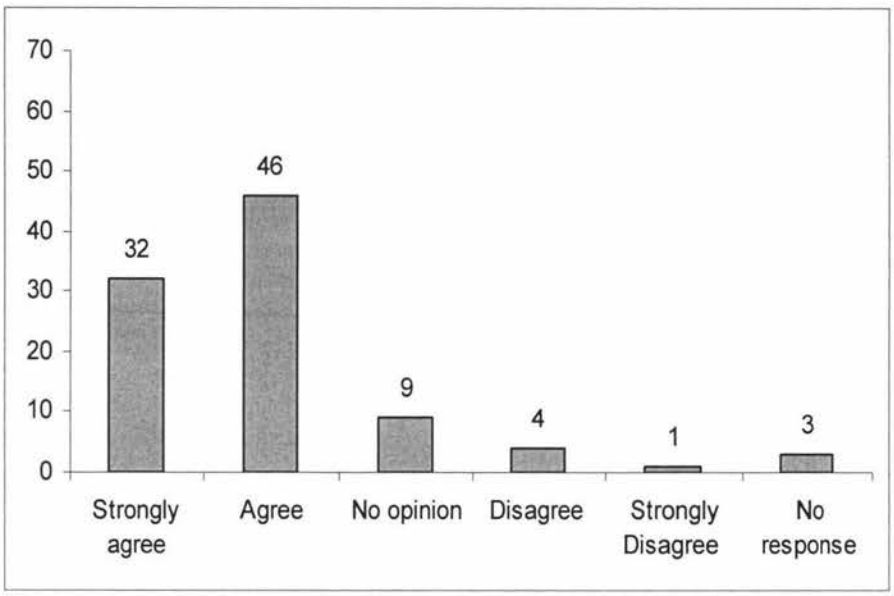
[q36] I would be more likely to adopt if there is sufficient ICT training and support to teach online

Figure 31.



[q37] I would be more likely to adopt if there is suitable IT helpdesk support to teach online

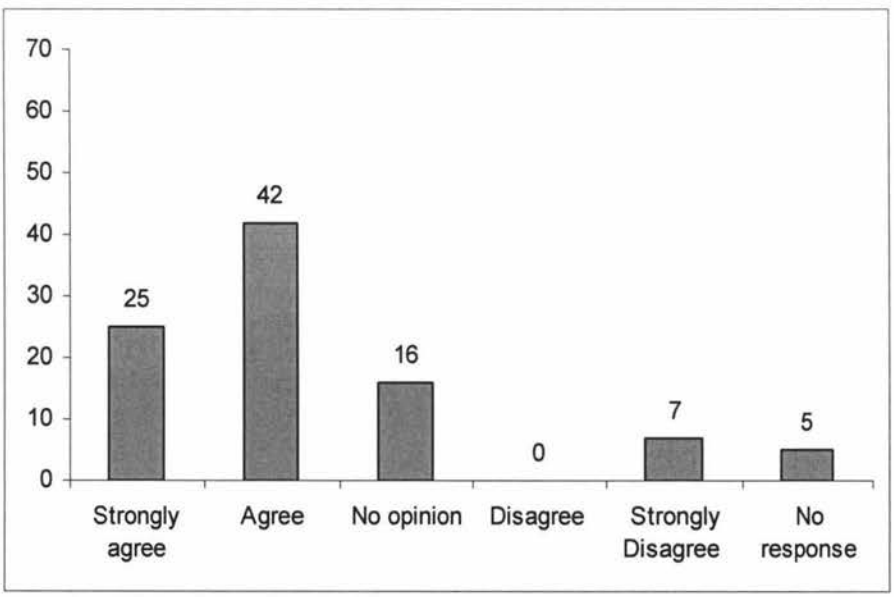
Figure 32.



Organisation characteristics

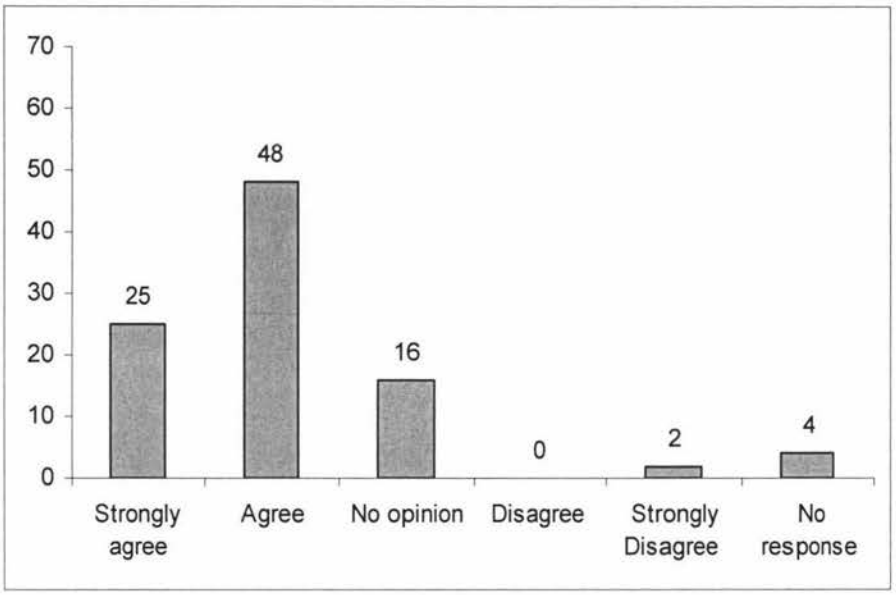
[q38] I would be more likely to adopt if there is a faculty-wide e-learning strategy for e-learning development

Figure 33.



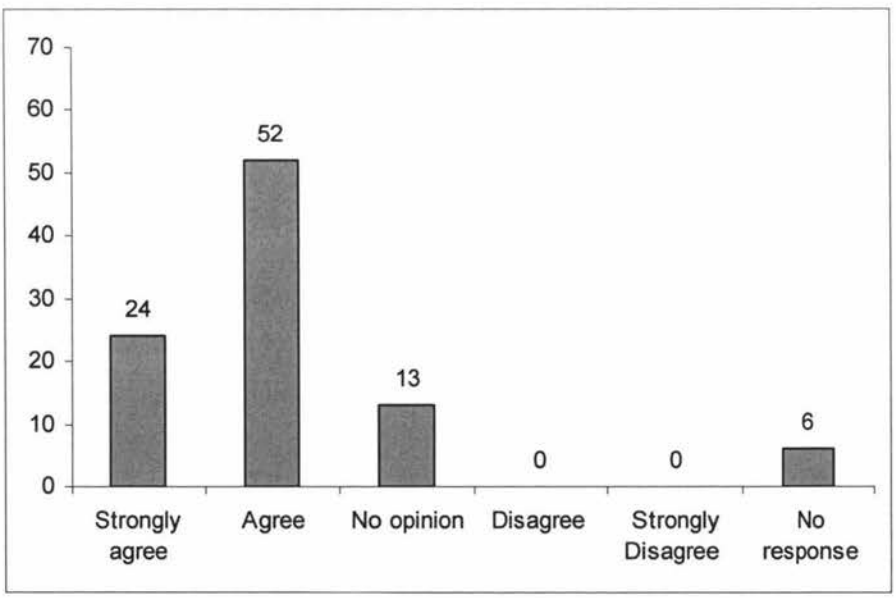
[q39] I would be more likely to adopt if the organisation culture is positive towards e-learning

Figure 34.



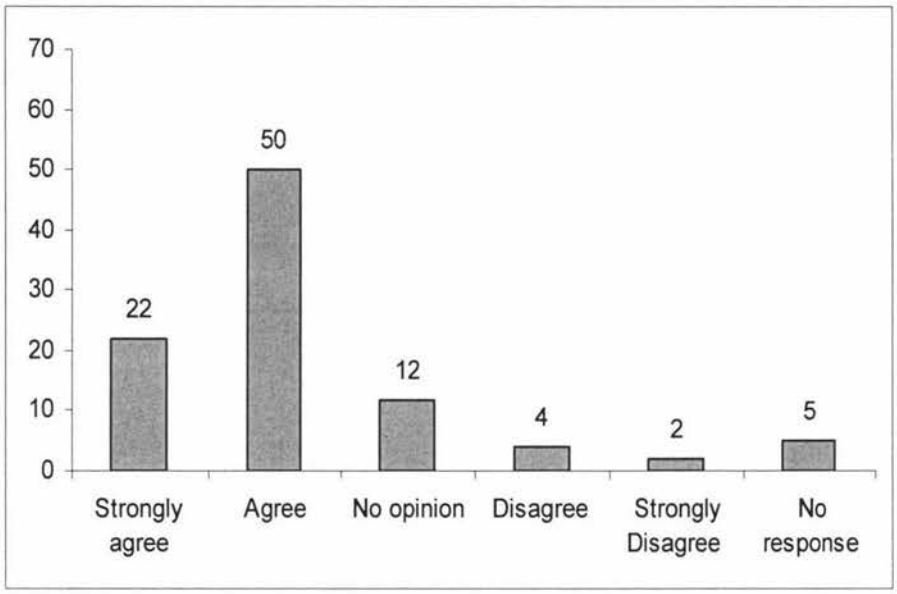
[q40] I would be more likely to adopt if there is strong institutional leadership for e-learning

Figure 35.



[q41] I would be more likely to adopt if there is an institute wide e-learning strategy and funding priority for e-learning development

Figure 36.



[q42] Rank your five most critical factors for the LMS adoption?

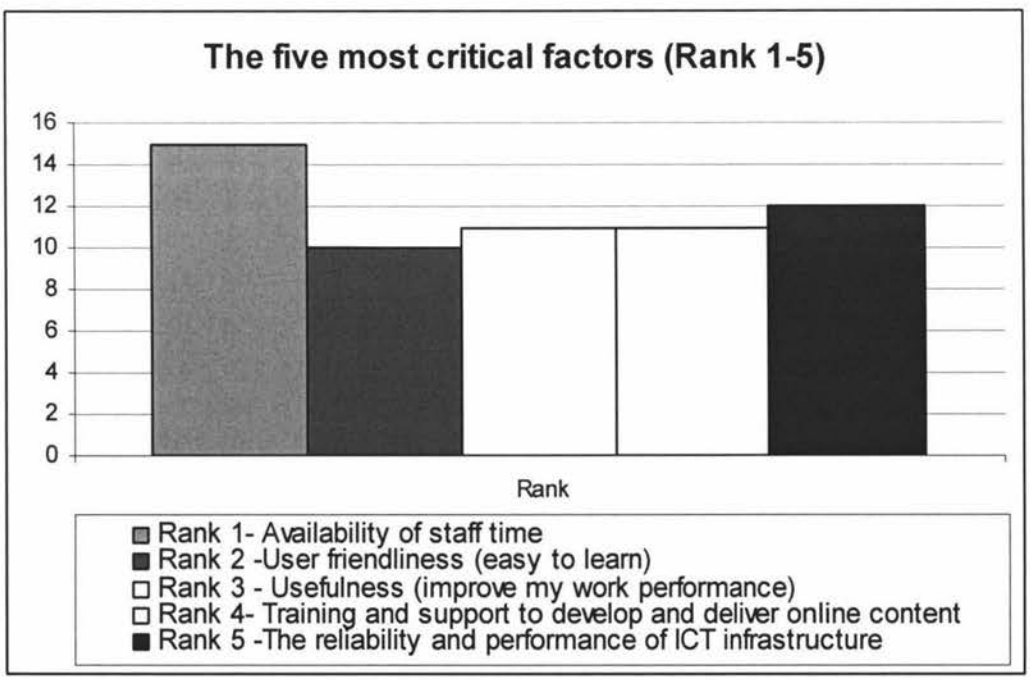
Figure 37. presents the five most significant factors for LMS adoption rated by the respondents. To arrive at this result, the respondent's choices (ranks) for all 26 factors were counted against each individual factor and weighted based on the rank (one to five) they received. The factor weighting was calculated by three steps;

Step 1 The different rankings received for each factor was counted into five variables – CR1 = count of rank 1, CR2 = count of rank 2, CR3 = count of rank 3 , CR4 = count of rank 4 and CR5 = count of rank 5

Step 2 A score (1-5) was awarded to individual variables, with CR1 (Rank 1) receiving the highest score (5) and CR5 (Rank 5) receiving the lowest score (1). i.e. CR1 x 5, CR2 x 4, CR3 x 3, CR4 x 2 and CR5 x 1.

Step 3 Each variable was then sorted in descending order and the factor that came in at the top of each sort list was identified. The graph was then prepared assembling the five factors that came at the top of each sort list.

Figure 37.



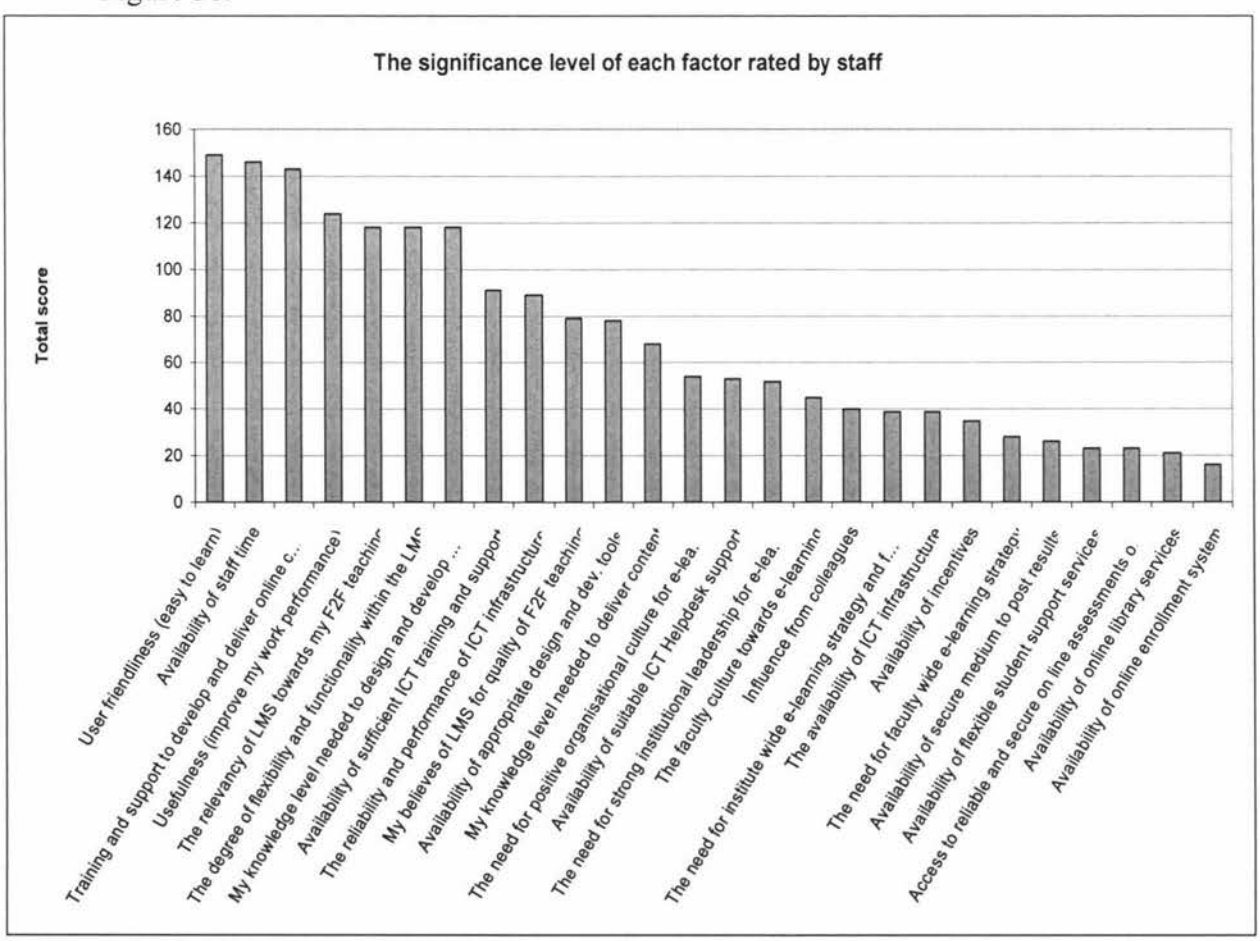
The level of significance of all factors

Figure 38. presents the total weightings that were received for all LMS factors in order of significance from highest to lowest scale. The total weighting was calculated using the five variables created in q42. In addition to step two of q42, two additional steps were performed to calculate the total weighting received by the each factor.

Step 3 All five variables (see q42) were added together and the total score (TCR) calculated for each factor. CR1 + CR2 + CR3 + CR4 + CR5 = TCR

Step 4 All variables were sorted in the descending order of the TCR and then the graph was made from all the factors from highest significance to lowest significance.

Figure 38.



Correlations between the mean score of all variables and the ranking question

Table 7. presents the Pearson Product Moment Correlation test that was carried out to investigate the relationship between the extent of agreement with an item in questions 16 to 41 and the ranking of the importance of that item in question 42.

Table 7.

Correlations

		mean q16toq41	ranked q42
mean q16toq41	Pearson Correlation	1	.555**
	Sig. (1-tailed)		.002
	N	26	26
ranked q42	Pearson Correlation	.555**	1
	Sig. (1-tailed)	.002	
	N	26	26

**. Correlation is significant at the 0.01 level (1-tailed).

Chapter Five

DISCUSSION OF RESULTS

This chapter presents a detailed analysis of the results outlined in Chapter Four. The chapter begins with analysing the demographic details and the organisational setting of the survey respondents. The individual factors are analysed next and then there is a detailed analysis of system and organisational factors. The chapter concludes by presenting an analysis of most critical factors for adopting a learning management system (LMS) at universities and institutes of technology and polytechnics (ITP's) in New Zealand.

5.1 Demographic characteristics and organisational setting

In addition to the analysis of frequencies of the data, a chi-squared statistical analysis was carried out to identify any possible effect of demographic variables. Preliminary analysis showed that with the exception of a few items, there were no important relationships in response pattern with the gender, educational qualification, teaching experience or the age of the respondents. The results presented here therefore apply to the whole sample unless otherwise stated.

Questions 1 to 15

Returns to the survey were received from the teaching staff from six ITP's and two universities. The return rates from individual institutions varied from a low of one to a high of twenty, with the total number of returns at 95.

The survey sample included a range of teaching staff positions that are common in the tertiary sector. The majority (80%) were made up of lecturers/tutors (41%), (25%) senior lecturers and (14%) programme coordinators.

Staff taught in a variety of subject areas, including business (20%), information systems (IS) (21%), arts and education (25%), technology (8%), social science and science (12%)

and (22%) other disciplines. The majority (66%) taught subjects relating to business, (IS) and arts and education.

The majority (79%) of the survey respondents had been in the teaching profession for over five years. Of that 57% of staff had over ten years of teaching experience.

The majority of the staff (91%) had gained degree level qualifications, and over half of the respondents (56%) had higher postgraduate qualifications, including (42%) masters and (14%) doctorate qualifications. This result suggests that over half of the survey population had considerable teaching experience and higher academic qualifications.

As shown in Figure 2., the majority (71%) of the staff were within the age group of 41-60 years, with 34% between 41-50 years and 37% between 51-60 years. Overall, 55% staff were below 50 years of age and 43% over 50 years. Unfortunately, this age distribution of the survey sample could not be compared with the academic staff age ratios nationally as the Ministry of Education does not collect the data on staff ages.

The gender distributions of the respondents were 52% males and 46% females. This distribution closely matches the national statistics of the gender distribution identified in the Ministry of Education statistics (Ministry of Education, 2005). With 52% males and 48% females in the universities and the ITP sector in New Zealand, it would seem that the present sample is quite representative in terms of gender.

Computer literacy is high among the staff surveyed. 37% of respondents had average IT skills and 60% above average skills. In contrast, e-learning knowledge was low among the respondents, with 42% average and 19% below average knowledge. The results also indicated that while staff between two age groups- under 50 and over 50, had similar computer literacy levels, e-learning knowledge was different between the two age groups. In the sample, the staff over 50 years of age had lower e-learning knowledge than the staff below 50 years.

Computer literacy levels and e-learning knowledge of the respondents was analysed against gender and institution type. The results indicated that the males and females had similar levels of computer literacy and e-learning knowledge. The results however

indicated that while university staff had similar computer literacy levels and e-learning knowledge, their counterpart polytechnic staff had lower e-learning knowledge (10% below) than their computer literacy levels.

E-learning knowledge is high among staff with higher academic qualifications. The results confirmed that staff with masters or doctorates had higher knowledge (11% higher) than the staff with other qualifications.

Staff who taught subjects relating to IT, information management sciences and business, had higher knowledge in e-learning than staff who taught arts, education, technology and social sciences subjects. The results further indicated that staff with higher teaching experience had higher e-learning knowledge than staff with less teaching experience.

The conclusions that can be drawn from the discussion up to this point suggest that over half of New Zealand tertiary teaching staff had over 10 years of teaching experience and higher academic qualifications that is masters and doctorate degrees. The analysis further indicates that while the majority of staff have high computer literacy levels, their e-learning knowledge is low comparative to their computer literacy levels. The research found that the degree of e-learning knowledge varied according to age group. Staff over 50 years of age have a lower knowledge than staff below 50 years. E-learning knowledge, however, is greater among experienced staff (over 10 years) and staff with masters and doctorate degrees than those who have lesser experience and qualifications.

Of the 95 staff surveyed, 65 staff (68%) had attended an e-learning training programme with the majority (58%) of them attending on campus training. 46% of staff had undergone basic training, another 46% intermediate and 8% advanced training.

As shown in Figure 10. the staff who participated in the survey delivered a total of 489 papers or course modules. Staff have adopted different teaching methods to deliver these papers. 35% of papers (highest of all) have been delivered only in face to face (F2F) mode without the aid of LMS or other e-learning technologies. 2% of papers have been delivered mainly online with e-technology support and only 7% of papers have been delivered mainly online with the aid of LMS and other e-technologies.

From these results, it can be concluded that the delivery of mainly online papers is very low (9% papers) in the survey sample. The results further indicate that the LMS adoption rate too is low. Of the 489 papers delivered, only 38% papers are supported with a LMS. Nevertheless, the results indicate that over half (296) of all papers are delivered with some form of e-technology support, such as e-mail, e-discussion lists or video conferencing etc. It is further noted that, of the 296 e-technology supported papers, the majority (62%) of papers are taught with the aid of LMSs. From this result, it seems that the use of LMSs is comparatively high among the other traditional e-delivery mediums used at present.

5.2 Factors influencing user acceptance

Discussion on the influence of the factors which influence adoption is presented in the order of the three factor groupings: individual, system and organisational. The section begins with discussion of the results of individual characteristics and individual perception factors relating to the LMS adoption. The discussion of the LMS system characteristics and external system characteristics is presented next and then the final section concludes by presenting the discussion on organisational support and organisational characteristics factors.

The discussion of the results (Question 16-42) follows a similar sequence in which they are presented in Chapter Four.

In addition to the frequency analysis of response patterns, a chi squared analysis was carried out to identify any possible effect of the results from different age groups, gender and the type of institutions. Preliminary analysis showed that with exception of a few items, there were no relationships in response patterns with the age, gender and the institutions type. The results presented here therefore apply to the whole sample unless otherwise stated.

Further, a t-test analysis was carried out to look at the difference between agreements and disagreements within LMS adoption factors (see Appendix Five). This analysis showed that with the exception of the question (Q19) that looked at staff beliefs on LMS adoption towards improving the quality of face to face teaching, and Q31, which collected staff

opinions on security and reliability of LMS for online assessment, the results are statistically significant. The results presented here therefore apply to the whole sample unless otherwise stated.

5.2.1 Individual factors

Individual characteristics

Question 16

As illustrated in Figure 11., 65 (68%) of the respondents agreed that they would be more likely to adopt a LMS if their content design and development knowledge is high. 13% of respondents disagreed with this view and 14% of staff did not present their opinion.

From the results it can be said that a higher degree of content design and development knowledge would influence staff uptake in LMS's. The results indicate that lack of appropriate skills affects staff confidence and capacity in the uptake of this technology and may cause them to reject it. This result reflects the findings of other similar studies conducted by various authors. The authors claim that teaching staff require multiple skills if they are to develop effective online courses. They include: (a) understanding of online pedagogy for course design (b) understanding theories of learning when teaching online (c) knowledge in information and communication technologies (ICT) and (d) knowledge in LMS and their associated tools (Inglis et al, 1999; Levine & Sun, 2003; Neil, 2004).

Question 17

Figure 12. presents the respondents opinion on their content delivery knowledge in relation to a LMS adoption. The majority of the 56 respondents (59%) agreed that they would be more likely to adopt a LMS if their content delivery knowledge was high. 19% respondents disagreed with this view and 15% of staff did not present their opinion.

From the results it can be interpreted that the knowledge in content delivery would enhance user confidence and in turn it would have a positive effect on their LMS uptake. The authors in earlier research, highlighted the importance of two facets of skills needed to deliver online courses: (a) technical skills in ICT and LMS and their associated tools and

(b) soft skills such as interpersonal and communication and project management knowledge (Neil, 2004; Varsidas, 2004; Bates, 2000; White & Weight 2000). The authors assert that knowledge in these aspects would enhance the confidence levels of staff in effective planning and delivery of online classes.

Individual perception:

Question 18 – 21, (Figure 13-16) asked about factors relating to user perception towards LMS adoption. The influence of their colleagues, its relationship to quality of teaching, its relationship to face to face teaching and the effects of school culture were analysed under this category.

Question 18

Figure 13. presents that 54% of those staff surveyed agreed that their LMS adoption could be influenced by their colleagues. 26% disagreed and 15% had no opinion.

The results indicate that the majority of staff are of the opinion that their adoption of an e-learning system could be influenced by their colleagues. This highlighted that experience of the early adopters is highly valued and that staff would arrive at their decision to adopt or reject this technology, based on information from their colleagues. It could further be interpreted that if their colleagues have encountered negative experiences, it will impact on their acceptance on this technology. This result reflects the contention of the Venkatesh and Davis (2002) on social influence on technology acceptance. The authors assert that the perception of the people who are most important, influences whether the person should or should not perform the behaviour in question.

Question 19

Figure 14. shows that 55% of staff agreed that they would be more likely to adopt a LMS if it would improve their face to face teaching process. 32 % disagreed, and of that number, 26% of staff had strong disagreement with this view.

With this outcome it can be said that the majority of staff prefer to adopt a LMS to complement their face to face teaching. Several authors have commented on the benefits of

adopting e-learning technologies on the face to face teaching process. Graves (2001) pointed out that institutions are adopting e-learning for two purposes: 1) to enhance the flexibility of traditional classroom based face to face courses with web access to syllabi, materials and discussions or 2) as a sole channel of distance education modality that eliminates or reduces "on-ground" classroom time. The results of this survey indicate that the majority of staff fall into the case 1) category of the Graves (2001) theory than the case 2) category. Bates (2000) stated that studies have shown that e-learning technologies extend the quality of face-to face teaching.

The results of the t-test for this item were not statistically significant. This indicates that there was no clear difference between the number of people who agreed that LMS adoption has an influence on the quality face to face teaching, and the number that disagreed with this belief. It would seem therefore that the possibility of a benefit of LMS for face to face teaching is not a significant factor for their adoption.

The results do not provide any clear indication of why there was so much disagreement with this statement. Further investigation would be needed to ascertain whether respondents failed to see the benefits of LMS for face to face teaching or they simply see there is no connection between a LMS and their face to face teaching.

Question 20

As illustrated in Figure 15., 75% of the respondents hold the view that they would adopt a LMS if it is relevant to their face to face teaching, with a minority (9%) of staff opposing this view.

Unlike the results for Q19, it is clear that the majority of staff would adopt a LMS if they see that it is relevant to their face to face teaching. From this result it could be interpreted that staff are keen to assess its appropriateness to their face to face teaching before they decide to adopt this technology A similar view was held by a group of staff that participated in a pilot study recently concluded at a New Zealand polytechnic. The mmajority of the respondents (70%) noted e-learning would fit with their traditional face to face delivery methods and it would enhance traditional methods with improved flexibility supporting the distance students. One tutor noted that e-learning places more study

responsibility on students and therefore provides more time to do practical activities during class time (Nanayakkara, 2004).

Question 21

Of the 95 staff who participated in the survey, 80% of staff said that positive faculty culture would influence their uptake of a LMS (Figure 16.). 10% of staff opposed this view.

With this result it is clear that if the faulty culture is not positive towards e-learning, it would impact the staff confidence in adoption and in turn may cause them to reject it. Oblinger, Barone and Hawkins (2001) noted that faculty express many apprehensions about online education. The authors highlight that less human interaction within distributed education is sometimes cited as a concern, particularly when faculty perceive that online dialogue will replace face to face interaction. They assert that the faculty concerns need to be addressed if online teaching is to be successful in the faculties.

5.2.2 System factors

The analysis of the system factors are framed around two sub factors: LMS characteristics and external system characteristics.

LMS characteristics

Question 22

Figure 17. presents that 76 (80%) of the respondents agreed that their degree of adoption would be determined by the flexibility and the functionalities of the LMS system. Of that 33% strongly agreed with this view, 6% disagreed and 12% did not provide their opinion.

This result highlights that flexibility and functionality of a LMS is one of the key factors determining the staff uptake in LMS. The limitation of system features would affect the LMS system adoption rate and may cause them to reject it.

Previous research in this topic has identified various flexibility and functionality limitations in LMSs. The staff participated in a pilot study carried out within a polytechnic in New Zealand had commented that *Blackboard* LMS has system limitations in creating interactive training material and it further lacked functionality to create course simulations (Nanayakkara, 2004). Most importantly, these respondents commented that *Blackboard* is not flexible and therefore it is not adaptable to their varying teaching needs. The respondents noted that due to such limitations, *Blackboard* was not suitable to create complete online courses. They however believed that Blackboard was a good tool to use to complement current face to face teaching practice.

Question 23

The results that are presented in Figure 18. show that 78 (82%) of the respondents indicated that the availability of appropriate course design and development tools are crucial for their LMS adoption. From these results it can be said that lack of LMS tools would discourage their uptake and may cause them to reject the system. These results are consistent with previous research by authors in related studies. Vrasidas (2004) criticised LMS pedagogical affordability. He argued that commercial learning management software is for the use of constructivist learning strategies. There are inherent weaknesses in LMS design due to their lack of ; (a) tools to allow learners to represent the knowledge in multiple ways (b) distribution of tools for meaningful learning – audio, video, multi media production tools and (c) visualization tools for the learner to express and construct meaning. A similar view was held by the group of staff who participated in the recent pilot study. The staff commented that Blackboard LMS lacks authentic assessment tools, interactive quizzes and multi media communication tools for seamless interaction between the learner and the teacher.

Question 24

Figure 19. presents the respondents views on LMS system adoption in relation to their work performance. Overall, 79 (83%) staff agreed that they would adopt a LMS if it improved their work performance. Of this 33% strongly agreed with this view. 2% disagreed and 13% of staff did not forward their opinion. This result demonstrates a strong correlation between the system adoption rate in relation to its usefulness. It shows that a very high proportion of staff believed that their adoption rate would increase if they saw that LMS would improve their work performance.

The Technology Acceptance Model (TAM) developed by Davis (1993), proposes that perceived usefulness and perceived ease of use are fundamental factors influencing user acceptance as they influence the user attitude towards the system. He defines perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance" and perceived ease-of-use as "the degree to which a person believes that using a particular system would be free from effort" (Davis, 1989).

From these results it can also be said that if staff believe that LMS reduces their work performance, it will significantly impact on their adoption and may cause them to reject it. A similar view was held by the staff responding to the pilot survey conducted at the New Zealand Polytechnic. 40% of the staff participated in the study believed that e-learning would not either improve or simplify their work performance. They indicated that development and delivery of e-learning courses requires more time and effort by tutors and it is more workload for them than their traditional face-to-face teaching method (Nanayakkara, 2004). The result agrees with previous research which suggests that while distance teaching brings a host of teaching and learning practices that may be convenient for students, they are far more labour intensive than traditional on campus teaching (Levine & Sun, 2003; Care, 2002).

Question 25

Figure 20. presents that 84 (88%) staff believed they would be more likely to adopt a LMS if the system was easy to use. Of this 39% strongly agreed with this view.

This result indicates that the ease of use factor, by far the second highest recorded of the 26 factors, suggests a strong positive relationship towards a staff LMS adoption and the "user friendliness" factor of the system. A similar view was held by a group of staff that participated in a pilot study recently concluded at a NZ Polytechnic. 90 % of staff commented that the ease of use factor has high significance on their decision to adopt a LMS (Nanayakkara, 2004).This result is in conformity with the TAM model presented by Davis (1989). Davis asserted that perceived ease-of-use is one of the fundamental factors influencing user acceptance, as it influences the user attitude towards the system.

External system characteristics

Question 26

Figure 21. shows that 82 (86%) staff believed that the availability of sufficient ICT infrastructure is a factor for staff uptake in LMS. Of that, 24% strongly agreed with the view and 4% disagreed.

From this result it can be said that the availability of sufficient ICT infrastructure is one of the essential factors determining the staff uptake of a LMS. It is clear that lack of sufficient infrastructure would not only discourage the LMS adoption but also may cause them to reject it. Hitt and Hartman (2002) stress the importance of maintaining sufficient network bandwidth and modem pools or internet service provider connections for student access. They stated that all technology infrastructure should be well managed and maintained to achieve a high degree of performance and reliability. The authors further commented that the infrastructure should support all online students at peak demand and it should accommodate the load without degrading the performance. They say that while most institutions have at least some elements of the technology infrastructure needed to support distributed learning, developing online courses will be likely to require additional equipment and specialised software and hardware, for example, additional servers and a course management system.

Question 27

Similar to the responses in Question 26, staff believe that ICT infrastructure reliability and efficiency is equally important for staff LMS adoption. As shown in Figure 22., 82 (86%) staff agreed that reliability of ICT infrastructure is a key factor influencing their adoption, with 40% strongly agreeing with this view.

The results indicate that sound information and communication infrastructure play a key role in successful delivery of online content to distance students. Lack of reliability, performance and timely support on infrastructure could inhibit both the tutor and the student from accepting this technology. All respondents (100%) that participated in the pilot study at the NZ polytechnic, indicated that reliability and performance is a key attribute to their decision to use this technology. Some of the respondents indicated that

they would not continue using e-learning technologies if they found there were issues with system performance and reliability (Nanayakkara, 2004). Hitt and Hartman (2002) noted that to achieve a high success rate, all technology infrastructure should be well managed and maintained. Also they stressed the importance of implementing sound operating procedures to address the requirements of distributed learning. They say that although much of the required infrastructure may already be in place, distributed learning imposes unique demands that institutional leaders must understand, especially regarding the system performance, scalability and reliability.

Access to student administrative services

Questions 28 to 32 gathered staff attitudes on availability of flexible student administrative facilities and services, required to complement their e-learning delivery.

Question 28

As shown in Figure 23., 40 (42%) staff were neutral on the need to have an online enrolment system for their LMS adoption. 34% of staff agreed with the need and 19% of staff did not see that the presence of online enrolment would be an influencing factor for adoption. From the results it can be said that the availability of an online enrolment system is not significantly important for staff uptake in LMS.

Question 29

Figure 24. shows that the majority, 47 (50%) respondents, saw that the availability of distance library services would influence their LMS uptake. 27% respondents were neutral on their opinion and 14% did not see the benefit of this facility.

Question 30

As shown in Figure 25., the majority, 58 (61%) staff, believed that the presence of flexible student support services would influence their LMS uptake. 16% staff did not present their views and another equal percentage did not see the relevance of this facility for LMS uptake.

Question 31

The reliability and security of online assessment, the least important factor within all variables analysed, seems less relevant for staff LMS uptake. The results presented in Figure 26. indicated that the majority, 63 (65%) staff, believed that security and reliability attributes in LMS would not have any impact on their adoption. However 27% of staff believed that they would agree with this aspect.

The results of this item were statistically significant but in this instance more people disagreed with the statement than agreed with it. This is the only item for which this occurred. It would seem therefore that the reliability and the security of the online assessment of LMS is not a significant factor for staff uptake in LMS.

Question 32

As presented in Figure 27., the majority, 59 (62%) staff agreed that they would be more likely to adopt a LMS, if a secure medium was available to post student results. 14% disagreed with this view and 19% did not provide their opinion. With this result, it is clear that the security of online presentation of student results is important for staff to engage in e-learning delivery.

Overall, the above results in q28-q32 contradict the views of authors Britain et al (2002) Graves (2001) and Hitt and Hartman (2002). They claimed that flexible administrative systems are important to complement online learning for students. The authors highlighted that, unlike any other technological development on campus, e-learning development should involve all services academic, administrative and supportive. They also say that while institutions are obliged to provide online access to resources required for course participation they also should provide services such as access to electronic library resources, registration, student advising and financial aid. for distance studying. The results of the survey indicate that these issues are not seen as very important by staff for their uptake in LMS. However, these factors may be relevant for students during their uptake in LMS, and these issues should be investigated further in a future research project.

5.2.3 Organisational factors

The analysis of the organisational factors are framed around two sub factors; organisational support and organisational characteristics

Organisational support

Question 33

Figure 28. shows a strong positive relationship between the intended adoption and the level of training and support received for staff from the organisation. 80 staff (84%) believed that their uptake would be influenced by the training and support provided to them. Of that 33% strongly agreed with this view.

With the majority of staff agreeing, it suggests that the availability of training and support is one of the key factors determining staff uptake of LMS. As highlighted in the analysis of question 16, the staff participating in the design and the delivery of online content require a high degree of instructional design knowledge, course management, LMS and IT skills. Beaudoin (1990) asserts that the success of faculties who choose to embrace distance education is largely dependent upon the degree of support the institutions are willing to give them. Venketash et al (2003) asserts that facilitation conditions, defined as the degree to which an individual believes that an organisational and technical infrastructure exists to support use of the systems, do have direct influence on the intention to use the systems.

Question 34

Figure 29. shows that of the majority of staff (92%), by far the highest recorded for 25 factors, believed that the availability of time is a critical factor for their LMS uptake. This suggests that there is a strong positive relationship between the level of staff adoption and their views on their time availability to design and deliver courses.

From the results it can be said that lack of time to design and deliver online courses is a major barrier for adopting e-learning technologies. This result is consistent with studies conducted by authors on this topic. Levine and Sun (2003) assert that although distance learning entails a host of teaching and learning practices that may be convenient for students, these are far more labour intensive than traditional college practices. Creating

courses, maintaining chat rooms, and responding to e-mails from students around the clock requires far more time and energy from faculty than traditional face to face courses. They say that there is a new language and different expectations, including "anytime, anyplace learning," "24/7 advising," and "round-the-clock availability of instructors." They point out this new level of service raises potential barriers in terms of staffing, course loads, advising expectations, faculty support, teaching assistant roles, and so forth.

Survey results from Moskal and Dziuban (2001) on faculty who taught online web based courses, reported that 85% of participants noted that teaching online required an additional investment of time. The respondents of their survey noted that institutions need to facilitate time availability for the successful adoption of e-learning technologies.

Question 35

As shown in Figure 30., the majority of staff, (58%) believed that incentives would influence staff to teach online. While 28% of staff strongly agreed with this view, another 18% disagreed that incentives have an impact on staff uptake level.

From the results it could be concluded that incentives have a bearing on the LMS adoption level and that lack of reward mechanisms may inhibit the level of uptake. The staff who participated in the pilot survey indicated that it is vital that e-learning development activities should be included in their workload activities and should be considered within the staff promotional criteria (Nanayakkara, 2004). Reinert and Fryback (1997) say that faculty staff, especially those who want to advance through the university ranks, will be reluctant or will not participate in distance delivery because of the lack of rewards for this activity within the university system. They highlight the importance of recognition for developing or teaching distance delivery courses as creative work and that it must be included in the criteria for tenure and promotion.

Question 36

Of the 95 respondents, Figure 31. shows that 80 (84%) staff believed that sufficient ICT training and support would influence them in teaching online. Of this 30% strongly agreed with view.

With this result, it is clear that there is strong positive relationship between the staff intention to uptake and the ICT training and support provided to them. It could be concluded that with more ICT training the staff become more confident users of ICT, in turn influencing their uptake of LMS. The staff that participated in the pilot study at the NZ Polytechnic believed that the lack of IT training and support is a major barrier to uptake of e-learning technologies (Nanayakkara, 2004). They noted they lack the skills and knowledge required to develop and deliver online content. They indicated the need for training in HTML page and multi media development and support for interactive content development. The respondents believed that delivering online classes requires the use of specialised devices such as video conferencing equipment, video streaming and training and that the knowledge in useing this equipment is essential to perform successful online classes.

The results of these findings is consistent with the previous research. Authors, Clark (1993) and Dillon and Walsh (1992) highlighted that the more the faculty knew about the technologies, the more highly they rated them for use in their teaching. McKnight (2004) says successful design requires skills in presentation, interaction, graphic design, coding and testing. He says that the faculty will need the assistance of instructional technology and IT practitioners and further stressed that a team of instructional designers, digital media specialist programmers and software engineers at the institutional level should be available to provide support for faculty members.

Question 37

The results that are presented in Figure 32. indicate that providing suitable IT helpdesk support to teach online would greatly enhance LMS uptake. 82% of the respondents surveyed agreed the need for suitable helpdesk for online delivery. From the results, it could be said that lack of helpdesk support would be a major barrier for their adoption. Bates (2000) and Hitt & Hartman (2002) say that distributed learning often forces institutions to create a broad array of electronic student services, 24/7 helpdesks, and special support materials for online students. Bates (2000) stresses that support services for online students are a critical success factor for distributed learning programmes and that institutions need to effectively resource such services to provide support for both on campus and off campus students.

Organisational characteristics

Question 38

As shown in Figure 33., the majority (71%) of staff believed that a faculty wide e-learning development strategy would influence their uptake. 17% were neutral in their opinion and 7% disagreed.

With the majority accepting this view, it can be concluded that faculty should provide an e-learning development strategy if they are to influence staff uptake. Bates (2000) highlights that the strategic plan needs to build on the unit's strengths and minimise its limitations. He says that once the plan is established it needs to be shared widely with faculty and staff. He asserts that dissemination and participation contributes to acceptance and adherence to the future directions of the unit.

Question 39

Figure 34. shows that an organisation's culture towards e-learning, also plays an important role in staff uptake of LMS. With the majority of (77%) staff agreeing with this view, it can be said that positive organisation culture would no doubt contribute to the increase of staff uptake across the organisation. With this result it is clear that if the organisation does not value the online delivery medium, it will affect their intention to use this technology. Beaudoin (1990) assert that the success of faculty who choose to embrace distance education is largely dependent upon the degree of support that institutions are willing to give them. Astin (1985) noted "... true excellence lies in the institution's ability to ... affect faculty favourably, to enhance their intellectual and scholarly development, and to make a positive difference in their lives ... the talent development conception of excellence focuses on changes ... [that] occur along such dimensions as teaching ability, mentoring ability, scholarly ability and productivity."

Question 40

The results presented in Figure 35. indicate that strong institutional e-learning leadership would have positive impact on staff adoption rate. With 80% agreeing, and with no disagreements, it is clear that strong institutional leadership for e-learning would be one of the major factors influencing e-learning acceptance within institutions. Versidas (2004) stresses the importance of top-down leadership along with bottom-up enthusiasm and

innovation for institutions perusing e-learning development. He says e-learning is really an academic opportunity and institutional leaders cannot simply defer to the IT person or person who is running the centre for teaching and learning. E-learning has to be viewed and supported as the fabric of a strategy advancing the institution's future and it has to cut across all academic and administrative offices across the campus and be viewed as a common good.

Question 41

The results of the final factor, Figure 36. shows that an institute wide e-learning development strategy and a funding priority have an impact on staff uptake of LMS. With majority of staff (75%) agreeing to this view it can be said setting up of an e-learning strategy and a funding priority would have a positive impact on staff uptake. The pilot survey respondents at the polytechnic in NZ noted that an institutional strategy should cascade to schools and then to programmes and courses. They believed that lack of an e-learning agenda inhibits the organisational buy-in for adopting new technologies. They further believed that e-learning adoption would require the redevelopment of organisational administration and support systems and that an institution wide strategy would need to address all these areas (Nanayakkara, 2004).

The results of the survey are consistent with the previous research by Hitt and Hartman (2002), that institutional leaders and senior administrators must invest in a strategic plan for distance education. The authors assert that management must provide leadership in developing this plan for the institution as a whole.

In summary, the analysis of the survey results highlights that with the exception of flexible administrative systems aspects, the majority of factors that are linked to individual, system and organisational aspects have a significant impact on the adoption of LMS systems in teaching institutions.

At the individual level, the results revealed that the degree of knowledge and skills in online content design and delivery would strongly impact on the decision of academic staff to embrace this technology. The study identified that individual perception towards e-learning is a significant factor for system acceptance. There is no single universal belief

that staff would adopt the LMS technology even if they believed it would improve the quality of their face to face delivery.

The staff in the survey sample also strongly believed that LMS relevancy towards their face to face delivery was a key factor to influence their uptake of LMS technology. At the same time it could be noted that a positive faculty culture is a one of the key influencing elements for staff uptake. At the system level, the LMS attributes that were significantly important were: appropriate flexibility, functionality, tools to design and deliver online courses. At the external system level, the sufficient capacities and the reliability of ICT infrastructure are key determinants for the system uptake. The study however found that the flexible administration services such as online enrolment, distance library services, flexible student support services, security and reliability of online assessment do not have any major on impact in staff uptake of LMS.

In terms of organisation factors, the faculty facilitation of staff skill development and staff release time for online engagement are key contributory factors for staff uptake of e-learning. In addition, sufficient ICT training and facilitating efficient helpdesk services to complement e-delivery would greatly boost staff interest in e-learning uptake. It was also revealed that institutional leadership for the e-learning development and an institution's investment in a strategic plan for e-learning development are critical to the successful adoption of e-learning.

Overall, with the analysis outcomes, it can be concluded that, with the exception of a few items, the majority of elements that have been assessed in the proposed e-learning framework received a high degree of acceptance from the participants of this study.

Question 42

In this question, the respondents were presented with all 26 factors (q16-41) and asked to identify the five most critical factors for LMS adoption and then asked to rank their selection by order of importance (1 to 5). The analysis for this question is presented two fold. First, Figure 37. presents the analysis of factors that have been identified as the five most critical factors for LMS adoption in the order of significance. Then Figure 38. presents the factor analysis comparing the significance level (highest to lowest) of all factors that have been investigated.

In preparation of Figure 37., all factors were weighted awarding a score based on the respondent's rankings. (See Q42 results for the calculation). The weighted factors were then assessed to identify the five most significant factors for user uptake in LMS.

As presented in Figure 37. the availability of time to design and deliver online learning material was the most crucial factor (rank 1) for LMS adoption. The ease of use factor of LMS was rated next (rank 2) and the third factor (rank 3) was its usefulness towards job performance. The next factor was (rank 4) the need for training and support to develop online content. From the five factors assessed the least critical factor (rank 5) was the reliability and performance of the ICT infrastructure to deliver online courses.

In preparation of Figure 38., the scores for all factors were added to identify their levels of importance from highest to lowest for system adoption. (See Q42 results for the calculation). The user friendliness of the LMS is seen as the most important factor identified by nearly half (48%) of the staff. Lack of time was the second most important factor – identified by 45% staff. The third most important factor, identified by another 45% of respondents, was the training and support needed to develop and deliver online content.

The other significant factors identified by survey respondents were the usefulness of the LMS, knowledge needed to design and develop online content, the LMS relevancy towards face to face teaching and the degree of flexibility and functionaity within the LMS.

As presented in Table 7., a Pearson Product Moment Correlation test was carried out to investigate the relationship between the extent of agreement with an item in questions 16 to 41 and the ranking of the importance of that item in question 42. The results showed a

positive correlation of .555 which is significant at the 1% level for a 1 tailed test. This result demonstrates the reliability of the data as the items were measured separately and yet yielded similar results.

This result provides credibility to the relative significance of each item that was assessed in this study since the outcomes of the analysis of the influence of factors and the ranking of these factors was very similar.

This chapter presented a detailed analysis of the results of the study. The chapter began with analysing the demographic details of the survey respondents. The analysis indicated that the majority of staff who participated in the survey had considerable teaching experience (over 10 years) and higher academic qualifications. The e-learning knowledge was greater among the experienced staff (over 10 years) and staff with higher qualifications. In relation to the LMS adoption, the analysis found the current level of LMS uptake is low among the participants.

In terms of the analysis of factors influencing LMS adoption, the study identified that while individual factors have a significant impact on user adoption, a number of factors within system and organisational aspects were ranked the highest determinant for LMS uptake. The five essential factors that have been identified in their order of significance are: (1) release time for staff: (2) ease of use of LMS (3) usefulness of the LMS (4) training and support to develop online content and (5) reliability and performance of information and communication technologies.

The chapter concludes by analysing the validity of the proposed e-learning framework and presents that the majority of the elements identified are valid for LMS uptake within teaching institutions.

Chapter Six

CONCLUSIONS

This chapter presents the conclusions that have been reached from the research findings. The chapter begins with presenting the highlights of current e-learning development trends within tertiary institutions in New Zealand. The findings of tertiary organisational settings are presented next and then the conclusions that have been reached from the LMS factor analysis. The chapter concludes by discussing the outcomes on the validity of the proposed e-learning framework and provides recommendations on the measures that should be instigated when deploying LMSs in tertiary institutions.

The study explored the e-learning development trends in the institutes of technology and polytechnics (ITP) sector in New Zealand and found that there is strong interest from institutions in promoting e-learning technologies. It was found that all ITPs have invested in a learning management system (LMS) to promote e-learning within their institutions. It was however revealed that despite the effort by institutions to introduce e-learning technologies, there is low uptake from staff.

In terms of organisational settings, the analysis suggested that characteristics of the institution have little impact on the final outcomes of the results.

The study found that over half of New Zealand tertiary teaching staff had considerable teaching experience (over 10 years) and higher academic qualifications such as masters and doctorate degrees. The study also found that the majority of staff had high computer literacy levels however their e-learning knowledge was comparatively low in comparison to their computer literacy levels. The research found that the degree of e-learning knowledge was varied according to age group. Staff over 50 years old had a lower knowledge than staff less than 50 years old. The e-learning knowledge, however, was greater among the experienced staff (over 10 years) and staff with masters and doctorate degrees than those who had lesser experience and qualifications.

In terms of technology adoption, the study found that over half (60%) of the tertiary courses are supported with some form of e-technology tools, such as email, e-discussion lists or video conferencing. The LMS adoption rate, however, is low with only 38% of all papers delivered with the aid of LMS systems.

The study identified key factors that would influence or inhibit the adoption of LMS by teaching staff. While the research was carried out within a comparatively small group of staff of New Zealand tertiary institutions, the results present a good insight of the wider range of issues that an academic institute would need to address when adopting e-learning technologies.

The analysis outcomes suggest that the findings of the study are relatively universal and are not influenced by staff age, gender or the institute type.

The study identified two facets of e-learning development: content development and content delivery. It highlighted the fact that institutions embracing e-learning systems would need to deal with multiple factors if the system was to be successfully adopted by its target groups. The multiple factors that need to be dealt with during each facet of e-learning development are: individual, system and organisational factors. The study introduces an integrated framework incorporating the key factors for user acceptance in e-learning. The results indicate that a significant majority of the features identified in the framework are likely to have a strong influence on user adoption.

At the individual level, the study revealed that the degree of knowledge and skills in online content design and delivery would strongly impact on the decision of academic staff to embrace this technology. This result signified the need for adequate training and support during the system implementation stage. It indicates that the failure to provide training will result in high level of user apprehension in accepting this technology.

The study identified that individual perception towards e-learning is a significant factor for system acceptance. The study leads to the conclusion that influence of colleagues is a key factor, but not all pervasive. Slightly over half of the survey sample agreed that the influence of their colleagues would impact upon the adoption whereas around a quarter of the survey sample felt that the opinion of their colleagues would not influence adoption.

There is no single universal belief that staff would adopt the LMS technology even if they believed it would improve their face to face delivery. The opinion of over half the survey sample was that they would adopt LMS technology if they believed that it would improve the face to face delivery. It is notable that a further third of the survey sample disagreed and around a quarter strongly disagreed.

The staff in the survey sample also strongly believed that LMS relevancy towards their face to face delivery was a key factor to influence their uptake of LMS technology. At the same time it could be noted that a positive faculty culture towards e-learning is one of the key influencing elements for staff uptake.

At the system level the LMS attributes that were significantly (over 80% rating) important were; appropriate flexibility, functionality and tools to design and deliver online courses. At the external system level, the sufficient capacities and the reliability of ICT infrastructure are key determinants for system uptake. The study however found that the flexible administration services such as online enrolment, distance library services, flexible student support services, security and reliability of online assessment do not have any major impact in staff uptake of LMS.

In terms of organisation factors, the faculty facilitation of staff skill development in e-content design and delivery and staff release time for online engagement are key contributory factors for staff uptake in e-learning. In addition to the e-learning specific skills, sufficient training in information and communication technologies and facilitating efficient helpdesk services to complement the e-delivery would greatly boost staff interest in e-learning uptake.

It was also revealed that institutional leadership needs to lead the e-learning development and should facilitate the infrastructure and training support for staff adoption. The need for institutions to invest in a strategic plan for e-learning development across the institute is critical to the successful adoption of e-learning. Any strategic plan developed needs to incorporate an investment plan for redevelopment of organisational administration and support systems to meet distance learning needs.

On the whole, the study identified that while individual factors have a significant impact on user adoption, a number of aspects within organisational and the system were ranked as the highest determinants for LMS uptake. The five essential factors that have been identified in their order of significance are: (1) release time for staff (2) ease of use of LMS (3) usefulness of the LMS (4) training and support to develop online content and (5) reliability and performance of information and communication technologies.

From this result it could be concluded that release time for staff to engage in e-learning development is the highest determinant of intention and usage of a LMS. Secondly, the LMS that is offered for adoption should be easy to learn and use. LMS with higher levels of complexity will reduce the uptake of the chosen system. Staff belief on how the system can enhance or attain gains in their job performance is another key determinant for system uptake. The greater the perception of benefit resulting from LMS adoption, the greater the acceptance and use of the system. The strength of the facilitation by the institution to train and enhance staff skills in content design and development is a key influence in increasing LMS uptake. The reliability and performance of ICT infrastructure was the fifth of the essential factors with the highest significance. The conclusion is that the perception of or actual history of failures of the ICT platforms will greatly impede staff uptake in LMS.

Overall, the analysis of the survey results concludes that with the exception of a few items, the majority of elements that have been identified in the proposed e-learning framework have a significant influence over user acceptance in e-learning systems. Of the 26 factors tested, the majority, 13 (50%) factors received a very high degree (agreed by over 75%) of acceptance from staff, another 10 (38%) factors gained high (51%-75%) acknowledgement. The three (12%) factors with the lowest influence within the external system characteristics were: availability of online enrollment system, distance library services and online assessment. These were regarded as the least (rated 25%-50%) important in influencing LMS uptake for staff. However, it may be that these factors might have a strong influence on the adoption of e-learning by students.

The results conclude that the five factors which are essential for e-learning adoption fall within the system and organisational factor groupings within the proposed e-learning framework. It is noted that these factors closely represent the factors that have been selected from the recognized technology acceptance models TAM and UTAUT. The two

factors, ease of use and the usefulness factors in the system, represent the perceived ease of use and the perceived usefulness of the system in TAM. The release time, training and support and the availability of ICT infrastructure have similar representation to the facilitation conditions of the UTAUT model. The conclusion is that the incorporation of elements from recognized models have given added credibility and validity for the proposed e-learning framework (Figure 2.1) in the study thus increasing dependability for its application.

Overall, with this outcome it can be concluded that the empirically tested proposed e-learning framework is a valid representation for user acceptance in LMSs in the tertiary teaching institutions.

6.1 Recommendations

The study outcome identifies that successful implementation of e-learning systems within teaching institutions requires that various individual, system and organisational barriers for teaching staff be addressed. Therefore institutions planning e-learning development need to instigate an action plan to address such barriers for greater uptake of e-learning technologies by their teaching staff.

The research findings highlighted that the organisational and system aspects require priority attention over the individual factors. Therefore, in the short term, tertiary institutions need to focus on organizational and LMS system aspects. In relation to the organisational aspect, the provision of release time for staff to attend relevant training and time to undertake online course development are essential for staff uptake in LMS. The institutions should facilitate staff training and provide support to enhance various skill needs, in particular the online content design and development skills for its staff. The institutions should invest in sound ICT infrastructure, in the context of e-learning development, to ensure that institutions maintain a stable and efficient e-delivery medium for all e-learning user communities.

In terms of the system factors, the institutions should carefully evaluate and adopt a user-friendly LMS with features that can be easily learned by staff with diverse ICT competency levels. It is further important that, before any e-learning specific training, the staff are made aware of the usefulness of the LMS for their subject areas. The potential benefits that LMS brings to enhance their job performance would significantly improve the staff buy-in for the system.

It is recommended that a similar study should be undertaken to ascertain the factors that are important to student user communities. While staff participated in this study ranked that flexible student administrative and support systems are less important for their system adoption, a study identifying student needs could be helpful to determine the relevancy of this aspect for the uptake of an e-learning system by the all system users. It is further envisaged that the recommended study would provide a greater insight to the factors associated within student user communities, which in turn would be highly useful for the academic community in New Zealand tertiary institutions.

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APPENDIX 1

Dear xxxxx, (to: institutional e-learning managers)

As part of my Masters thesis in Information System at Massey University, I am conducting a survey to ascertain the factors influencing user adoption of Learning Management Systems (LMS) in New Zealand Tertiary Institutions. I wish to invite your institution's teaching staff (non LMS adopters, partial adopters and full adopters) to respond in this survey.

The details of the survey are given below. I would be most grateful if you could forward this email to your teaching staff at your faculties and schools and facilitate their participation in this survey.

Many thanks for your assistance.

Charith Nanayakkara

Dear teaching staff;

Your chance to tell us what you think....

With the emergence of internet and web technologies, the Learning Management Systems (Blackboard, WebCT, Moodle etc.) are increasingly becoming a popular e-delivery solution to support ever growing demands in flexible teaching needs in tertiary institutions. Whilst many of you may have been keen to adopt such technologies in your teaching process, you may have found that adopting such technologies is a complex process that requires careful consideration of many aspects.

I am undertaking a study to investigate the factors which influence the user adoption of Learning Management Systems (LMS) in New Zealand Tertiary Institutions. The study investigates many factors at the individual, system and organisation level which influence LMS adoption by teaching staff.

The project is intended to get a better understanding of users' needs and opinions so that future implementations of LMS will be better and easier for you to adopt.

I would be most grateful if you could participate in the following survey. This web survey questionnaire contains short questions (90% check box type) and will take 10-15 minutes of your time to complete.

To access the Information Sheet and the survey questionnaire please click on: http://www.boppoly.ac.nz/LMSresearch/survey.cfm. To directly access the survey questionnaire please clicks on: survey

Thank you for your assistance in making this project a success.

Charith Nanayakkara

APPENDIX 2

Information Sheet

Research Project - Adoption of e-learning technologies in tertiary institutions in New Zealand

Research Focus - Learning Management System (LMS) adoption

With the emergence of internet and web technologies the teaching institutions are exploring the potential use of integrated technologies i.e. Learning Management Systems (Blackboard, WebCT, Moodle) to cater to the ever growing demands in distance education. While institutions are making significant efforts in the development of LMS and associated infrastructure, the introduction of learning technologies in teaching institutions has often been complex and teachers and faculty do not always use the technology as expected and often systems continue to be underutilized.

I am undertaking a study to investigate the factors relevant to user adoption of Learning Management Systems (LMS) in New Zealand tertiary institutions. This study is part of my Masters degree thesis in Information Systems at Massey University in NZ.

In this survey, I am seeking your opinion on the factors that would influence or inhibit the adoption of LMS in your teaching process. I hope that the questionnaire will take no more than 10-15 minutes of your time.

The main outcome of this study will be a research report analysing multiple factors: individual, system and organisational, for LMS adoption. The report will also identify the most critical factors for LMS adoption and will present research conclusions together with recommendations to address barriers for system adoption.

The project results would ultimately benefit the teaching staff within institutions. It is envisaged that study outcomes would help to address priority needs by staff, and inturn receiving greater "buy-in" for system adoption during their teaching process. (For further project details please see : http://www.boppoly.ac.nz/LMSresearch/index.htm)

All information obtained from this survey will be treated in strict confidence and the data will be used only for this research purpose. Information collected will only be reported in a coded form ensuring the confidentiality and anonymity of the staff as well as the institutions taking part in the survey. We will destroy this data by Massey University's approved disposal methods five years after the completion of this study.

You have a right to refuse to participate in this study. You may stop answering the questionnaire at any stage and/or answer questions of your choice only if you desire to do so. There is no penalty from declining to participate or from withdrawing from the research project at any stage.

It will be assumed that filling in and returning of the questionnaire implies your consent to participate in this research.

When the project is completed you could obtain a copy of project report either accessing the project website http://www.boppoly.ac.nz/LMSresearch/index.htm or accessing the Massey University College of Business, IS Department's web site http://fims.massey.ac.nz/~is/staff/r_j_whiddett.htm. A summary of the findings will be obtainable by contacting Dr. Richard Whiddett at the address given below.

I would be most grateful if you could respond to the following online questionnaire.

If possible, I would appreciate your responses by **22nd December 2005**.

Thank you for your assistance in making this project a success.

Charith Nanayakkara

Project Supervisor:

Dr R. Whiddett
Department of Information Systems, Massey University

Massey University Research & Ethics Committee have been informed about this survey. At the request of the ethics committee I have given below their statement for your information.

"This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named below are responsible for ethical conduct of this research.

If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher(s), please contact Professor Sylvia Rumball, Assistant to the Vice chancellor (Ethics & Equity), telephone 06 350 5249, email humanehicspn@massey.ac.nz".

Appendix 3

Online Survey Questionnaire

Research Project - Adoption of e-learning technologies in tertiary institutions in New Zealand

Research Focus - Learning Management System (LMS) adoption.

Background Information

1. Your institution? [ ]

2. Your job title? [ ]

3. What is your subject area? [ ]

4. Years of teaching experience?

○ < 2 yrs ○ 2-5 yrs ○ 6-10 yrs ○ > 10 yrs

5. Your highest tertiary qualification?

○ Doctorate
○ Masters
○ Post graduate Diploma
○ Bachelors Degree.
○ Diploma
○ Professional teaching
○ Other

6. Your Age group?

○ < 20 yrs ○ 20-30 yrs ○ 31-40 yrs ○ 41-50 yrs ○ 51-60 yrs ○ > 61 yrs

7. Your Gender?

○ Male ○ Female

8. How do you perceive your current computer literacy rate?

○ Very high ○ Above average ○ Average ○ Below average ○ Very low

9. How do you perceive your current knowledge of e-learning technologies?

○ Very high ○ Above average ○ Average ○ Below average ○ Very low

10. Have you attended any Learning Management System (LMS) training programs or workshops? i.e. Blackboard, WebCT, Moodle.

○ No, go to Q13

○ Yes

11. Where did you attend the LMS training program/s?

○ On campus ○ Off campus ○ Both on and off campus

12. What is the level of the most recent LMS training you attended?

○ Basic ○ Intermediate ○ Advanced

13. How many papers/course modules do you currently teach at your institution?

[ ] papers/modules.

14. The table below lists some common teaching methods adopted to deliver papers/modules by teaching staff. Please provide the number of papers you teach within each teaching method. (the total number of papers or modules should equal the amount stated in question 13.)

Teaching method	**Number of papers or modules**
a. Face to Face (F2F) only, **without** the aid of a Learning Management System (LMS) or other e-technologies. i.e. Video conferencing, e-discussion lists, email etc.	[ ]
b. F2F, **with** the support of other e-technologies but **without** the aid of a LMS.	[ ]
c. F2F, **complimented** by a LMS, and **with** the support of other e-technologies.	[ ]
d. Mainly online,**with** the support of other e-technologies but **without** the aid of a LMS.	[ ]
e. Mainly online, **with** the aid of a LMS, and **with** support of other e-technologies.	[ ]
f. None of the above methods.	[ ]

15. Do you consider that any of your current **non-LMS supported paper(s)** (Q14 a,b and d) could be supported by a LMS?

○ No.

○ Yes, How many? ⌐ papers.

Learning Management System (LMS) adoption factors

Individual characteristics:

16. I would be more likely to adopt a LMS if my content design and development knowledge is high

○ Strongly agree ○ Agree ○ No opinion ○ Disagree ○ Strongly disagree

17. I would be more likely to adopt a LMS if my content delivery knowledge is high

○ Strongly agree ○ Agree ○ No opinion ○ Disagree ○ Strongly disagree

Individual perceptions:

18. My decision to adopt or reject a LMS could be influenced by my colleagues

○ Strongly agree ○ Agree ○ No opinion ○ Disagree ○ Strongly disagree

19. My decision to adopt or reject a LMS could be influenced by my believes towards e-learning. I would more likely to adopt if I perceive that LMS improves the quality of my face to face teaching

○ Strongly agree ○ Agree ○ No opinion ○ Disagree ○ Strongly disagree

20. I would be more likely to adopt if the LMS is relevant to my face to face teaching

○ Strongly agree ○ Agree ○ No opinion ○ Disagree ○ Strongly disagree

21. I would be more likely to adopt if my faculty or the school culture is positive towards e-learning

○ Strongly agree ○ Agree ○ No opinion ○ Disagree ○ Strongly disagree

System characteristics:

22. I would be more likely to adopt if the LMS provides appropriate flexibility

and functionality to teach online

Strongly agree Agree No opinion Disagree Strongly disagree

23. I would be more likely to adopt if the LMS provides appropriate course content design and development tools

Strongly agree Agree No opinion Disagree Strongly disagree

24. I would be more likely to adopt if the LMS improves my work performance

Strongly agree Agree No opinion Disagree Strongly disagree

25. I would be more likely to adopt if the LMS is easy to learn

Strongly agree Agree No opinion Disagree Strongly disagree

External system characteristics:

26. I would be more likely to adopt if there is sufficient Information and Communication Technology (ICT) infrastructure is available

Strongly agree Agree No opinion Disagree Strongly disagree

27. I would be more likely to adopt if the ICT infrastructure is reliable and efficient

Strongly agree Agree No opinion Disagree Strongly disagree

In the following questions, please identity the degree of importance of having other flexible student services to compliment the e-learning delivery.

28. I would be more likely to adopt if an online enrolment system is available

Strongly agree Agree No opinion Disagree Strongly disagree

29. I would be more likely to adopt if distance library services are available

Strongly agree Agree No opinion Disagree Strongly disagree

30. I would be more likely to adopt if distance student support services are available

Strongly agree Agree No opinion Disagree Strongly disagree

31. I would be more likely to adopt if an online assessments are reliable and secure

Strongly agree Agree No opinion Disagree Strongly disagree

32. I would be more likely to adopt if secure medium is available to post student results

Strongly agree Agree No opinion Disagree Strongly disagree

Organisational support:

33. I would be more likely to adopt if adequate training and support is available to design and deliver online papers

Strongly agree Agree No opinion Disagree Strongly disagree

34. I would be more likely to adopt if I was given sufficient time to design and deliver online papers

Strongly agree Agree No opinion Disagree Strongly disagree

35. I would be more likely to adopt if I was offered incentives to teach online

Strongly agree Agree No opinion Disagree Strongly disagree

36. I would be more likely to adopt if there is sufficient ICT training and support is available to teach online

Strongly agree Agree No opinion Disagree Strongly disagree

37. I would be more likely to adopt if there is suitable IT Helpdesk support is available

Strongly agree Agree No opinion Disagree Strongly disagree

Organisation characteristics:

38. I would be more likely to adopt if there is a faculty wide e-learning strategy for e-learning development

Strongly agree Agree No opinion Disagree Strongly disagree

39. I would be more likely to adopt if the orgnisation culture is positive towards e-learning

Strongly agree Agree No opinion Disagree Strongly disagree

40. I would be more likely to adopt if there is strong institutional leadership for e-learning development

Strongly agree Agree No opinion Disagree Strongly disagree

41. I would be more likely to adopt if there is an institute wide e-learning strategy and funding priority for e-learning development

Strongly agree Agree No opinion Disagree Strongly disagree

42. Rank your **five most** critical factors for LMS adoption from the following list. Please rank from most critical (1 through to 5) depending their significance to you.

The factors are grouped into individual, system and organisational, and they are colour coded for your easy reference. Please consider **all factors** when making your selection and please do not exceed 5 factors from the full list.

Individual Factors for LMS adoption
System Factors for LMS adoption
Organisational Factors for LMS adoption

	Rank
My knowledge level needed to design and develop content	
My knowledge level needed to deliver content	
Influence from colleagues	
My believes of LMS for quality of F2F teaching	
The relevancy of LMS towards my F2F teaching	
The faculty culture towards e-learning	
The degree of flexibility and functionality within the LMS	
Availability of appropriate design and dev. tools	
Usefulness (improve my work performance)	
User friendliness (easy to learn)	
The availability of ICT infrastructure	
The reliability and performance of ICT infrastructure	
Availability of online enrollment system	
Availability of online library services	

Availability of flexible student support services	
Access to reliable and secure on line assessments online a	
Availability of secure medium to post results	
Training and support to develop and deliver online content	
Availability of staff time	
Availability of incentives	
Availability of sufficient ICT training and support	
Availability of suitable ICT Helpdesk support	
The need for faculty wide e-learning strategy	
The need for positive organisational culture for e-learning	
The need for strong institutional leadership for e-learning development	
The need for institute wide e-learning strategy and funding priority	

Thank you for your time in taking part in this survey.

APPENDIX 4

Research Project - Adoption of E-learning Technologies in Tertiary Institutions in New Zealand

Research focus – Learning Management System (LMS) Adoption

Background:

Digital technologies are revolutionizing the practices of teaching and learning at colleges and universities all around the world. Until recently, the teaching institutions had adopted various e-delivery methods with the aid of Information and Communication Technologies to facilitate their distance teaching. However, with the emergence of internet and web technologies, tertiary institutions are increasingly exploring the potential uses of integrated web technologies such as Learning Management Systems (LMS), to cater to the ever growing demands of flexible teaching needs in distance education.

There have been a few research studies in e-learning technology adoption in New Zealand in the past. I observed that while these studies have investigated factors in the wider context of e-learning adoption (analysing wide variety of e-delivery mediums), there is little focus to identify factors relevant to LMS adoption.

I feel, now that LMS systems are building greater momentum within the NZ tertiary sector as an integrated e-delivery solution (replacing traditional e-delivery mediums and practices), it is timely, and is useful, to most of us if we identify factors relevant to LMS adoption.

I have decided to undertake a comprehensive study to identify factors that would influence or inhibit the adoption of LMSs' within New Zealand tertiary institutions. The study has been undertaken as part of my masters' thesis in Information Systems at Massey University in NZ.

The project is intended to provide valuable information to participating institutions. The project details are given below for your information.

Outline of the website:

This website is intended to provide you with useful information about the research project and its upcoming survey. The site is structured into six sections;

1. Research Objectives.
2. Intended Outcomes.
3. Who would benefit from this study and how?
4. What are the other recent studies in this topic and how this study would stand out from others?
5. What do I need to know about the upcoming research survey?
6. How could I participate in this survey and what do I need to do?

I am keen to include many institutions in this project and wish to invite your institution to take part in the research survey. Please let me know if your institution is interested in participating in the survey. I look forward to your assistance in making this project a success.

Charith Nanayakkara

APPENDIX 5

T-test analysis for all LMS adoption factors.

One-Sample Test						
	Test Value = 3				95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
I would be more likely to adopt a LMS if my content design and development knowledge is high	-7.007	89	<.001	-0.622	-0.8	-0.45
I would be more likely to adopt a LMS if my content delivery knowledge is high	-4.558	87	<.001	-0.477	-0.69	-0.27
My decision to adopt or reject a LMS could be influenced by my colleagues	-3.108	91	0.003	-0.348	-0.57	-0.13
I would be more likely to adopt LMS if I perceive it will improve the quality of my face to face teaching	0.078	90	0.938	0.011	-0.27	0.29
I would be more likely to adopt LMS if it is relevant to my face to face teaching	-9.07	90	<.001	-0.857	-1.04	-0.67
I would be more likely to adopt LMS if my faculty or school culture is positive towards e-learning	-10.638	89	<.001	-1.022	-1.21	-0.83
I would be more likely to adopt if the LMS provides appropriate flexibility and functionality to teach online	-12.43	92	<.001	-1.086	-1.26	-0.91
I would be more likely to adopt if the LMS provides appropriate course content design and development tools	-13.374	91	<.001	-1.087	-1.25	-0.93
I would be more likely to adopt if the LMS improves my work performance	-14.634	92	<.001	-1.183	-1.34	-1.02
I would be more likely to adopt if the LMS is easy to learn	-18.032	91	<.001	-1.293	-1.44	-1.15
I would be more likely to adopt if there is sufficient ICT infrastructure available	-14.164	91	<.001	-1.087	-1.24	-0.93
I would be more likely to adopt if the ICT infrastructure is reliable and efficient	-16.105	91	<.001	-1.272	-1.43	-1.11
I would be more likely to adopt	-2.393	90	0.019	-0.231	-0.42	-0.04

One-Sample Test						
	Test Value = 3 t	Sig. (2-tailed) df		Mean Difference	95% Confidence Interval of the Difference Lower	Upper
if an online enrolment system is available						
I would be more likely to adopt if distance library services are available	-4.723	88	<.001	-0.472	-0.67	-0.27
I would be more likely to adopt if distance student support services are available	-5.932	88	<.001	-0.618	-0.83	-0.41
I would be more likely to adopt if online assessments are reliable and secure	2.02	88	0.046	0.27	0	0.53
I would be more likely to adopt if a secure medium is available to post student results	-6.125	90	<.001	-0.67	-0.89	-0.45
I would be more likely to adopt if adequate training and support is available to design and deliver online papers	-13.006	94	<.001	-1.116	-1.29	-0.95
I would be more likely to adopt if I was given sufficient time to design and deliver online papers	-19.073	91	<.001	-1.543	-1.7	-1.38
I would be more likely to adopt if I was offered incentives to teach online	-5.307	90	<.001	-0.659	-0.91	-0.41
I would be more likely to adopt if there is sufficient ICT training and support to teach online	-12.123	91	<.001	-1.087	-1.27	-0.91
I would be more likely to adopt if there is suitable IT helpdesk support to teach online	-12.885	91	<.001	-1.13	-1.3	-0.96
I would be more likely to adopt if there is a faculty-wide e-learning strategy fro e-learning development	-7.665	89	<.001	-0.867	-1.09	-0.64
I would be more likely to adopt if the organisation culture is positive towards e-learning	-12.181	90	<.001	-1.033	-1.2	-0.86
I would be more likely to adopt if there is strong institutional leadership for e-learning	-16.656	88	<.001	-1.124	-1.26	-0.99
I would be more likely to adopt if there is an institute wide e-learning strategy and funding priority for e-learning development	-10.385	89	<.001	-0.956	-1.14	-0.77