ADOPTION AND USE OF A LEARNING MANAGEMENT SYSTEM AT THE UNIVERSITY OF FORT HARE: ENVIRONMENTAL FACTORS

by

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ABSTRACT

Learning Management Systems are adopted and used by institutions of higher learning such as universities, universities of technology and colleges. The acceptance of integrating Learning Management Systems into the traditional classroom method of teaching and learning presents many challenges to academic staff, students, and management at various levels. If such challenges are not addressed they may lead to project failure. If such projects fail, institutions may not realise the returns on their investments as institutions usually allocate many of their resources to start such projects. This study addresses the question of which critical environmental and management success factors are necessary for the successful acceptance of such a technology and what is necessary for such a technology to be used continually. This study examines Information Systems literature, users' environmental and management factors, and perceptions in the context of an institution of higher learning to suggest Critical Success Factors for such a project. Critical Success Factors are identified and discussed under the contexts of Management Support, the appointment of a Project Champion, provision of training to project participants, provision of adequate access to computing resources, monitoring and evaluation of the project, the existence of strong communication channels, and creation of positive perceptions about the target technology. Acceptance models such as Technology Acceptance Model and the Expectation Confirmation Model in Information Systems literature are also taken into consideration in coming up with the suggested Critical Success Factors.

KEYWORDS

Environmental Factors, Learning Management Systems, Technology Acceptance, Critical Success Factors

DECLARATION

I, Malan Willie Holmes Malande Xazela, hereby declare that:

- The work in this dissertation is my own work.
- All sources used or referred to have been documented and recognised.
- This dissertation has not previously been submitted in full or partial fulfilment of the requirements for an equivalent or higher qualification at any other recognised educational institution.

Malan Willie Holmes Malande Xazela

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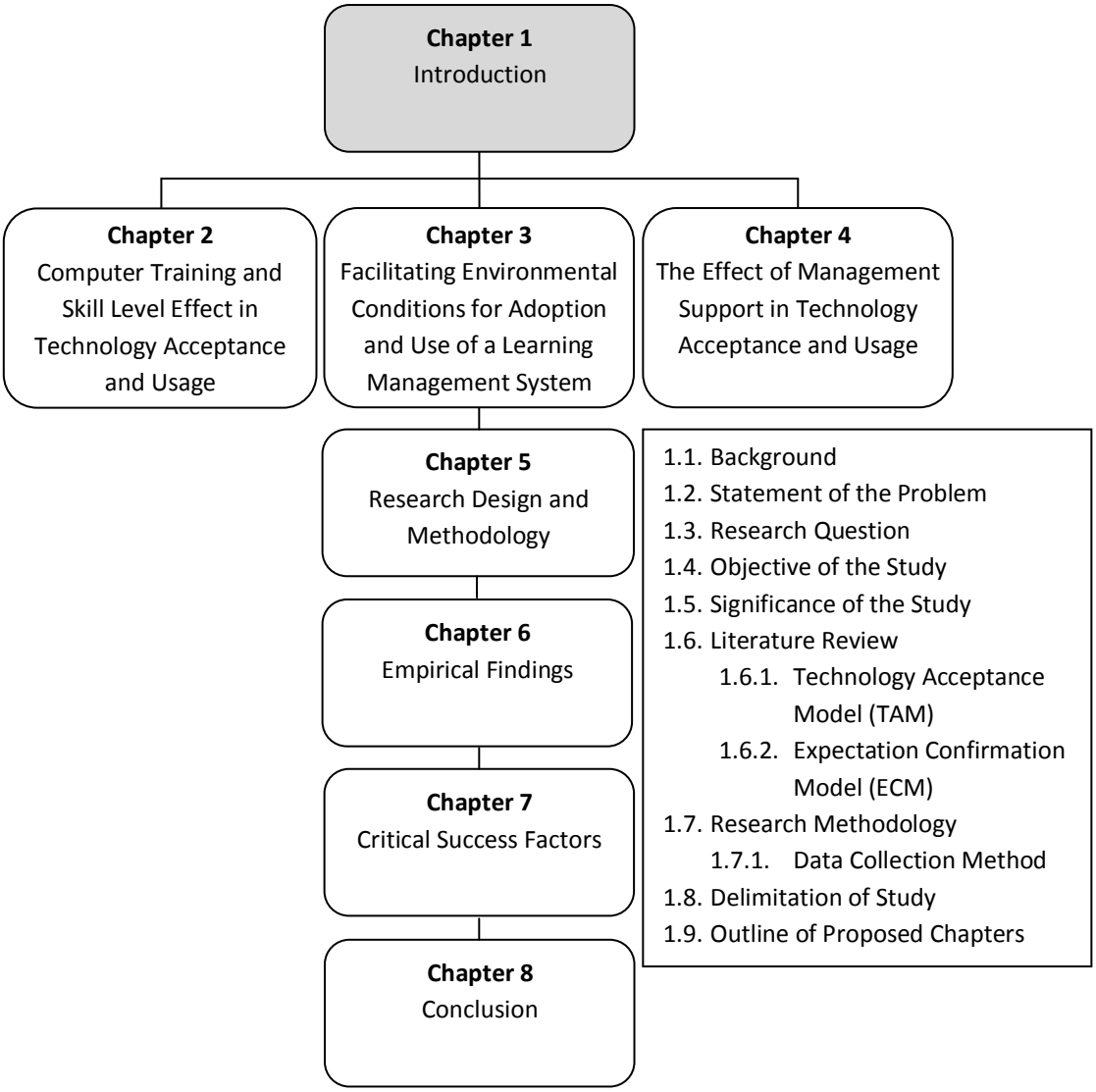
INTRODUCTION



1.1 BACKGROUND

A Learning Management System (LMS) provides a lecturer with a way to create and deliver content, monitor student participation, make possible interventions, and assess student performance. For students, an LMS provides them with the opportunity to make use of various interactive features to aid their learning; this may include downloading and uploading content and activities such as assignments. Most LMSs are web-based in order to allow anytime, anywhere access to both students and lecturers (SearchCIO.com, 2003). Thus, LMSs have become increasingly popular in tertiary education.

The e-Learning Unit (eLU) was established within the Teaching and Learning Centre (TLC) in 2007 to take control of e-learning issues.The eLU coordinated an e-Learning Indaba in East London on 26 July 2007 where major stakeholders of the institution met. This led to approval for the purchase of a new LMS for the institution. Thus, Blackboard replaced WebCT in 2009. Training on the new LMS was conducted for eLU support staff and academic staff in 2008. Twelve academic staff embarked on a pilot programme, running 18 modules for 679 students. In order to understand this context, it is necessary to consider existing research in this area.

A considerable amount of research has been conducted in technology acceptance (Yaobin, Tao & Bin, 2008; Teo, 2009; Wu, Shen, Lin, Greenes & Bates, 2008; Horst, Kuttschreuter & Gutteling, 2007). These studies looked at the adoption of technologies by private companies, governments and educational institutions; however, only a few focused on the continued use of such technologies (Thong, Hong & Tam, 2006; Mahmood, Hall & Swanberg, 2001).

Technology adoption and continued use is important for companies and institutions to realise the value of their investments in technologies. This is especially relevant in educational institutions who need to ensure the technology they introduce is continually and effectively used to achieve the primary objective of empowering students. This study aims to investigate and predict factors that affect the adoption and continued use of an LMS at the University of Fort Hare, an historically disadvantaged institution.

1.2 STATEMENT OF THE PROBLEM

A LMS (WebCT) was available to the UFH community between 2004 and 2008, after which the current LMS (Blackboard) was purchased. The University of Fort Hare (UFH) has previously experienced low involvement in the usage of electronic learning (e-learning) technologies, including LMSs. A low percentage of staff members made use of WebCT (the previous LMS employed by the institution between 2004 and 2008). The reasons for limited use of WebCT were never scientifically investigated and validated. According to Teo (2009), the necessary facilitating conditions for adoption and continued use of an LMS that may not have been met, include technical support, administrative support, access to computers and sufficient bandwidth.

A lack of organisational support for e-Learning, in terms of an institutional policy, may also have contributed to this lack of use (Mahmood *et al.,* 2001; Wu, Shen, Lin, Green & Bates, 2008).

Insufficient computer skills, of both staff and students, may lead to a perception that the LMS is difficult to use, or even irrelevant to their work. Perceptions of usefulness and ease of use of a technology are determinants of technology acceptance and use (Porter & Donthu, 2006; Yaobin, *et al.*, 2008; Horst *et al.,* 2007). Additionally, personal experience with technology in general, may result in a negative or positive attitude toward the adoption and use of an LMS (Mahmood *et al.,* 2001; Teo, Wong & Sing, 2008).This study sets to investigate the effect of such factors and their effect in the local context as outlined in the research question and sub questions.

1.3 RESEARCH QUESTION

What management and environmental Critical Success Factors have influenced the acceptance and continued use of a Learning Management System at the University of Fort Hare?

In order to answer the above research question, the following sub research questions will be addressed:

1. *What facilitating environmental conditions are necessary for the adoption and continued use of a Learning Management System?*

   This research question will look at facilitating environmental conditions, such as technical support, access to computers and sufficient bandwidth.

2. *What effect does management support have on the decision to make use of a Learning Management System?*

   This research question will look at the value of institutional policies and administrative support in promoting the continued use of LMSs.

3. *What influence does the computer skill level of a user have on the likelihood of a Learning Management System being adopted and used?*

   This research question will look at the various skill levels evident amongst UFH staff and students, and the effect this has on the user's perception of the ease of use of the LMS.

1.4 OBJECTIVE OF THE STUDY

The objective of the study is to investigate and identify management and environmental factors that influence the acceptance and use of an LMS at UFH, and to suggest ways to sustain this

technology use from initial adoption (the pilot programme) to full adoption where it will be used continually.

1.5 SIGNIFICANCE OF THE STUDY

Most studies on technology use and acceptance have been done in an environment that is not the same as at UFH. The user profiles are different and the studies have mainly been conducted in developed countries. Studies conducted in the African continent differed from results of most of the studies conducted in Western countries. For example, the study done by Anandarajan, Igbaria and Anakwe (2002) showed that the main determinant for use of a technology in African countries was *perceived ease of use,* as opposed to western countries where it was *perceived usefulness*. Another study conducted in South Africa produced similar results (Averweg, 2008).

This study aims to investigate and validate the factors promoted by the Technology Acceptance Model (TAM) which predict technology use and acceptance. In particular, emphasis will be placed on the current setting and user profiles, and ways will be suggested for sustaining the use of the LMS technology. This study examines the facilitating conditions, management support and computer skills levels, and their effect on the *perceived usefulness* and *perceived ease of use* of LMSs. This study will add to the body of knowledge about technology adoption factors in the African setting. The TAM constructs that have been investigated and validated in Western countries will be tested for validity in the African context.

1.6 PRELIMINARY LITERATURE REVIEW

This section introduces the main theories and literature on technology acceptance and use.

1.6.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) was developed by Davis in 1986 and has been used to predict and validate factors that influence technology adoption, acceptance, and use. It is one of the most cited theoretical frameworks in the information systems discipline (Teo, 2009). The model is an attempt to derive the determinants of computer acceptance, and is depicted in Figure 1.1 below.

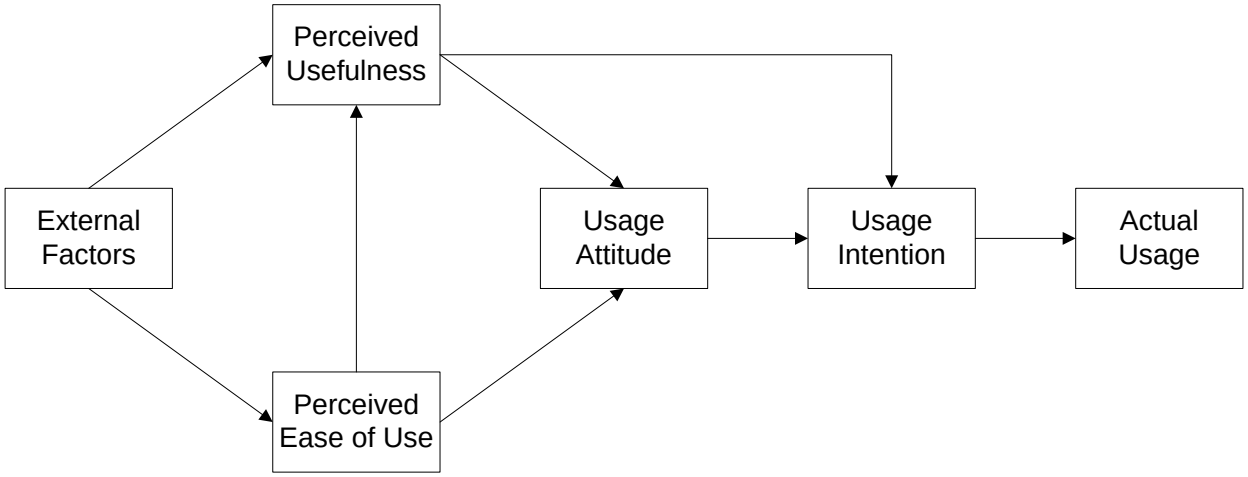


Figure 1.1: Technology Acceptance Model (Yaobin, Tao & Bin, 2008; Park, Lee & Cheong, 2007)

The model is based on factors relating to Actual System Use (ASU), Attitude Towards Using (ATU), Perceived Ease of Use (PEU), Perceived Usefulness (PU), and Behavioural Intention (BI). ATU is defined as "the user's desirability of his or her using the system" (Renaud & van Biljon, 2008, p: 212). ATU is the result of personal and social influences (Renaud & van Biljon, 2008). PEU of a system is the view the user has, thinking that the technology is easy to work on (Park *et al.,* 2007). PU is the view the user has that a technology is helpful in assisting a user in his/her work (Park *et al.,* 2007). BI is the interest in using a technology to achieve a task in the future (Wu *et al.,* 2008).

A number of studies have tested external factors that influence technology adoption in TAM that resulted in the original TAM being extended. Some of the tested external factors that influence acceptance, use and adoption in TAM are listed in the table 1.1 below.

Table 1.1: External Factors Affecting Acceptance, Use and Adoption

Factor	Author
Age	Anandarajan, Igbaria and Anakwe (2002) Porter and Donthu (2006)
Education	Porter and Donthu (2006)
Income	Porter and Donthu (2006)
Race	Porter and Donthu (2006)
Culture	Yaobin, Tao and Bin (2008)
Concentration	Yaobin, Tao and Bin (2008)
Social Pressure	Andarajan, Igbaria and Anakwe (2002)
Personal Experiences (good or bad)	Horst, Kuttschreuter and Gutteling (2007)
Computer Skills: User's experience and computer training.	Andarajan, Igbaria and Anakwe (2002)
Management Support: General support offered by top management.	Wu and Kuo (2008)

Subjective Norm (SN): User's view of whether other people important to him think that he should engage in technology use.	Lee, Lee and Lee (2001) Wu and Kuo (2008) Yaobin, Tao and Bin (2008)
Social Identity (SI): Knowledge that an individual belongs to certain social groups together with emotional and value significance to him of this group membership.	Lee, Lee and Lee (2001)
Trust: Extent to which one is willing to ascribe good intentions to, and have confidence in the words and actions of other people (or systems).	Horst, Kuttschreuter and Gutteling (2007) Wu and Kuo (2008)
Self Identity: The salient part of an actor's self which relates to a particular behaviour that reflects the extent to which an actor sees him-or-herself as fulfilling the criteria of any societal role.	Lee, Lee and Lee (2001)
Technology Complexity (TC): The level to which technology is thought to be difficult to understand and use.	Teo (2009)
Facilitating Conditions (FC): Factors in the environment that influence a person's desire to perform a task.	Teo (2009)
Perceived Enjoyment (PE): Internal motivation for use of computers.	Andarajan, Igbaria and Anakwe (2002)
Flow: The holistic sensation that people feel when they act with total involvement.	Yaobin, Tao and Bin (2008)

TAM has been used to determine technology use by university instructors (Park *et al.,* 2007), and pre-service and in-service teachers (Teo *et al.*, 2008; Teo, 2009). It has been tested in a number of cultural environments: in an African environment, (Anandarajan *et al.,* 2002; Averweg, 2008) a Chinese cultural environment (Yaobin *et al.*, 2008), a Singaporean and Malaysian environment, (Teo *et al.*, 2008) and in a Singaporean environment (Teo, 2009). It has been validated in users' acceptance of instant messaging, (Yaobin *et al.*, 2008) and has also been used in explaining how attitudes determine Internet usage (Porter *et al.*, 2006). TAM has been used to predict acceptance of technology in different fields; healthcare (Wu *et al.*, 2008), adoption of e-government (Horst *et al.*, 2007), education, (Teo *et al.*, 2008) and many other fields.

According to Teo (2009), teachers have a role to play that will either advance the use of technology in education or affect it badly. Teo (2009) cited personal factors, such as reluctance to work with computers and technical factors, such as technological complexity. Teo (2009) also states that the successful use of technology in teaching and learning depends on the factors that significantly influence teachers' technology acceptance. Teo (2009) published research findings that showed *perceived usefulness*, *attitudes* towards computer use, and *computer self-efficacy* having a direct effect on *behavioural intention* to use technology. He found that *perceived ease of use*, *technological complexity*, and *facilitating conditions* directly affect *behavioural intention*. The study was conducted on pre-service teachers in Singapore.

A similar study has been conducted on university instructors (Park *et al.*, 2007). The study examined factors that influence instructors' adoption and use of an Internet-based course management system, and tests the applicability of the TAM in the context of e-learning practices in higher education. The results revealed that *perceived ease of use* of the system had a significant impact on *perceived usefulness* as the TAM suggested. Also *perceived usefulness* was found to have a direct effect on *behavioural intention* and an indirect effect on the *actual system use*.

Park *et al.* (2007) also tested the effect of *policy* on adoption in the educational environment and found that the policy has no significant impact on adoption decision. A number of factors have been investigated in the role they play in technology acceptance: these include; *subjective norm* and *moderation effect* (Schepers & Wetzels, 2007), *self identity* and *social identity* (Park *et al.*, 2007), *social Influence* (Lee, Lee & Lee, 2006), *personal experiences*, *risk perception* and *trust* (Horst *et al.*, 2007). Some studies have cited presence and absence of *risk* and *trust* as determinants in technology acceptance (Horst *et al.*, 2006).

The TAM study where research was conducted between Singaporean and Malaysian pre-service teachers did not yield significant differences across two *cultures* (Teo *et al.*, 2008). A study conducted in an African setting in Nigeria found that *perceived usefulness* and *perceived enjoyment* have no effect on usage, as opposed to findings in North America (Anandarajan *et al.*, 2002). *Organisational support* and *social pressure* had more effect on usage with Nigerian users. It was also found that normative and social values had more effect on users. These findings are not in agreement with the findings on Chinese Internet users (Yaobin *et al.*, 2008) . Yaobin *et al.* (2008) found that users accepted technology because of *intrinsic motivation* (*perceived enjoyment* and *concentration*) and *extrinsic motivation*. The study was conducted mainly on high school students and undergraduate students and not on working professionals, which may be an indication that students are interested in the *enjoyment* aspect of usage.

Factors such as *age*, *education*, *income* and *race* have also been found to have an impact on technology acceptance (Porter & Donthu, 2006). Porter & Donthu (2006) found that there is less Internet usage by older, less educated and lower income individuals, than those who are younger, highly educated, white and wealthier. They found that *race*, *age*, *education* and *income* are associated with Internet usage. Furthermore, older users need a different approach, as compared to younger users. Porter & Donthu (2006) state that older users understand the importance of Internet usage so there is no need to market technology to them, as compared with younger users. Older users' concerns are cost and comfort in familiar environments. They are challenged by new, unfamiliar environments. Older users should be helped to overcome psychological access barriers and the tools they use should be based on familiar devices.

Other factors that have been validated as being determinants of adoption are: *perceived ease of use*, *perceived usefulness*, *personal experience*, *risk,* and *trust* (Horst *et al.*, 2007). Horst *et al.* (2007) discovered that *risk* perception, *personal experience*, *perceived behavioural control* and *subjective norm* significantly predict the *perceived usefulness* of technology in general. According to him, *perceived usefulness* is the main determinant of the intention to adopt technology. *Trust* was the main determinant of perceived *usefulness* and has been found to be the main determinant of *behavioural intention to use* a system, together with *subjective norm*.

Schepers and Wetzels (2007) found that *subjective norm* has more effect on younger users, such as students, as compared to older users. They also claim that younger users are more technologically ready and easily influenced by trends. These findings are in agreement with Porter and Donthu (2006). Schepers and Wetzels (2007) assert that technology acceptance differs in various cultures. *Perceived usefulness* determines *intention to use* and *actual use* in Western cultures, while the determinant in non-western cultures is *ease of use.*

The differences between results conducted in Western countries and countries in Africa have also been identified in a study conducted in South Africa (Averweg, 2008). Averweg (2008) found that *perceived ease of use* was the main determinant of acceptance. The main determinant in the majority of studies conducted in Western countries is *perceived usefulness*. Averweg (2008) states that it is important to consider the influence of local conditions on the adoption and assimilation of technologies in developing countries. Local conditions may be the cause of the differences in the findings, as in Anandarajan (2002).

Once technology has been adopted, continued usage of the technology becomes the focus, and thus the Expectation Confirmation Model (ECM) will now be introduced.

1.6.2 Expectation Confirmation Model (ECM)

While the Technology Acceptance Model (TAM) deals with intentions to adopt, accept and use technology, the Expectation Confirmation Model (ECM) (see Figure 1.2) deals with the post-adoption environment, where users decide whether or not to continue using a technology (Thong *et al.*, 2006). Thong *et al.* (2006) state that until the post-adoption usage of the technology can be confirmed, it is premature to classify a technology adoption as a success.

According to Thong *et al.* (2006), it is important that post-adoption beliefs be investigated and dealt with, because if enthusiasm over initial adoption of technology diminishes after users have gained experience, the technology will suffer from decreased use. That would have an impact on organisations that built their services around that technology, and would need to write off significant investments employed in implementing the technology. Thong *et al.* (2006) state that there are potential benefits in increasing user retention rates, like reduction in operating costs and a possible increase in profit.

While initial acceptance of e-learning is an important first step towards realising e-learning success, the long term viability of e-learning and its eventual success depend on its continued use, rather than its first-time use.

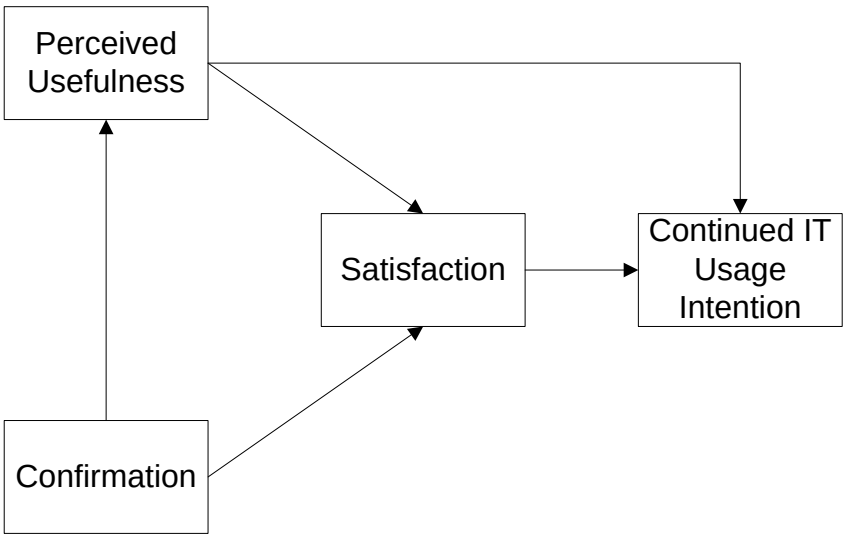


Figure 1.2: Expectation Confirmation Model (ECM) (Thong, Hong and Tam, 2006)

The ECM assumes that continued use of technology depends on three main factors:

1. Users' level of **satisfaction**

2. The extent of users' **confirmation** of expectations

3. Post adoption expectations in the form of **perceived usefulness**

Table 1.2 below lists factors whose effect has been investigated in continued IT usage:

Table 1.2: Factors Affecting Continued IT Usage

Factor	Author
Past Usage	Wu and Kuo (2008)
Habitual Usage	Wu and Kuo (2008)
Positive Attitude	Mahmood, Hall and Swanberg (2001)
Subjective Norm	Lee, Lee and Lee (2001) Wu and Kuo (2008)
Educational Level	Mahmood, Hall and Swanberg (2001)
Professional Level Skill	Mahmood, Hall and Swanberg (2001)
Level	Andarajan, Igbaria and Anakwe (2002) Mahmood, Hall and Swanberg (2001)
Training Level	Mahmood, Hall and Swanberg (2001)
IT Maturity Level	Mahmood, Hall and Swanberg (2001)
Strategic Applications Level	Mahmood, Hall and Swanberg (2001)
Organisational Support	Mahmood, Hall and Swanberg (2001)
Organisational Size	Mahmood, Hall and Swanberg (2001)

A study by Thong *et al.* (2006) used an extended ECM (Figure 1.3), and the results were supportive of the original ECM. Thong *et al.* (2006) found that both *satisfaction* and *post-adoption expectations*, such as *perceived usefulness*, *perceived ease of use* and *perceived enjoyment*, are significant determinants of users' continued technology usage intentions. The study confirmed that *confirmation* has the primary effect on *satisfaction,* and that users place more emphasis on the confirmation of their expectations than on individual post adoption beliefs, in forming their levels of satisfaction. Thong *et al*. (2006) found that there is a weak association between *perceived usefulness* and *satisfaction.*

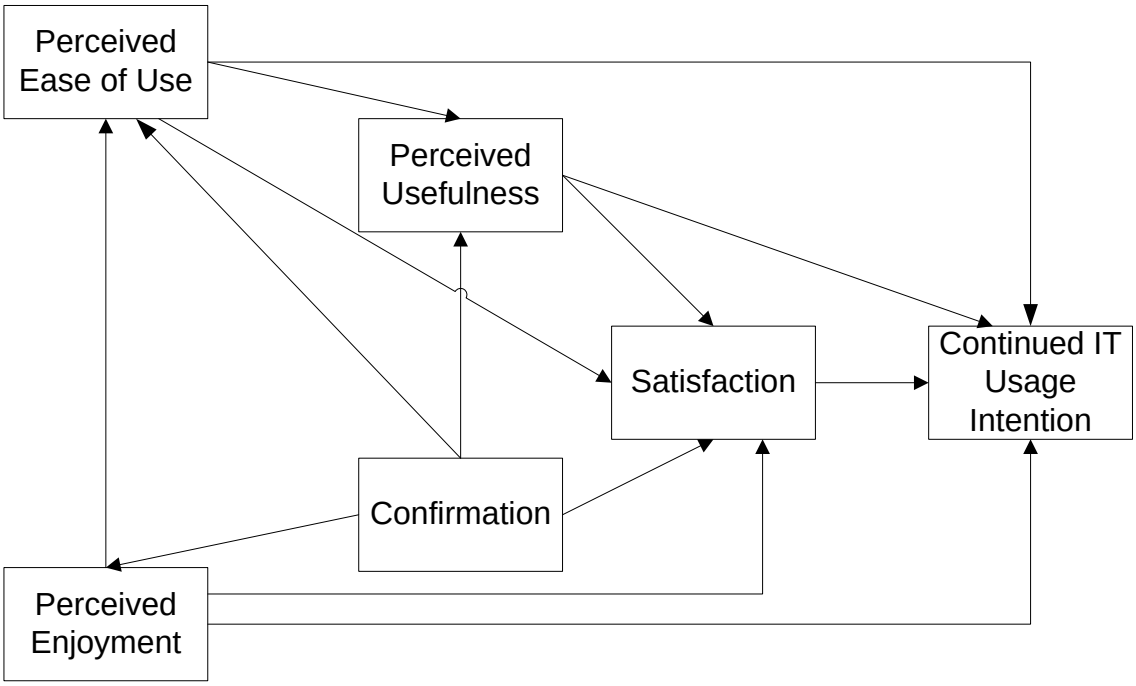


Figure 1.3: Extended ECM (Thong, Hong and Tam, 2006)

A study conducted on *habitual usage* and *past usage* of IT adoption and continuance (Wu & Kuo, 2008) revealed that both *habitual usage* and *past usage* have a strong influence on intention. According to the study, the predicting power of *perceived usefulness* and *perceived ease of use* on intention is diluted by the addition of *habitual usage* and *past usage*. According to Wu and Kuo (2008), studies have demonstrated that *past usage* is the most powerful predictor of *future usage*. Information System *habit usage* is defined as the extent to which people tend to perform behaviours automatically because of learning (Wu & Kuo, 2008).

A study conducted by Mahmood *et al.* (2001) analysed a number of other studies on technology usage continuance; revealed that most studies of IT use continuance showed that *perceived usefulness*, *perceived ease of use*, *organisational support*, and *skill level,* in that order, were the factors with the highest effect on *continued usage* . The study is in agreement with other studies (Thong *et.al,* 2006) which found that *perceived ease of use* and *usefulness* play a great role. According to Mahmood *et al.* (2001) the factors with the lowest effect on continued usage are

educational level, *professional level*, and *training level*. Factors that are in the middle ground in terms of effect on IT continued usage, are *organisation size*, *IT maturity level* of the organisation, and *positive attitude*. A study revealed that the highest ranking factors are those that have the most impact on individuals in performing their daily tasks (Mahmood *et al.*, 2001). *Usefulness*, *ease of use*, and *educational support* are the factors with the strongest effect.

1.7 RESEARCH METHODOLOGY

This study investigates technology acceptance and use at UFH by lecturers and students at the Alice and East London campuses. Data was collected through online questionnaires from both lecturers and students. A quantitative research method was used.

Questionnaires were used to collect data. The questionnaires were evaluated by experts in questionnaire design before use. The participants were chosen because they are users or potential users of the LMS.

The questionnaires were hosted on SharePoint server and links to the questionnaires distributed by e-mail. Different formats of questions and responses were used; yes/no, degree of agreement or disagreement (Likert Scale), scale questions and rank order questions. The different formats of questions for both TAM constructs *perceived ease of use* and *perceived usefulness* were adapted from published research and amended to fit the current study (Averweg, 2008). A similar approach to Anandarajan *et al.* (2002) was adopted for the questions on factors of *computer skills* and *organisational support* and was adapted to fit the current study.

1.8 DELIMITATION OF THE STUDY

The study was conducted on two of the campuses of UFH - Alice and East London. The Alice campus is in a rural area and the East London campus is an urban area. The study covers LMS acceptance and use. A total of 195 out of 679 students with Blackboard experience and 57 lecturers participated in the study. The 57 lecturers include the 12 who participated in the LMS pilot programme, as well as new and potential users. The questionnaires were administered on SharePoint.

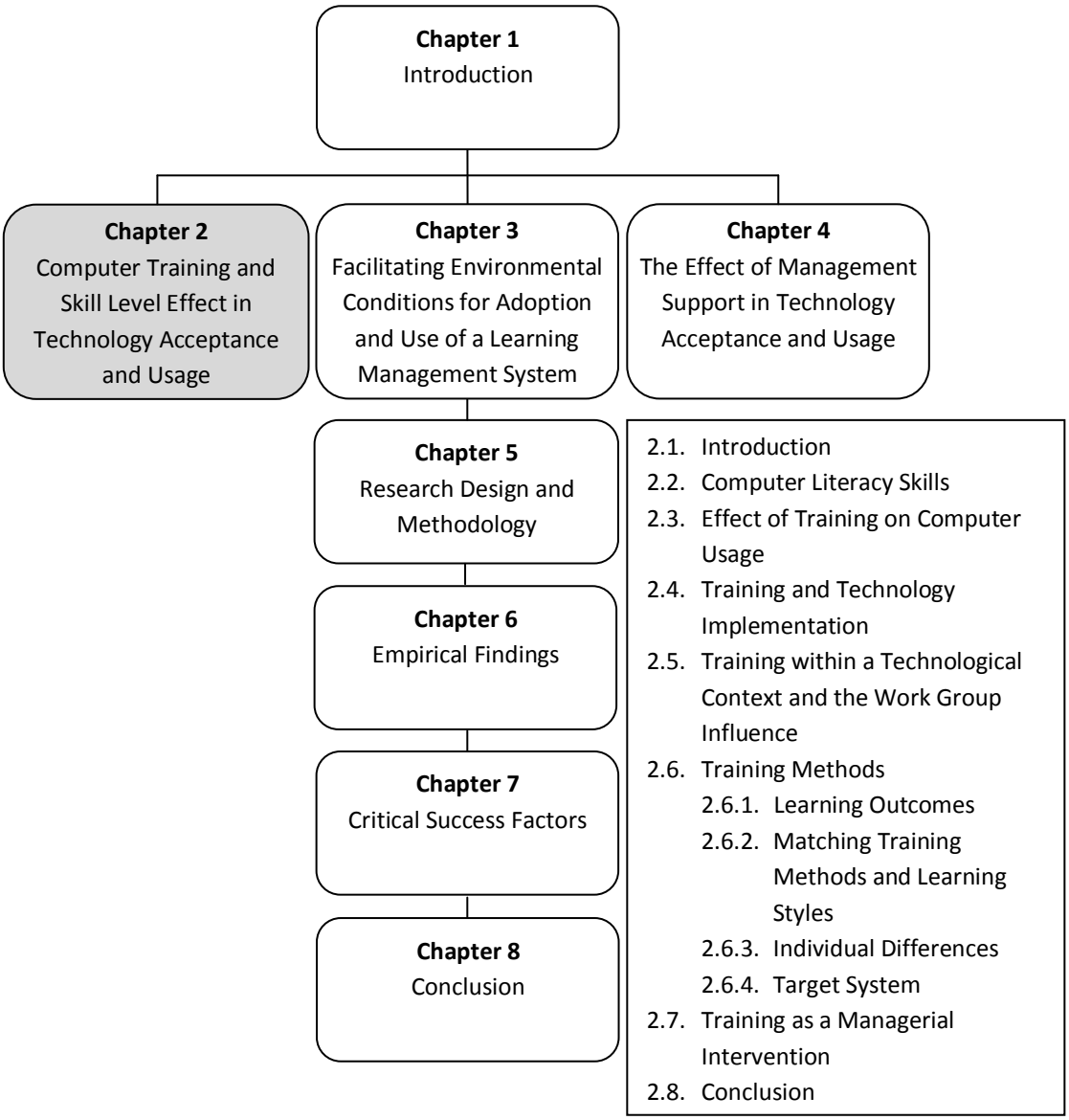
1.9 OUTLINE OF PROPOSED CHAPTERS

Chapter one discussed the background to the study, problem statement, research questions and research methodology. In Chapter two, computer training and skill level effect in influencing technology acceptance and usage will be discussed. In Chapter three the issues of infrastructure technical support, access to IT infrastructure, bandwidth are discussed as an enabling environment that facilitates teaching and learning using technology.

In Chapter four the effect of management support in technology acceptance and usage are discussed. Chapter five is the research design and methodology of this study. A detailed explanation of how the study was conducted and the tools used will be discussed. Chapter six is the empirical findings, Chapter seven the Critical Success Factors, and Chapter eight is the conclusion.

CHAPTER 2:

COMPUTER TRAINING AND SKILL EFFECT ON TECHNOLOGY ACCEPTANCE AND USAGE



2.1 INTRODUCTION

This chapter covers the relevant literature about training in preparation for adoption and use of technologies. The focus is on training related to Information Technology (IT) and Information Systems (IS) technologies in general. Training and user computer skill will be discussed as interventions that can be made in influencing the user perceptions of ease and usefulness of use for a technology and is necessary when new technology is introduced. In addition to training various approaches to training are discussed which may be used in a variety training context in ensuring greater understanding of the introduced technology concepts by trainees.

The sections of this chapter cover the following issues:

- Computer literacy skills and the role played by such skills for technology adoption and use.
- The effect of training on computer usage during the technology implementation process. The work group influence on training in a technological context.
- Training methods in a technological context, with focus on learning outcomes of creating a perception that a technology is easy to use and increasing the trainee computer skill.
- The effect of individual differences during training and effect those differences will have on the perception of ease of use and usefulness.
- A number of learning styles to cater for individual differences are also discussed; matching the learning styles, training methods with the characteristics of the target system for users to find the system easy to use;
- Lastly, training is discussed as a managerial intervention during the technology adoption and use process.

2.2 COMPUTER LITERACY SKILLS

If technical innovations are to be successful, the support staff should have the necessary skills to support end-users during the implementation process. According to Sharma and Yetton (2007), end-user training is a critical intervention in the implementation process. If the training is to be provided to participants, the training intervention should be part of the budget provided for technological innovation implementation.

Today, the modern day population is exposed to a number of technological innovations, such as cell phones, and automatic teller machines (ATMs). Nash (2009) confirmed that student exposure to such technologies does not necessarily mean they have the skills required to be competent in using all computer applications suitable for a number of contexts; such as work and educational environment. In the case of students entering tertiary institutions in South African (SA), Nash (2009) concluded that students entering university in SA for the first time should be trained to gain computer skills.

According to Nash's (2009) findings, computer training should be continued for students entering university in SA, especially black students coming from a disadvantaged background. In Hardy *et al.* (2006) as cited by Nash (2009), North Missouri University computer literacy training was stopped, based on the assumption that students had sufficient computer skills to be successful in the academic environment. The computer literacy training had to be re-introduced later because of assessments that were conducted revealed that students did not have the necessary skills. The findings were that the offering should differ because students were at different levels in terms of the necessary skills.

A number of universities have resorted to making students write proficiency exams to test the necessary computer skills as part of the orientation programme for new students. This includes the University of Cape Town (UCT) (Nash, 2009). Nash (2009) states that it cannot be assumed that all students are at the same level in terms of computer skills necessary for successful academic engagement. The same view is echoed by Dednam (2009) who conducted a study in one of the South African Universities and found that there is a need for computer literacy.

In the context of UCT, students who write the skills test and get 60% and above are considered to have the necessary computer skills to make it at university (Nash, 2009). The overall assessments for 2009 new students indicated that the majority of students were comfortable with certain modules, as shown in Table 2.1.

Table 2.1: Overall Computer Literacy Assessment Results for 2009 New Students at UCT (Nash, 2009)

Assessment	Average overall score	Percentage of students scoring below 60%
Overall	74 %	16%
Intro to PC's	83%	9%
Windows	83%	12%
MS Word	66%	28%
MS Excel	50%	55%
Internet & email	84%	8%

The majority of students who needed training were Africans, followed by Coloureds, Indians and then Whites (see Table 2.2). The results show that mostly populations from disadvantaged backgrounds were the ones who needed training and Nash (2009) suspects this may be as a result of lack of exposure these groups have to the relevant technologies.

The students most lacking were Africans as shown in table 2.3. Women were also lacking as compared to men. The assumption is that, because UCT has strict admission requirements as compared to a number of universities in RSA, it may be even worse in other institutions with less strict admission requirements. So, can one assume that the situation in universities

predominantly attended by African students from disadvantaged backgrounds computer literacy is the lowest?

Table 2.2: Percentage of Students Scoring Below the Pass Mark of 60% in 2009 by Population Group (Nash, 2009)

Assessment	African	Coloured	Indian	White
Overall	39%	9%	4%	1%
Intro to PCs	21%	5%	2%	2%
Windows	30%	5%	2%	1%
MS Word	57%	26%	15%	8%
MS Excel	74%	59%	45%	40%
Internet/Email	22%	2%	1%	0%

Table 2.3: Average Scores by Population Group (Nash, 2009)

Assessment	African	Coloured	Indian	White
Overall	61%	76%	81%	83%
Intro to PCs	74%	85%	88%	88%
Windows	70%	86%	89%	91%
MS Word	48%	67%	74%	79%
MS Excel	36%	50%	57%	59%
Internet/Email	71%	87%	91%	92%

Computer literacy is the basic training necessary for staff and students to participate in teaching and learning at a tertiary institution and the skill is necessary as it has been shown that it has an impact on perception of ease of use and usefulness, which may lead to technology acceptance (Sharma & Yetton, 2007; Xia & Lee, 2000).

2.3 EFFECT OF TRAINING ON COMPUTER USAGE

Alshare, Gradon and Miller (2004) embarked on a research project to try to understand the relationship between computer literacy, attitudes, perceived ease of use, and perceived usefulness, as determinants of computer use. Their results showed that computer literacy, attitudes, perceived ease of use, and perceived usefulness all had a significant impact on computer usage.

Nash (2009) and Alshare *et al.* (2004) agree on the definition of computer literacy as an understanding of computer characteristics, capabilities and applications, as well as the ability to implement this knowledge in the skilful productive use of computer applications to individual roles in society.

The degree of computer literacy has the implication of having a direct effect on determining the amount and level of training that will be needed by learners or workers at an institution. Lack of

computer skills plays a role in companies and institutions and leads to a situation where available technology is underutilised.

Low use of installed systems has been found to be the cause of low returns in organisational IT investments (Alshare *et al.* 2004). According to Nelson, Kattan and Cheney (1991), if a technology is not used by targeted company workers one of the reasons may be lack of training and the ability to use a system which would lead to user acceptance and satisfaction.

The model used by Nelson and Cheney (1987) to determine technology acceptance is shown in Figure 2.1 below. The model was developed to explain the relationship between training, ability, and use for end-users. Nelson *et al.* (1991) tested the relationship between the model constructs and included IS personnel as part of the study. IS personnel are defined as "individuals whose primary job responsibility involves the management, development, maintenance or support of information systems within an organisation" (Nelson *et al,* 1991 p.177). End users are differentiated from IS personnel because they are defined as "users of the output of information system" and are outside the IS department.

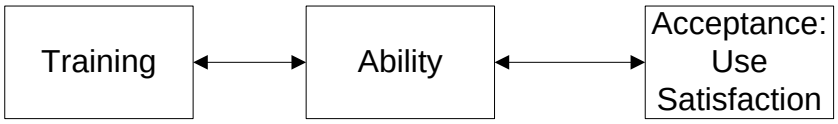


Figure 2.1: Model for Training, Ability and Acceptance of IT (Nelson, Kattan & Cheney, 1991)

Training is a process embarked on in order to gain the necessary skills to accomplish a task, whereas education is defined as involving an understanding of abstract theory (Nelson et al, 1991). Training has been linked with successful implementation of technology, especially training of end-users. Training is said to increase acceptance of technology because users' perceptions of the system change as a result of training. The perceptions that change include ease of use, usefulness, (Alshare, Gradon & Miller, 2004) and accessibility (Nelson et al., 1991).

Users receive training mostly from four sources, which are the vendor, the company they work for, the college they are studying at or working for, and self-study. According to Nelson *et al.* (1991), the formal sources do not seem to be sufficient as many times users have to train themselves.

According to the model in Figure 2.1, training has an effect on the ability to use technology. Ability is defined as the skill required to accomplishing an objective (Nelson *et al,* 1991). Acceptance, which leads to the use of a technology occurs as a result of increase in ability, and is defined as the degree of willingness to utilise information technology (Nelson *et al,* 1991).

Nelson *et al.* (1991) conclude that computer related training is important to the acceptance of IT, and users who have high levels of training are those that accept IT. This was found to be true

for both end-users and IS personnel who participated in the study. Training increases the users' knowledge of the target system, and has an impact on perceptions and attitudes about the new technology (Xia & Lee, 2000). Training increases procedural knowledge, which influences the perception of ease of use and the attitude about the new technology. The result of the study showed that IS personnel and end-users used self training more than other sources of training, such as work. Company training was the second most used source of training.

2.4 TRAINING AND TECHNOLOGY IMPLEMENTATION

There is consensus among scholars that training is a critical intervention in technology implementation (Sharma & Yetton, 2007; Xia & Lee, 2000) and is effective in terms of user attitudes, perceptions of ease of use, and perception of usefulness. Sharma and Yetton (2007) point out that sometimes the investment in training is not realised. The reason is that some situational factors of training are not taken into consideration. These factors include individual cognitions and inter-individual cognitions.

The usual individual training involves experts training new users by showing them how to use technical features, giving the users some time to practise what has been demonstrated, and giving feedback as a result of the practice the users have been engaging in. According to Sharma and Yetton (2007), there are three areas on which individual training should focus: (a) tools and commands of the technology to be implemented; (b) how the technology to be used fits into company daily business and its usefulness; and (c) how other people in similar work environments use this technology the problems encountered and solutions to the problems. Users who have been trained to use the technology to be implemented can subsequently embark on forms of more advanced learning. These include further knowledge as a result of merging, categorising, and reclassifying the existing knowledge (Sharma & Yetton, 2007).

The explicit training of individuals contributes to the success of technology implementation. However, group training has an impact on technology implementation through the interaction of individual members interacting as part of a group. Group training also has an effect on implementation through the creation of the transactive memory system (Sharma & Yetton, 2007) and collaborative task knowledge (Sharma & Yetton, 2007).

Transactive memory is the use of external storage in addition to human memory. The external storage can be the memory of people who were in the same class, when one was attending a lesson, and who can remind one of certain learning content covered in that class. Group members can also act as transactive memory if an individual is part of a group. This results in group members having a greater pool of storage from which one can retrieve data. One of the key elements for an individual with transactive memory is remembering what other group members' knowledge is concerning the subject. In simple terms, a group member knows who

knows what, and can take advantage of that by making use of the relevant group member. According to Sharma and Yetton (2007), training plays a big role in the development of transactive memory, and groups with a well developed transactive memory outperform groups with impaired transactive memory systems. The group members need to communicate well and share information about their learning and expertise in order, for them to be effective (Sharma & Yetton 2007). The group members gather information about each other during the training, through observing each other and during their conversations. Group members who train together outperform group members who are trained individually (Sharma & Yetton, 2007)

Transactive memory is about who knows what, while collaborative task knowledge is about who does what. Sharma & Yetton (2007) define collaborative task knowledge as an understanding of` "the interdependent relationships among all users' work procedures, enabling users to assess the collective consequences of their individual ways of using a collaborative application in the context of a business process" (p.222). The relationship between individual cognitions and inter-individual cognitions is shown in Figure 2.2.

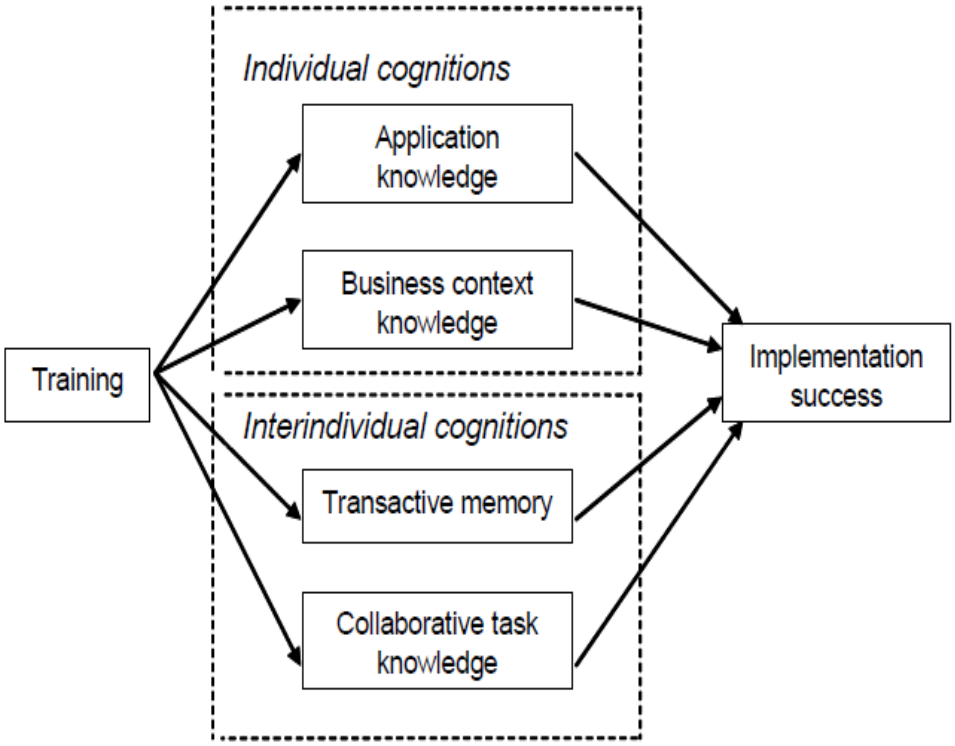


Figure 2.2: A Conceptual Model of the Effect of Training on Implementation Success (Sharma & Yetton, 2007)

Figure 2.2 above indicates how training leads to implementation success. Application knowledge and business context knowledge are individual based while transactive memory and collaborative task knowledge are group based.

The study conducted by Sharma and Yetton (2007) also looked at the effects of technical complexity and task interdependence in technology implementation, as shown in Figure 2.3

below. Users are likely to struggle with complex technology which will affect their attitudes toward such a technology.

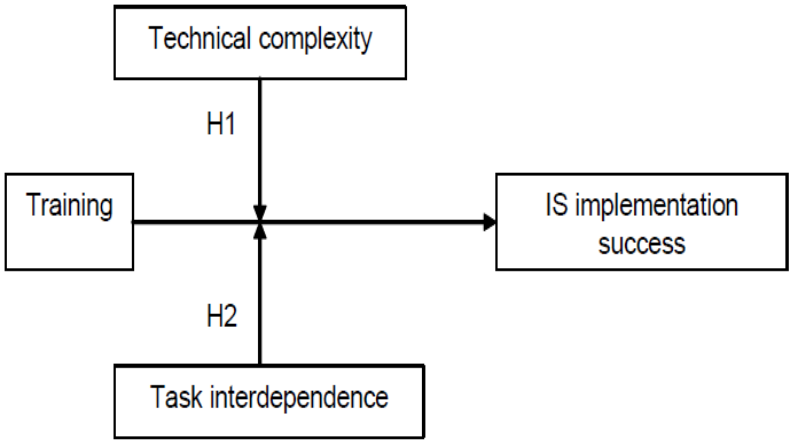


Figure 2.3: Contingent Model of the Effect of Training on IS Implementation (Sharma & Yetton, 2007)

The users who feel that a certain technology is complex and require advanced skills for ease of use are likely to reject that technology (Sharma & Yetton, 2007; Davis, 1989). According to Sharma and Yetton (2007), "complex technologies create knowledge barriers that inhibit end-user adoption" (p. 225). Technical complex technologies require users to work in unfamiliar situations, and tasks are performed in different ways. In such situations users have to overcome knowledge barriers that affect user intention to adopt and implement a technology. In situations where users experience technology complexity issues, they have to make use of expert trainers at their disposal who are the source of information needed to overcome the complexity obstacle.

If technology complexity is low, users experience less difficulty with it and are therefore able to find solutions without attending formal training. The information they obtain through informal means could be from self-learning, learning by doing, or information from other users (Sharma & Yetton, 2007).

Task interdependence, similar to technology complexity, is said to make users experience difficulties in the use of technology innovation, thereby badly influencing implementation (Sharma & Yetton, 2007). Both of these can be overcome through appropriately focused training, as their effects vary and depend on users' characteristics.

2.5 TRAINING WITHIN A TECHNOLOGICAL CONTEXT AND THE WORK GROUP INFLUENCE

Gallivian (2000) states that it is evident, that for technology to be successfully implemented there has to be training. Even though this is a truth accepted by organisations, it has not always been acted upon and is not an issue that has been taken seriously. The budget for training has always been the first to be cut when organisations need to tighten their spending because of economic recessions or increased competition and pressure from competitors (Gallivian, 2000).

Also to counterbalance overspending by some departments, the budget for training is usually cut. Some managers view training as the only way of increasing technology usage, but this is limited as there are other barriers to usage, and a realistic understanding is needed that training has its benefits as well as its limitations (Gallivian, 2000).

LeRounge *et al*. (2003) also agree with Gallivian (2000) that training has a number of challenges. The training challenges listed by LeRounge *et al*. (2003) are listed below:

- Training is costly and is a constant challenge. In selecting training processes, how do you balance the organisations best interests with the individual's?

- Skills become dated and the competitive edge fades. How do you manage training course development to maintain the edge?

- Recruiting high quality technology trainers is a challenge. How do you balance the need for both technical and instructional skills?

- Complex training technologies are increasingly used to address time constraints, distance, simulated reality, and "just-in-time" training. How should you select, implement, develop, and design courses in a co-ordinated way? (LeRounge *et al*. (2003), p. 98)

Training-associated problems range from type, quality, and financing to infrastructure issues. Gallivian (2000) sees it as a very simplistic approach to think that acceptance of technology could be addressed by simply only providing training in an isolated context. There are a number of factors that are job-related, or social, and some contextual factors. Gallivian's approach is to rethink the importance of training by looking at a broader context which would explain how users learn to use their technology in the work environment. The context in which the user learns must not be looked at as isolated, as it is most of the time in a workgroup, department or company context. This context is what shapes the learning of a user, and is opposite to the individual learning context. Gallivian (2000) views learning as happening within a group of a work environment, which is similar to Sharma and Yetton's (2007) assertions that users also learn in groups and not only as individuals. Since most training research is focused on formal classroom training and individual learning, Gallivian (2000) rejects this view, and suggests that learning occurs as a result of an individual's assimilating information from group attitudes. The users learn as parts of a group who influence each other and affect each other, sharing certain attitudes. Gallivian (2000) states that negative comments made during a training session have a stronger influence than positive comments. Users may be more receptive to negative influences from their fellow group members than by positive input from their instructors in forming attitudes about the technology to be implemented. The positive sources, such as course instructors and experts, may be regarded as unreliable. This behaviour occurs in the classroom and is likely to occur further in the work environment. The approach is that learning

takes place when users are in their work environment, and in specific social contexts influenced by group dynamics and organisational contexts like values, norms and culture.

According to Gallivian (2000), workgroup and organisational influences must be taken into consideration. Gallivian (2000) states that users learn better through a hands-on approach, called discovery learning. Gallivian (2000, p. 57), states that:

> "With the increasing availability of easy-to-use computer software, people seldom learn to use a system through formal training... several researchers have suggested that exploration learning is more effective than instruction based training... Through their extensive laboratory observations on how people learn to use a word processor [at IBM's Watson Research Centre], Carrol and Mark (1984) concluded that people learn how to use computer systems actively by exploration... Learners do not follow training instructions. Instead they learn through self-discovery or help from peers... With the increasing availability of easy-to-use computer software, this phenomenon is becoming more common".

Co-workers influence each others' attitudes, values, and knowledge. Hence, learning is most effective when it occurs at a work place, in the presence of co-workers.

2.6 TRAINING METHODS

Training is one of the methods used to increase employee productivity (Gupta & Bostrom, 2006) by empowering the workers with the exact skills needed for their work environment. It can also be viewed as a way in which companies and institutions communicate with their employees, making them aware of the strategic direction the company is taking. The technology sector is always changing due to the rise in number of new technologies, and, to keep up with the change, companies have to keep on training their employees in these new technologies. Gupta and Bostrom (2006) say that because of the increase in requirements for continuous learning, and skilled employees leaving for better work opportunities, there is a need to go beyond the traditional method of teaching. The cost of computing is decreasing, making it possible for companies and institutions to move to technology-mediated learning. Another method of training that has increased is collaborative learning, in which learners learn by working together towards a common learning goal (Gupta & Bostrom, 2006). The concept of these approaches to learning are incorporated in end-user training. Gupta & Bostrom (2006) proposed a framework for end-user training (EUT) as shown in Figure 2.4.

The framework is based on the view that its constructs, the training method, and individual differences have an impact on the development of end-users' mental models about the technology to be learnt (Gupta & Bostrom, 2006). We will now briefly explain the constructs of

EUT framework: learning outcomes, training methods, individual differences, and the target system.

2.6.1 Learning Outcomes

Learning outcomes are the results intended to be produced at the end of the learning process. The knowledge gained through the learning process is used to find solutions to business problems or to participate in business processes. Learning outcomes are classified into: skill based outcomes, cognitive outcomes, affective outcomes and meta-cognitive outcomes (Gupta & Bostrom, 2006). A list of learning outcomes in IS literature, as discussed by Gupta and Bostrom, is listed in Table 2.4 below.

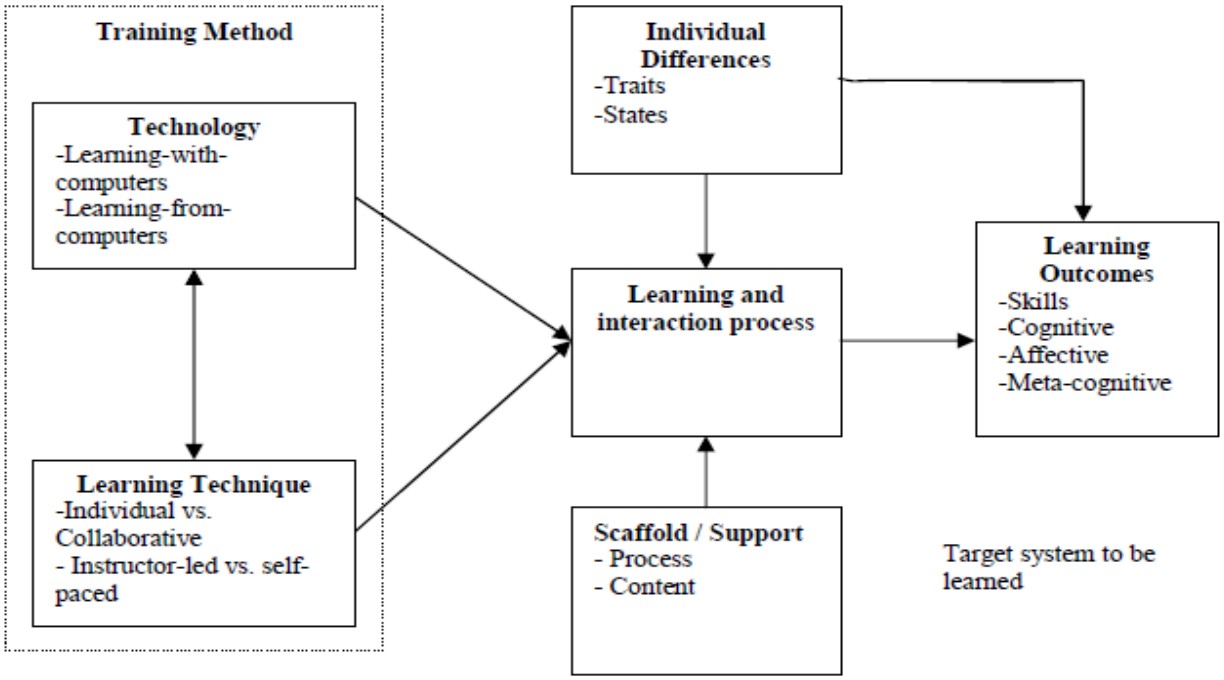


Figure 2.4: A Framework for End-User Training (EUT) Research (Gupta & Bostrom, 2006)

Skill based outcomes are about the user's ability to use the technology which the training targeting (Gupta & Bostrom, 2006). Skill-based outcome examples can be command based. Command based is the knowledge of the syntax; a set of commands and command structures of the targeted technology for which training was offered for the users. Command based does not end in knowing the commands; the user must also know the effect of those commands when executed on the target system.

The commands can be grouped together to make a system function; that is, a user is able to perform a task after executing a number of commands on the system. Cognitive outcomes are the judgement awareness of the user. Examples of cognitive outcomes include business procedural, tool conceptual, and business conceptual. Affective outcomes concern the emotions of the end user and the creation of knowledge to increase the end users' motivation for learning

(Gupta & Bostrom, 2006). Meta-cognitive is the trainee's awareness of knowledge of learning and the processing of information.

Table 2.4: Learning Outcomes for End-User Training in IS Literature (Gupta & Bostrom, 2006):

Training Outcome	Olfman *et al*.	DerSoursa *et al*.	Coulson *et al*.	Kang *et al*.	Sanchez & Nambisam *et al*.	Munro *et al*.	Anderson
Skill	Command Based Tool procedural	Application procedural	Application knowledge	Application knowledge	Know-how	Depth Breadth	Procedural
Cognitive	Business procedural Tool conceptual Business conceptual	Application conceptual Business conceptual	Domain knowledge	Business context knowledge Collaborative task knowledge	Know why Know What	Finesse	Conditional Declarative
Affective	Motivation	N/A	N/A	N/A	N/A	N/A	N/A
Meta - Cognitive	Meta - cognitive	N/A	N/A	N/A	N/A	N/A	Meta - Cognitive

2.6.2 Matching Training Methods and Learning Styles

The training methods are a set activities and of materials used in a process to empower the trainee with new knowledge about a particular object, context, process, and situation (Gupta & Bostrom, 2006). Simon (2000) states that there is research evidence that when learning styles match training methods, the training is successful, as compared to situations where this is not the case. Some of the training methods in IS literature are 'instruction-based', 'exploration learning', and 'behaviour modelling' (Simon, 2000).

In instruction-based learning the entire content to be learnt is presented by the trainer. This method is familiar to many people. It has dominated training and fits all situations. This method is said to be dynamic since the instructor is present, as content expert, and questions from the trainees can be answered immediately (Simon, 2000). In the exploration method, trainees take ownership of the learning process, as stated below, by Simon (2000, p. 43):

> *"Exploration learning* has been characterised as a matter of re-arranging, or transforming, evidence in such a way that one is enabled to go beyond the evidence so re-assembled, to additional new insights" (Bruner, 1966, p. 72). Glaser (1966) describes exploration learning as a process by which individuals are granted the freedom to impose their own structures on learning. Exploration may also involve an inductive process through which an individual learns general concepts by starting with specific tasks or examples (Taba, 1963). This has been credited as the best way to learn personal computing (Brynda, 1992).

> Exploration-based training in this study is operationalised as an independent study format, utilising self-paced manuals."

The behaviour-modelling method is said to be a combination of both the instruction-based and the exploration models, as stated by Simon (2000, p. 43-44):

> "The *behaviour modelling* method—developed in the 1970s for building an individual's skills—is a combination of the exploration and instruction methods that concentrates on the idea of observing and doing, while following a role model. The theoretical constructs of behaviour-modelling are sound and well established (Bandura, 1969; Goldstein & Sorcher, 1974). Trainees then imitate the role model's behaviour in practice. The technique emphasises learning points in the instruction mode, and modelling, practice, and feedback in the exploration, or hands-on mode. Learning points are simply guidelines to lead an individual to a desired objective."

A number of learning styles have been researched and it is important for a training manager to take them into consideration for effective training. This will lead to effective technology implementation, as users will have a better understanding of the target technology shaping their perceptions about the technology. Studies have been conducted to investigate the effect of learning styles in technology-enhanced learning and hypermedia learning. Kolb's model is one of the learning models that have been investigated. According to Kolb, learning is a cycle with four stages (Woodard & Mestre, 2006):

- Reflective observation, or "learning by watching and listening, carefully observing before making judgements, viewing issues from different perspectives, looking for meaning of things".
- Abstract conceptualisation, or focusing on using logic, ideas and concepts.
- Active experimentation, or "learning by doing, ability to get things done, risk taking, influencing people and events through action".
- Concrete experience, or using experiences and real situations that are personally and immediately relevant to the individual. It emphasises feeling, as opposed to thinking (Woodard & Mestre, 2006, p. 29).

The four learning styles identified by Kolb are: assimilative, convergent, accommodative, and divergent styles.

Simon (2000) uses a training model (see Figure 2.5) to show the relationship between Kolb's learning styles and the three training methods (i.e., instruction, modelling and exploration)

discussed above. The model in Figure 2.5 below can be interpreted as explained by Cox (2008, p. 6) below:

> "The intersection of the two dimensions results in the designation of the four learning styles. The theory asserts that each of us has a preference for comprehending and transforming, and the combination of these preferences is called our learning style. A learner who prefers 'concrete and reflective' has a "diverging" learning style. A learner who prefers 'abstract and reflective' has an "assimilating" learning style. A learner who prefers 'abstract and active' has a "converging" learning style. A learner who prefers 'concrete and active' has an "accommodating" learning style."

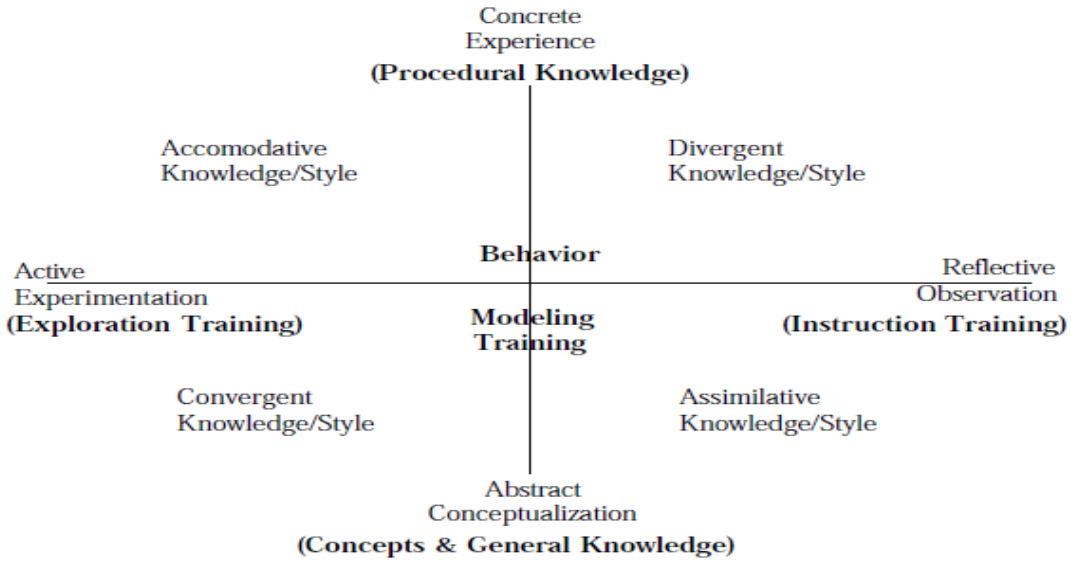


Figure 2.5: Comprehensive Training Model (Simon, 2000)

Simon (2000) studied the relationship between learning styles, as stated by Kolb, and training methods, their effects on end-user computer satisfaction, and computer use. The results showed that where training methods and learning styles matched there were greater results.

As a result of the study Simon (2000) came to the following conclusions:

- Learning styles play an integral role in the understanding of trainees' abilities and as a predictor in the effectiveness of training programmes.
- Information type has a direct link to both learning style and training technique.
- A technique, such as behaviour modelling, can facilitate an all-in-one approach to training.

- A successful match of learning style, information type, and training/learning technique can lead to higher levels of End User Computer Satisfaction, which in turn could lead to higher levels of computer use.

In planning for training as part of technology adoption and use processes, training managers should take into consideration the different learning styles and training methods if training is to achieve the outcomes set for the training processes.

2.6.3 Individual Differences

People are different, and since they are different, they respond differently to different training methods. A number of training methods and learning styles have been discussed in IS and education literature. Some of the learning styles include Kolb's learning style (as discussed above) Carl Jung and Myers Brigg's Type Indicator (MBTI), Howard Gardner's Theory of Multiple Intelligences, catering for diverse learning, and VAK (Visual, Auditory and Kinesthetic) styles.

2.6.3.1 Howard Gardner Multiple Intelligences

The theory of multiple intelligences was developed in 1983 by Howard Gardner (Armstrong, 2010). According to this theory there are eight intelligences that a person can develop. Armstrong (2010) states that the traditional education system is limited, as it caters for only two of the intelligences, namely linguistic and logical/mathematical. The eight intelligences are:

- Verbal/Linguistic intelligence ("word smart")
- Logical/Mathematical intelligence ("number/reasoning smart")
- Visual/Spatial intelligence ("picture smart")
- Bodily/Kinaesthetic intelligence ("body smart")
- Musical /Rhythmic intelligence("music smart")
- Interpersonal intelligence ("people smart")
- Intrapersonal intelligence ("self smart")
- Naturalist intelligence ("nature smart")

Armstrong (2010) states that the people who have intelligences other than linguistic and logical/ mathematical are not appreciated, as focus is on these two intelligences. The theory points out that attention should also be given to artists, architects, musicians, naturalists, designers, dancers, therapists, entrepreneurs, and others who play a role in life.

Armstrong states that many people who have some of the skills listed above, other than linguistic and logical/mathematical, end up as drop-outs as they are not catered for at school,

and in fact end up being labelled as ‘disabled’. The labels they are given include; ‘learning disabled’ or ‘underachievers’, whilst their unique ways of learning are not addressed.

The theory also has implications for adult learning and development. According to Armstrong, many adults find themselves in jobs that do not make use of their mostly high developed intelligence. He gives an example of a bodily-kinaesthetic individual stuck in a linguistic or logical desk-job when he or she would be much happier in a job where he/she could move around, such as a recreational leader, a forest ranger, or a physical therapist (Armstrong, 2010).

The different learning styles should be taken into consideration by training managers when planning around empowering workers and planning to introduce new technologies, as they may have an impact on the effectiveness of the training provided. That may in turn have an impact on company technological effectiveness.

2.6.3.2 VAK (Visual, Auditory and Kinaesthetic)

The VAK learning style is based on the fact that people learn in three ways. These are: by seeing (vision), listening (auditory), and movement (kinaesthetic). This has implications that trainers should incorporate all these in planning their training, and the environment in which they train should accommodate these. The trainers should present information in all three styles of learning in order to accommodate all trainees in their class.

2.6.4 Target System

If the characteristics of the users of an organisation and technology to be adopted are known, training should be customised to be efficient based on learning styles, training methods, characteristics of the target technology, and learning outcomes.

Some technologies are designed based on some theory. This applies especially to educational technology as it can be designed to accommodate certain learning or training styles. The example is Moodle, a Learning Management System (LMS) designed and based on the principles of constructivism, constructionist, social constructivism, and separate and connected behaviour[1].

If it is known that the technology is designed or based on a particular learning theory, the appropriate training method that matches the learning theory supported by the technology should be used. The trainer should teach to gain maximum results.

[1]See http://docs.moodle.org/en/philosophy

2.7 TRAINING AS A MANAGERIAL INTERVENTION

Since there is a lot of evidence of training as a catalyst in empowering users to gain necessary skills that can positively affect the technology implementation process, it is necessary that managers treat training as a very important intervention, if technology is to be successfully used and implemented.

Training managers should intervene at various stages of the implementation or adoption process, as they are decision makers and plan for training at critical points of the process. Xia and Lee (2000) argue that technology adoption and diffusion is a stage-based process. This process occurs when an individual passes from initial awareness and knowledge of a technology, to developing a positive or negative attitude towards the technology, and to a decision to adopt it or reject it. During the process the users' initial attitude about the technology can be confirmed or reversed. In the process of the user experiencing the technology and developing a perception about the technology, the user may stop or continue to use the technology because the decision to adopt is not a one time decision, but an iterative decision process.

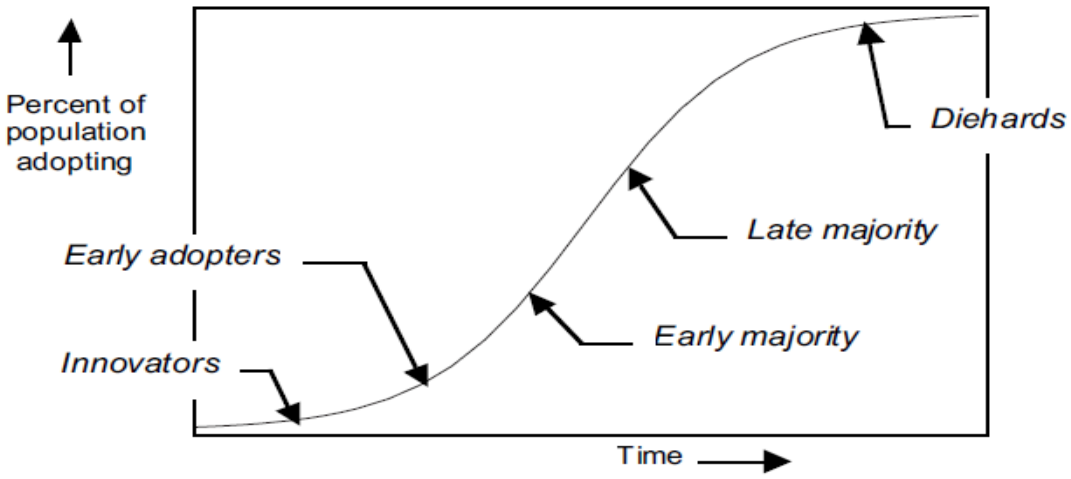


Figure 2.6: Stages in Technology Adoption (Zemansky & Massy, 2004)

In the technology adoption process as shown in Figure 2.6, the early adopters can have a great influence on the other group of adopters shown in the figure. The early adopters can influence the early majority if they experience problems, and the early majority will be hesitant to try the technology. This may have a bad influence, and as a result the early adopters and early majority may end up abandoning the integration of technology to the learning project. The effect of the early adopters and early majority abandoning the project will be that the late majority and diehards will not begin to participate in the technology integration.

The timing of training as an intervention is very important. Managers should make sure users are trained and not strugle with a new technology as that would act as a guard against the development of negative attitudes and the perception that that the technology is difficult to use.

If a negative perceptions develop amongst trainees they may spread and my lead to users abandoning the adoption process.

2.8 CONCLUSION

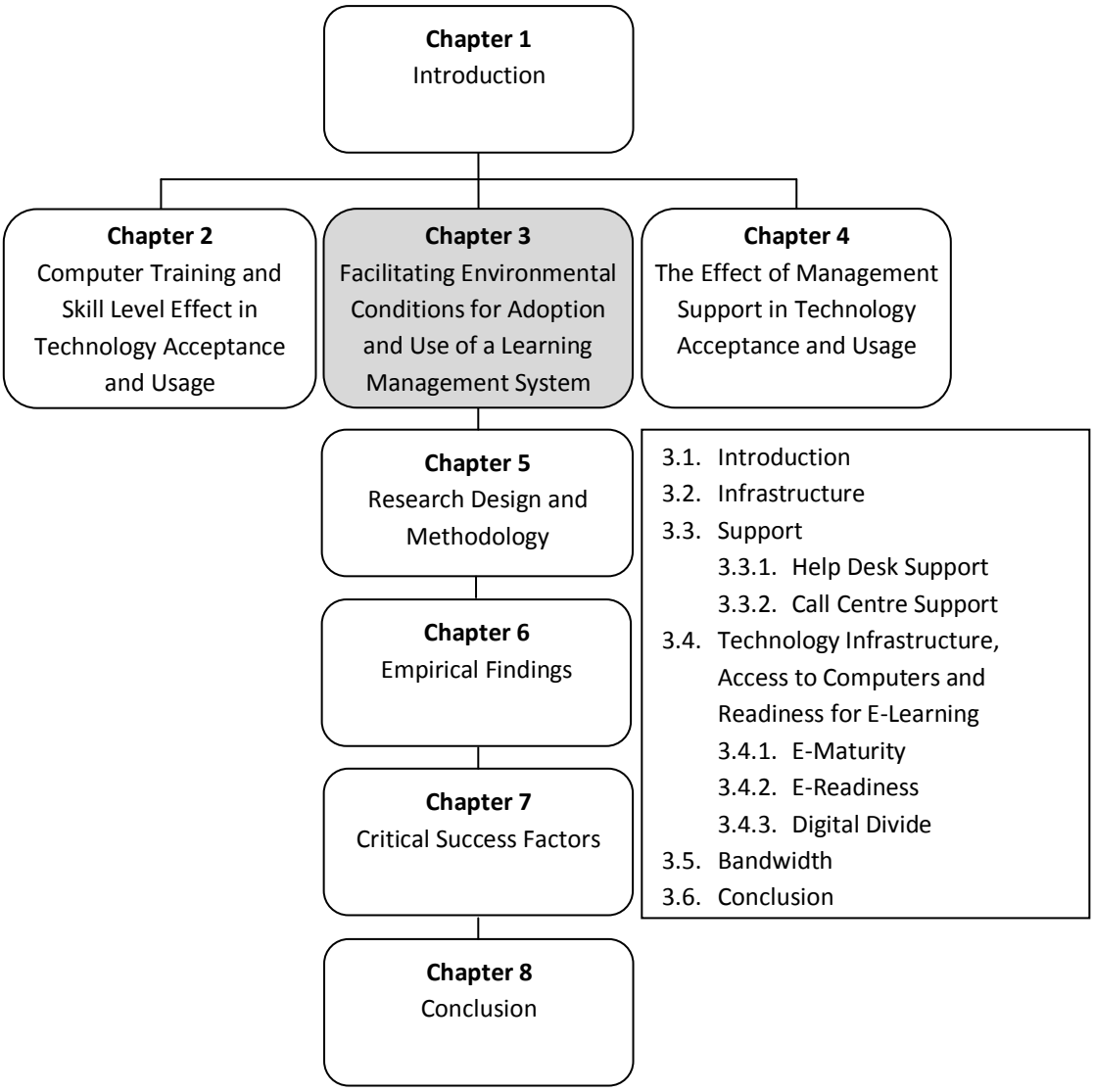
In this chapter, relevant literature about training in preparation to use and adoption of technologies has been discussed. Topics in this chapter covered issues such as: computer literacy skills and the role played by such skills for technology use; the effect of training on computer usage; training during the technology implementation process; the work group influence on training in a technological context; training methods, with focus on learning outcomes, matching training methods and learning styles. The effect of individual differences during training and a number of learning styles to cater for individual differences were also discussed; matching the learning styles, training methods with the characteristics of the target system; and lastly, training was discussed as a managerial intervention during the technology adoption and use process.

All these topics discussed in literature are evidence of the role training plays and how it influence users to adopt and use a technology because of changed perceptions as result of training received. Training has an effect on user perceptions whereby users will perceive a technology easy to use because of training, or perceive it useful because of functionality of the technology they have been exposed to as a result of training received.

The next chapter will discuss the facilitating environmental conditions required for the adoption and continued use of a learning management system.

CHAPTER 3:

FACILITATING ENVIRONMENTAL CONDITIONS FOR ADOPTION AND USE OF A LEARNING MANAGEMENT SYSTEM



3.1 INTRODUCTION

An institution's ICT infrastructure and level of support are pre-requisites for adoption and use of an LMS. For an institution to use technology in teaching and learning basic infrastructure should be present. The infrastructure should be supported and both lecturers and students should be given adequate access and necessary support to properly use the technology for teaching and learning. The following are discussed in this chapter:

- Infrastructure such as computers, the network and bandwidth necessary for participating in online teaching and learning is discussed.
- The role played by infrastructure availability.
- Access and support for teaching and learning in the context of an institution of higher learning is discussed.
- The published status of institutions of higher learning in South Africa, concerning bandwidth, student:computer ratio, and learning management (LMS) use is explored.
- Challenges faced by institutions in providing information technology infrastructure for teaching and learning.

3.2 INFRASTRUCTURE

E-learning requires that students and teachers have access to the Internet, collaborate with peers, and interact with the trainer for support (Moolman & Blignaut, 2008). It is a requirement that learners are motivated to learn on their own to participate in E-learning (Moolman & Blignaut, 2008), and institutions have to prepare before embarking on e-learning programmes to ensure that such programmes become a success. Such preparations should include the provision of, and access to, computers, networks and Internet resources, as these are central to e-learning.

According to Alexander (2001) there are four reasons for using technology in education:

- To improve quality of learning
- To improve access to education and training
- To reduce the cost of education; and
- To improve the cost-effectiveness of education

Alexander (2001) suggests that before teachers embark on an E -learning project a number of questions should be asked. The questions should be about the context of learning, information technology, and teaching and learning design. If the required ICT tools for e-learning are not

made adequately available, this will have a great impact on the success of the technology adoption, and the use of e-learning in an institution.

The unavailability of infrastructure for learning will have an impact, as adequate availability is a requirement (Moolman & Blignaut, 2008). Also, the intention of improving the quality of learning, access to education and training, and reducing the cost of education for students will not be fulfilled (Alexander, 2001). According to Alexander (2001), asking the questions below will provide evidence to determine whether or not the adoption and use of E -learning technology will be successful.

- Is this technology available and accessible for this group of learners?
- What is the cost of this technology to the learner?
- Does this technology support the most suitable learning design for this content?
- What kinds of interaction are possible with this technology?
- What level of support does this technology require?
- Is this technology a viable option in this context, and does it enable the most appropriate learning strategies to be used for this particular content, for this group of learners?

According to Hitch and MacBrayne (2003), for E -learning to be effective, the institutions must have:

- A flexible, yet solid, technological infrastructure.
- One-stop student services that mirror the programmes found on the campus, but which are delivered more cohesively and conveniently.
- A creative faculty and academic development support.

In both Alexander (2001) and Hitch and MacBrayne (2003), it is evident that technological infrastructure must be available and must also be accessible to the students and staff of an institution for e-learning success. The economical availability, in terms of affordability, must be considered, as well as support. According to Hitch and MacBrayne (2003), the solid technology infrastructure will be central to the smooth running of e-learning.

Adequate infrastructure is a pre-requisite for adoption and use of Blackboard. Infrastructure is necessary to host the LMS, and there are implications if only the minimum requirements are met for hosting the LMS which will negatively affect student and staff experiences. Such situations may lead to undesired consequences of inefficient and unreliable IT systems on which staff and students may decide not to rely on as the performance is as required and

expected. Support of a technological infrastructure is a necessity to maintain the required good service to users of an infrastructure. In the next section support is discussed.

3.3 SUPPORT

If learners have access to technology for learning and the value of the technology is to be realised in terms of improving quality of learning, access to education and training and reducing the cost of education (Alexander, 2001), staff and students will need to be supported for a smooth implementation.

According to Ngugi *et al.* (2007), South African universities have dedicated forms of information technology support centres for e-learning, including the support for Learning Management Systems users. The different centres of support for South African universities are listed in Table 3.1 below.

Table 3.1: University Centres Responsible for Supporting ICTs in Teaching and Learning (Ngugi et al, 2007)

Traditional Universities	**Centre Responsible for Supporting ICTs in Teaching and Learning**
University of Cape Town	Centre for Educational Technology, Centre for Higher Education Development
University of Fort Hare	E-learning Section, Teaching and Learning Centre
University of the Free State	Centre for Higher Education Studies and Development
University of KwaZulu-Natal	Centre for Information Technology in Higher Education Section
University of Limpopo	Academic Computing Support
North-West University	Academic Support Services
University of Pretoria	Department of Telematic Learning and Education Innovation
Rhodes University	Academic Development Centre
University of Stellenbosch	Centre for Teaching and Learning
University of the Western Cape	Teaching and Learning Technologies Unit E-Learning Division
University of the Witwatersrand	Centre for Learning and Teaching Development
Comprehensive Universities	**Centre Responsible for Supporting ICTs in Teaching and Learning**
University of Johannesburg	Centre for Teaching, Learning and Assessment
Nelson Mandela Metropolitan University	Centre for Teaching, Learning and Media
University of South Africa	Institute for Curriculum and Learning Development
University of Venda	Department of Information Technology Services
Walter Sisulu University	Situation unclear in current merger context, but an academic development unit at Border Technikon (one of the merging institutions) seems to facilitate web-supplemented courses
University of Zululand	ICT Department (includes an 'electronic classroom' for training lecturers in online applications)
Universities of Technology	**Centre Responsible for Supporting ICTs in Teaching and Learning**
Cape Peninsula University of Technology	Fundani Centre (teaching, learning and academic support) Centre for e-learning

Central University of Technology	Centre for e-learning and Educational Technology
Durban University of Technology	Centre for Higher Educational Development
Tshwane University of Technology	Department of Telematic Education
Vaal University of Technology	Department of Teaching and Learning, Centre for Institutional Development

The centres listed above in Table 3.1 have different functions, from basic IT training for lecturers to sophisticated research integrated with support programmes for lecturers (Ngugi *et al.*, 2007).

In Weaver's (2008) research at Monash University in Australia, it is evident that quite significant support was required by lecturers, as shown in Table 3.2 below. The support needed ranged from training that lecturers felt they needed to be comfortable with the Learning Management System (LMS) at Monash, to technical assistance, support to ease the workload, and pedagogical advice.

Table 3.2: Ongoing Help Required to Support Staff Use of WebCT (Weaver, Spratt, & Nair, 2008)

	Number of staff	Percentage of staff (%)
Specific training as required	58	60.4
Online technical assistance	57	59.4
Assistance in migration to new versions of software	48	50.0
Advice on good practice in online teaching and learning	44	45.8
Support to ease my workload	39	40.6
Specific advice on particular learning issues	27	28.1
Support in managing large classes	27	28.1
Other	13	13.5

According to Weaver (2008), more support was needed for lecturers, as students quickly found ways to tackle some of the issues using the LMS. As shown in Table 3.3 below, the percentage of students who experienced major difficulties was 4.5%, while 51.6% found the WebCT LMS to be easy to learn.

Table 3.3: Difficulty Experienced by Students in Learning to Use WebCT (Weaver, Spratt, & Nair, 2008)

	Number	Percentage (%)
Major difficulties	59	4.5
Minor difficulties	334	25.5
Generally easy to learn	675	51.6
Always easy to learn	240	18.4

The students who received basic training from a lecturer or a tutor were about 23.1% of the respondents and the majority (50.9%) of students were able to find solutions as they worked on the LMS, as shown in Table 3.4 below.

Table 3.4: Resources Utilised by Students to Learn WebCT (Weaver, Spratt, & Nair, 2008)

	Number	Percentage (%)
Worked it out myself as I went	969	50.9
My lecturer or tutor provided an introduction to the unit	439	23.1
Other students helped me to get started	162	8.5
Consulted online resources	91	4.8
Lecturer or tutor helped me to get started	89	4.7
Completed a preliminary online exercise	70	3.7
Consulted helpdesk staff	33	1.7
Other	49	2.6

Only a small percentage (1.7%) of students made use of the help desk, in comparison to 59.4% of staff who made use of online technical assistance and help in other aspects of using WebCT. This indicates that support needed for learning to use an LMS will vary depending on the student and lecturer context and tasks as the students largely just read and download content while lecturers need to create and upload content.

3.3.1 Help Desk Support

In Alexander's (2001) research, students and staff experiences showed that there is a need for reliable technology network and support, maintenance of such networks, and the provision of necessary access for staff and students. The help desk support is limited to computer related problems only.

Help desk staff may be technical specialists who provide answers to more difficult technical problems, while general technical problems may be addressed at a call centre. However, it is evident that support for the use of learning technology will not be required in all cases, as some staff and students may be able to solve problems themselves (Weaver, Spratt, & Nair, 2008), because of competence in technical skills and learning from their peers (Weaver, Spratt, & Nair, 2008).

3.3.2 Call Centre Support

A call centre is a single point of contact where a number of services are offered to students and staff. The services must be available at any time. Call centres differ from help desks in that the scope of services offered goes beyond solving computer problems to other learning related problems (Hitch & MacBrayne, 2003). Some universities have their help desks as part of their call centres (Hitch & MacBrayne, 2003). Call centres can be used to offer help to staff members and students who are not campus residents, and also to those who are within the campus. Help is available on a number of issues related to learning, including the use of an LMS.

3.4 TECHNOLOGY INFRASTRUCTURE, ACCESS TO COMPUTERS, AND READINESS FOR E-LEARNING

If technology adoption and use is to be achieved, the right infrastructure has to be in place (Alexander, 2001) and such technology should be accessible to students. The necessary support should be available so that it is accessible when needed. If an institution cannot meet those requirements it is not ready for e-learning. E-readiness is described as "the availability and access to IT infrastructure, policies to support and to participate in the international global network" (Moolman & Blignaut, 2008, p. 169).

The issues of e-readiness and the digital divide become important and cannot be left out in considering infrastructure requirements for learning and the technological backlog in Africa. The digital divide is described as "the divergence between individuals, communities, cultures and nations at socio-economic levels, in terms of access to information and communication technologies and Internet use" (Moolman & Blignaut, 2008, p. 169). Alexander (2001) defines the digital divide as the gap between those who have access to information and those who do not. If infrastructure is available it will be an indication of the readiness of an institution to embark on e-learning such as use of a Learning Management System, and then issues of access, availability and use will come into place. According to Alexander (2001), as stated in section two of this chapter availability alone is not enough as that will not satisfy the reasons for using technology in education,

3.4.1 E-Maturity

According to Moolman and Blignaut (2008), if an institution chooses a technology and uses it effectively to meet its needs, that institution is e-mature. E-maturity is the ability of an organisation to utilise computer technology. This e-maturity includes the computer support to improve processes, products, and delivery of quality services.

The e-maturity of an organisation also signals the ease with which it deploys the technology to beneficial areas. Such an e-mature organisation encourages ICT skills-development, trusts the Internet, agrees to the inherent cost of technology, supports the benefits of technology, and uses computer technology across the organisation (Moolman & Blignaut, 2008).

3.4.2 E-Readiness

E-readiness can also be in the context of students and lecturers who use the technology for learning. E-readiness of an individual can be assessed by evaluating technical experience and competence in working with computers (Moolman & Blignaut, 2008). If students or staff members are found not to be e-ready, some form of support has to be offered to enable them to be ready to teach and learn using technology. The support can be in the form of training, which can be formal or informal.

There are e-readiness assessment tools for organisations. Some criteria to determine e-readiness of an organisation are: examining the evidence of features such as infrastructure, service accessibility, Internet use, skills and human resources, organisational competence, and IT diffusion. The presence of these indicates the e-readiness of the organisation.

3.4.3 Digital Divide

According to Moolman and Blignaut (2008), South Africa has been found to be the most e-ready country in Africa, as people in South Africa have access to telephone lines, mobile phones, and personal computers both at work and at home, more than in most countries in Africa. Gyamfi (2005) sees the computer as key to bridging the digital divide in Africa. According to Gyamfi (2005, p. 22),

> "The key to digital technology is the computer, a tool that has ushered in the use of the Internet as the basis for collecting and disseminating information. As the main medium for information acquisition, the computer is regarded as an agent of division between those who do have access to information and those who do not. However, just having access to a computer does not translate to its usage in the acquisition of information, if other essentials like infrastructure for electricity and telephone lines, appropriate content of information, and literacy of users are not addressed."

The provision of access to networked computers will go a long way to bridging the digital divide. A number of initiatives to bridge the digital divide have targeted schools, universities and communities in South Africa, and the African continent at large. Some of these initiatives are listed in Table 3.5 below. These date back to as early as 1999.

Table 3.5: Some Initiatives to Bridge the Digital Divide in Africa (Gyamfi, 2005)

Some initiatives to bridge the digital divide
SchoolNet: A non-profit provider of Internet service, computer hardware and training to schools in SSA countries. The aim of SchoolNet is to get young people in SSA countries online and to develop the skills to participate in the digital revolution (SchoolNet Namibia, 2003).
The USAID Leland Initiative: A US government benefit of the global information revolution to African countries, by connecting them to the Internet and other global information infrastructure (USAID Leland Initiative, 2001).
Partnership for ICTs in Africa (PICTA): An informal group of donors and executing agencies committed to improving information exchange and collaboration around ICT activities in Africa. PICTA is committed to providing assistance in ICT development to all African countries (PICTA, 2001).
The Agence de la Francophonie: An agency for cultural and technical cooperation that executes development programmes and projects among French speaking countries. The agency has provided support for ICTs in ten Francophone SSA countries by installing ICT laboratories.
Microsoft Corporation's Partners in Learning Programme: Has donated resources for training in information and communication technology in Ghana. Additionally, the programme will facilitate ICT integration into school curricula and provide support for teacher training and student education in all educational institutions in Ghana (Ghana News Agency, 2004).

The Kofi Annan ICT Centre of Excellence: A joint Ghana/India project to produce the human resources needed for the emerging ICT industry in Ghana and the West African sub-region.
Computers For Africa (CFA): An international non-profit organisation that refurbishes used computers, networks them and ships them as 'ready-to-set-up' laboratories. It provides computer education to non-profit organisations serving the most disadvantaged groups, especially women and youth, as well as organisations that work for positive social development in East African countries (Computers For Africa, 2004).
INTELCOM II plan of the Economic Community of West African States (ECOWAS): An initiative to upgrade regional telecommunications networks, and establish communication links between all sixteen capitals of the member states. This initiative will also provide ECOWAS with a modern and reliable telecommunications network (UN Office for the Coordination of Humanitarian Affairs, 1999).

Infrastructure issues also affect South African universities, as the historical disadvantaged universities have "less robust infrastructure in place than do their more advantaged counterparts" (Ngugi *et al.*, 2007). This has an effect on the quality of IT service experience each institution offers to students and staff. In terms of looking at South Africa in provinces, in 2007 the Western Cape province had the highest percentage of households with access to personal computers at 33%, followed by Gauteng at 25.2%, with the lowest in Limpompo province at 44%. The same trend is followed for Internet access, with the Western Cape Province leading at 23.4%, followed by Gauteng at 20.0% and the lowest Internet access found in Limpopo province at 3.0%. The information can be found in Table 3.6 below.

Table 3.6: Percentage of Household Access to Different Forms of ICT by Province in 2007 (Ngugi *et al,* 2007)

Province	Households with cell phone (%)	Households with landline (%)	Households access to PCs (%)	Households with access to the Internet (%)
Western Cape	46.7	55.3	33.8	23.4
Gauteng	48.7	28.5	25.2	20.0
KwaZulu-Natal	35.2	31.7	13.3	8.2
Free State	33.9	21.8	10.3	7.3
North West	35.3	15.0	9.9	5.0
Northern Cape	20.1	20.0	9.8	3.9
Eastern Cape	25.7	15.9	7.9	5.5
Mpumalanga	26.3	17.6	7.6	5.5
Limpopo	26.1	7.1	4.4	3.0
National Average	33.1	23.6	13.6	9.1

There are inequalities in terms of IT resources in South African provinces, which have an impact on people in different provinces. Limpopo, Northern Cape, Eastern Cape, North West and Mpumalanga are the provinces most affected by the digital divide, with percentages less than 10% for households with access to PCs and less than 6% for Internet access.

Table 3.7: Student-Computer Ratios at Higher Education Institutions in the Western Cape in 2005 (Ngugi, *et al*, 2007)

Institution	Student enrolment	Number of student computers	Student computer ratio
Cape Technikon	18 523	1 588	11:1
Peninsula Technikon	10 040	1 654	6:1
University of Cape Town	21 716	3 042	7:1
University of the Western Cape	14 873	1 455	10:1
Stellenbosch University	22 082	1 631	12:1

According to Ngugi *et al.*, (2007) in 2005 at Stellenbosch university the student computer ratio in 2005 was twelve students to one computer (see Table 3.7), as compared to seven students to one computer in the university of Cape Town and six students to one computer in the Peninsula Technikon which has since merged with Cape Technikon to form the Cape Peninsula University of Technology. These differences in ratios indicate the possibility of difficulty in accessing computers in formerly disadvantaged institutions and with students from poor backgrounds. The situation may be different in institutions with students from mostly privileged backgrounds who may not depend on the institution to provide computers for access as they may use their own computers. The situation may vary depending on the institution.

Muhuro (2008) conducted research on the availability and use of ICT resources for teaching and learning at the University of Fort Hare in 2008. Looking at different campuses of the University of Fort Hare, the student computer ratio at East London of 13:1 (see Table 3.8 below) is not very different from student ratio in Stellenbosch of 12:1. The ratio of 9:1 in Alice campus is not very different to the ratio of 10:1 in the University of Western Cape. It is clear that sometimes computing resources are not equally distributed between the different campuses of the same institution. The Bisho campus has a ratio of 1:1115 (rounded) as the campus caters to part-time degree students who only attend for short courses at a time.

Table 3.8: Distribution of ICT Resources in Relation to Enrolment at University of Fort Hare in 2008 (Muhuro, 2008)

Campus	Enrolment	Total number of computers	Ratio
Alice	5408	630	1:9
Bhisho	206	185	1:1
East London	3185	190	1:17

Muhuro (2008) went further to ask the research respondents about the state of the computers, as shown in Table 3.9. The results from respondents varied: 23% specified that the computers were too slow, 20% stated that Internet was not always available, 18% indicated that computers were sometimes not working and 12% indicated that some computers were not working at all.

All these stated problems with faulty computers have a bad effect on the access and availability of learning technology.

Table 3.9: Assessment of the State of ICT Resources by Students at University of Fort Hare in 2008 (Muhuro, 2008)

Responses	Frequency	Percentage of Respondents (%)
Computers have allowed instant communication	10	3
Computers have enabled us to do research	3	1
Computers do not work all the time	18	6
Projectors available but not effective	13	4
Programmes not installed on some computers	14	4
System slow	73	23
At times there is no network	63	22
Outdated hardware/ old machines	25	8
H drive not always available	28	9
We sometimes lose information	26	8
Printers and photocopiers not working	39	12
Total	**312**	**100**

According to Ngugi *et al.* (2007), there is some form of LMS use for learning in all higher education institutions in South Africa. The issues of availability, adequate access and support, however, are not satisfactory and stand in the way of Alexander's (2001) four reasons for using technology in education, which are: (1) To improve the quality of learning, (2) To improve access to education and training (3) To reduce the cost of education; and (4) To improve the cost-effectiveness of education. Even though LMSs are available in some cases, there is sometimes no evidence of use, or minimal use, or dissatisfaction with a certain LMS and the intention to change to another type (Ngugi *et al,* 2007).

There is evidence that there is infrastructure, which is sometimes not enough, but the most important issue is support to help students access and properly use the infrastructure. There is also evidence that staff at institutions need pedagogical support to integrate technology in learning and teaching, and to apply good educational practices. Staff struggle with a number of challenges ranging from technological challenges to pedagogical challenges. Some of the challenges are listed in Table 3.10 below.

Table 3.10: Teaching and Learning Challenges Facing Institutions of Higher Education in South Africa (Ngugi, *et al*, 2007)

Economic	Technological	Political	Social	Pedagogical
Globalisation Increasing competition Attracting foreign students Massification	Expensive bandwidth Good access to mobile technology	Tension between policies from DoE, DST and DoC Absence of key policies.	Contestation of knowledge Multi-disciplinary Trans-disciplinary Indigenous Knowledge System Information overload	Relevance of curricula Language of teaching and learning Poorly prepared students Lecturers' lack of experience or training in supporting students Lecturers' competing demands

Czerniewicz and Brown (2009, p.114) discuss some of the issues of infrastructure and support for learning in higher education institutions, based on case studies conducted. They say:

> "South African case study highlights how important adequate resource allocation is in facilitating e-learning. This is not merely a matter of having facilities and resources available, but pertains to the management and maintenance of those resources. The imperative for resource allocation exemplified in centralised structures (Marshall & Mitchell, 2005) and institutional systems (Marshall & Mitchell, 2005; Nichols, 2008) is confirmed in the literature. In addition, research indicates that student ICT use is undeniably enabled by institutional on-campus infrastructure.
>
> For South Africa, this means rethinking the notion of infrastructure, support and enabling systems, casting them as agents rather than simply as scaffolds. It means the provision of hardware and software that is customisable to local conditions, in specific classrooms and disciplines, and is easily responsive to specific teaching and learning problems."

3.5 BANDWIDTH

According to Ngugi *et al.* (2007), institutions of higher education in South Africa are faced with a number of challenges, as listed in Table 3.10. Among these challenges are technological

challenges of expensive bandwidth and good access to mobile technology. This comes back to the issue of access and cost of access to the available technology infrastructure whilst trying to improve the quality of education through use of technology. The backbone bandwidth of some institutions of higher learning is listed in Table 3.11 below as published in February 2009 by Hodgkinson-Williams (2009). Despite the challenge of expensive bandwidth, institutions have made sure there is access to resources even though limited in some situations.

Table 3.11: South African Higher Education Institutions and Backbone Bandwidth Available (Hodgkinson-Williams, 2009)

Institution	Backbone Bandwidth Available (Kbps)
Cape Peninsula University of Technology (CPUT)	14336 (DSIX) 10240 (BELL)
Central University of Technology (CUT)	8192
Durban University of Technology (DUT)	6144 (MLSULT) 8192 (BC)
Mangosuthu Technikon (MANTEC)	2048
North West University (NWU)	20480 (PUK) 4096
Tshwane University of Technology (TUT)	18432 (PTA) 2048 (NEL) 2048 (POL)
University of Cape Town (UCT)	32768
University of Fort Hare (UFH)	4096 (EL)
University of Johannesburg (UJ)	10704 (MC) 1584 (AUCK) 3256 (DC)
University of Limpopo (UL)	8192
University of Pretoria (UP)	18432 (MC) 2048 (MED) 2048 (OND)
University of South Africa (UNISA)	18432 (MC) 4096
University of the Western Cape (UWC)	16384
University of the Witwatersrand (Wits)	23552
University of Zululand	512
Walter Sisulu University (WSU)	4096

It is evident from Table 3.11 that the backbone bandwidths of some institutions are higher than those of other institutions. This is a result of a number of factors which may include some of the institutions lacking funding for Information Technology infrastructure in the past. It is mostly historically disadvantaged institutions that are negatively affected by lower bandwidths.

As a result of a number of changes in South Africa the historically disadvantaged institutions have experienced an increase in the number of students entering university. This puts a strain

on IT resources and poses a challenge to institutions that engage in use of technologies that will use the institution's network and consume bandwidth (such as Learning Management Systems).

Institutions have to take into consideration the available bandwidth as they plan integrating the use of technology into their teaching and learning. The available bandwidth will impact staff and students in their use of technology in teaching and learning, and may have an impact on the perceptions of ease of use of such technologies. The University of Fort Hare is on par with a number of institutions looking at the indicated bandwidth. However the management and use of this bandwidth is likely to be a key concern when using a LMS.

3.6 CONCLUSION

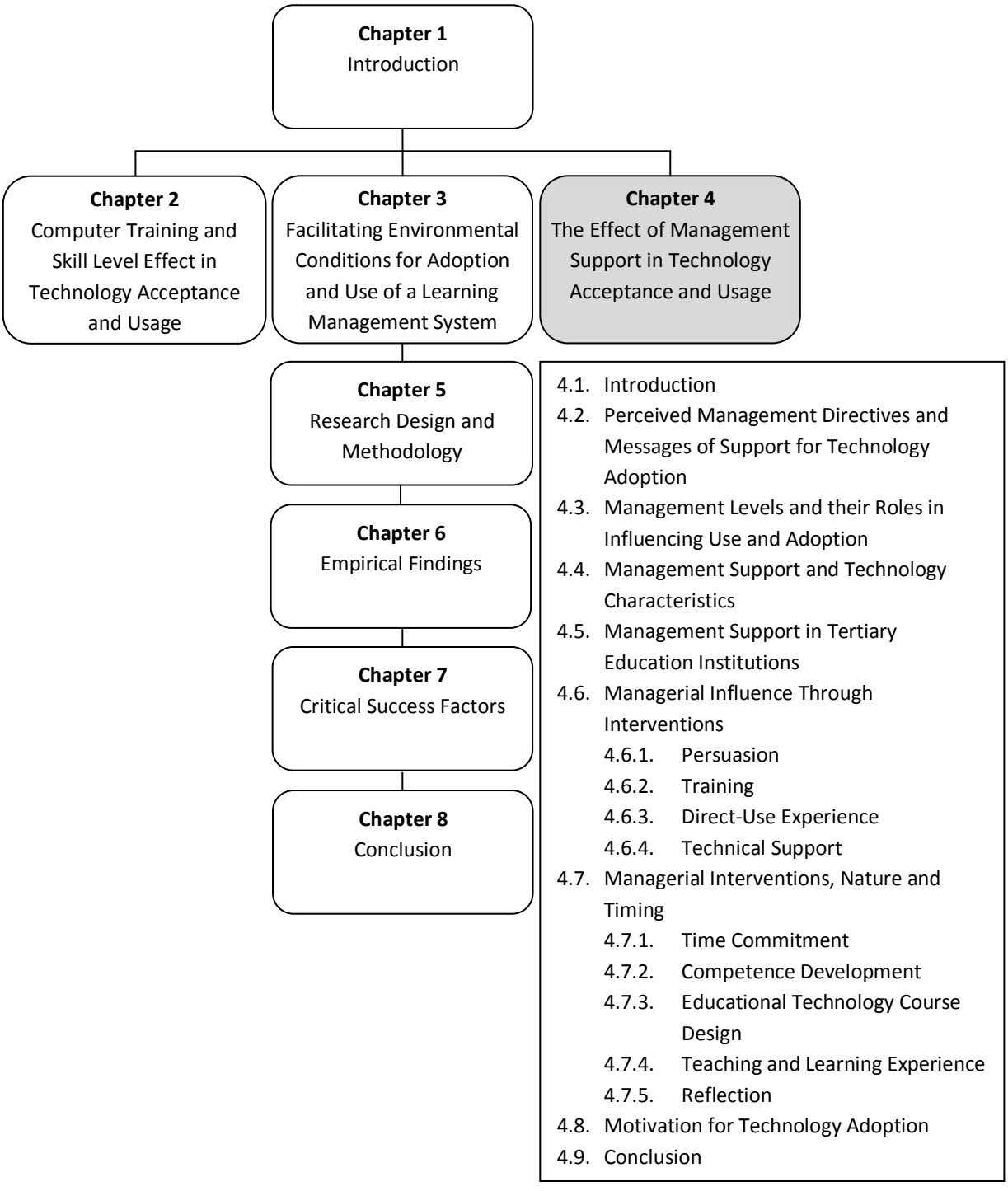
In this chapter the presence of ICT infrastructure affecting teaching and learning with technology was discussed. Even though all institutions of higher learning in South Africa have infrastructure available, student and staff satisfaction is not guaranteed.

The context under which the infrastructure is discussed is the pre-requisite for students and staff engaging in technology-enhanced learning. A learning management system requires an infrastructure such as a computer network, and enough bandwidth for access to the educational content online. Also, computer training and a wide range of support is required for staff and students for such projects to be successful.

Therefore, it is clear that if the infrastructure supporting the LMS is lacking, so too will the experience of students and staff be lacking. The next chapter will discuss the effect management support has on the adoption of a LMS.

CHAPTER 4:

THE EFFECT OF MANAGEMENT SUPPORT IN TECHNOLOGY ACCEPTANCE AND USAGE



4.1 INTRODUCTION

Anandarajan, Igbaria and Anakwe (2002) suggest that organisational factors have an impact on technology adoption and usage. These organisational factors include support and usage of technology within an organisation. Organisational support includes management support, technical support, and information centre support (Ngai, Poon, & Chan, 2007).

The focus in this chapter is on the support role of management in an organisation, and factors around the role played by managers in technology use and adoption in an organisation. Wu *et al*, (2008) found that management support has a direct impact on the subjective norm and creates a favourable environment for technology adoption.

In this chapter the effect management support has on the decision to adopt and use a Learning Management System (LMS) is discussed. The topics covered are:

- Perceived management directives and messages of support.
- Management levels and their roles in influencing use and adoption.
- The impact of the different roles played by managers.
- Management support and technology characteristics.
- Managerial influence through interventions the interventions covered being persuasion, training, direct-user experience and technical support.
- The nature and timing of managerial interventions.
- The chapter concludes by looking at some reasons for motivating managers to adopt technology.

4.2 PERCEIVED MANAGEMENT DIRECTIVES AND MESSAGES OF SUPPORT FOR TECHNOLOGY ADOPTION

Management support has been discussed as one of the determinants of technology adoption and is believed to create a more positive attitude about the system to users, and generally leads to the use of computer systems (Ngai *et al.,* 2007). Leornard-Burton and Deschamps (1998) investigated interaction between perceived managerial behaviour and employee characteristics in promoting the use of an innovation. They focused on end-user characteristics, managerial influence, how end-users respond to a manager's influence, and reasons for their response. They state that even though a user's evaluation of a technology is affected by an organisational leader's attributes, opinions and actions, they are also influenced by each individual's personal interests, needs and skills. The personal interests, needs and skills will determine the user's response to managerial directives about the innovation. Leornard-Burton and Deschamps (1998) state that not all end-users will respond to the managers as intended, but the response will vary. Leornard-Burton and Deschamps (1998) state further that a message about adoption, issued by authority, influences the adoption decision of a subordinate, either by making the

decision for the receiver, or by enforcing a decision already made. The intended influence is amplified if the message to adopt an innovation is from a manager, as compared to a message from a person without authority. The question raised is whether the subordinates will simply comply with the instruction to adopt only because it is a management directive.

According to Leornard-Burton and Deschamps (1998), authority does not always ensure compliance. The authors generally based their discussion on two different organisational environments:

- A stable organisation where an instruction is issued by the authorities and the subordinates are complying with directives from the management for reasons of legitimacy and the position of the management;
- Where the decision process is highly decentralised, the subordinates are highly professional and communicate freely and there is a loose management structure. In this latter situation, Leornard-Burton and Deschamps (1998) argue that persuasion will work better than a formal authority giving a directive to the subordinates to adopt an innovation.

The important factor for the success of the persuasion approach is that there should be consensus between superiors and subordinates, and the management is seen by the subordinates as being professionally competent to make the decisions.

The two issues here are that subordinates can be persuaded to adopt an innovation because of their perception of management legitimacy and competency, or accept an innovation because of a directive from management to do so. In an organisation with decentralised decision-making processes, where subordinates are highly professional and competent, they may question the legitimacy of messages from authority to adopt and compliance may be low, hence affecting the adoption success. Leornard-Burton and Deschamps (1998) argue that the indirect influence effect of management on subordinates to support an innovation is difficult to evaluate and forecast, and is subject to individual interpretations.

Leornard-Burton and Deschamps (1998) research shows that management has an important role to play in the adoption of a technology, and the role varies depending on the type of organisation and subordinates' personal factors. Their research results show that the users are influenced by direct intervention of management in the form of messages urging use, and indirect management encouragement in the form of resources. Some of the research results are summarised in Table 4.1.

Table 4.1: Research Results Modified Summary (Leornard-Burton & Deschamps, 1998)

Number	Hypothesis	Research Results
1	A positive relationship is expected between innovation use and perception of managerial behaviour supporting or urging use.	Not supported
2	A positive relationship exists between management messages or support and use of innovation for less innovative individuals, but not for highly innovative ones.	Supported
3	A positive relationship exists between perceptions of management messages urging use, or management support and use among people for whom the job-determined importance of the innovation is low (but for whom importance is not high).	Supported
4	A positive relationship exists between management messages or support and use among people for whom the subjective importance of the task is low, but not among people for whom it is high.	Supported
5	A positive relationship exists between perceived management messages or management support and use for people having low task related skills, but not for highly skilled people.	Supported
6	A positive relationship is expected between management messages or perceived support and use for people low in technology-related skills, but not for highly skilled people.	Not supported
7	A positive relationship exists between perceived management messages or management support and use for low performers, but not for high-performers.	Supported

Indirect management encouragement is provided in the form of resources, including training users and making resources available to provide access. The majority of users who perceived managerial influence to be significant for them, reported that training tended to be more important than the perceived accessibility of IT (Leornard-Burton & Deschamps, 1998). Leornard -Burton and Deschamps (1998) suggest that IT innovation implementation should be a two-step process. Management should first focus on providing and advertising an adequate infrastructure supporting the innovation and then turn attention to motivating late adopters.

There is a group of people in an organisation who have the necessary skills to make their own decision about usefulness of the technology and will adopt the innovation without a struggle as they are used to other technologies they have access to in everyday life. They have the perception that the technology is easy to use because of experience with other technologies. Word of mouth is very important for this group. For this group of users (early adopters) physical accessibility of the technology is said to be very important, more so than influence from management, as they are motivated and do not need messages from management urging them to use the available technology. For the other group of users you will find in an organisation, providing access is usually not enough for them, they need a directive from management urging them to use the innovation.

4.3 MANAGEMENT LEVELS AND THEIR ROLES IN INFLUENCING USE AND ADOPTION

According to Lewis, Argarwal and Sambamurthy (2003), even though senior management make adoption decisions, the success of an IT innovation will mainly depend on individual users in an organisation who should be using the technology. The role of users in adoption and the use of technology cannot be ignored, and this has been emphasised by Leornard-Burton and Deschamps (1998). Lewis *et al.* (2003) use a framework that provides sources of influence on beliefs about technology use. The framework puts institutional factors at the highest level, followed by social factors, individual factors and beliefs. Beliefs are at the centre of this framework. The framework is shown in Figure 4.1.

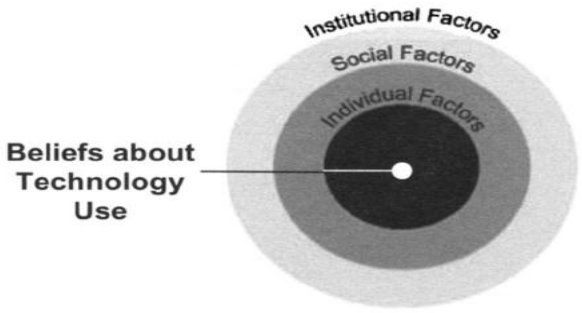


Figure 4.1: Sources of Influence on Beliefs About Technology Use (Lewis et al, 2003)

According to this model, the closer the factors are to the centre of this model the more they are influential in users' decision-making to increase beliefs about technology use (Lewis *et al.*, 2003). Organisational factors fall into the institutional factors of this model and the focus is on managerial commitment and support.

Lewis *et al.* (2003) view that top management attitudes will influence workers in the organisation, but the organisational environment will influence users more deeply than management attitudes. Lewis *et al.* (2003) identify three processes in which organisational environmental conditions influence the users' cognition and behaviour in an organisation; namely signification, legitimisation and domination.

Signification is the user's use of the understanding of the organisational environment in forming beliefs about new technology introduced into the organisation. Legitimisation is a way in which a user validates beliefs and actions of individuals, based on what the users pick up from management about the new technology. Domination reflects the idea that the organisational environmental condition controls individual beliefs so much that users will comply with management directives about technology use (Lewis *et al.* 2003). In simple terms this means top management attitudes and actions are likely to influence perceptions and attitudes of technology users in an organisation.

Top management commitment influences the user by setting up structures that will be conducive to the creation of positive beliefs and attitudes toward the use of the new technology. Users can believe that a technology is useful and rewarding to use in the work environment, based on management commitment to the technology introduction.

Lewis *et al.* (2003) does not believe that top management commitment will influence ease of use beliefs, because top managers interact with users at strategic levels, and not in day-to-day working of the users with the new technology. On the contrary, the research results showed that users believed that top management commitment made the technology easy to use, by providing the necessary resources (Lewis *et al.,* 2003). There are two levels of management the users interact with: The top management at enterprise level, and senior management at departmental level in which a user is working (Lewis *et al.,* 2003).

The top management provides funding and other resources which will indicate to the users the importance of the new technology and the commitment of management. Senior management support the work of top management by executing their responsibilities, following directives from top management towards the new technology, thereby influencing users at departmental level.

Lewis *et al.*, (2003) research results show that managers need to focus their attention on showing commitment to adoption and use decisions concerning new technologies in organisations. The reasons that users develop positive beliefs about the use of new technologies is due to messages of support from management and by the provision of resources necessary to users and potential users of the new technology. These results are shown in Figure 4.2 below.

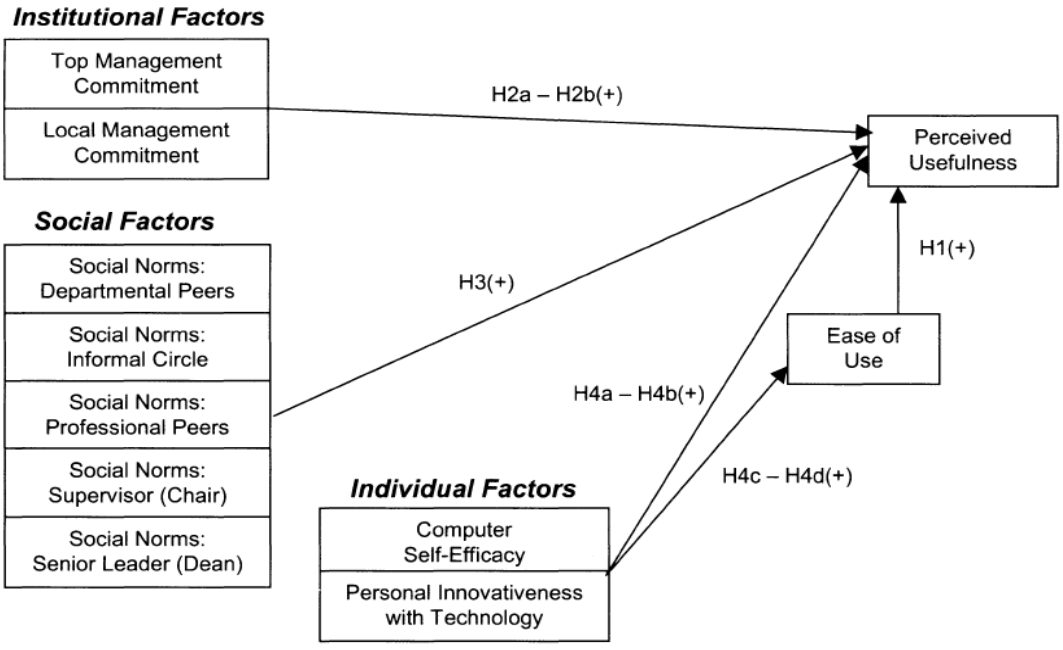


Figure 4.2: Research Model (Lewis et al, 2003, p. 660)

4.4 MANAGEMENT SUPPORT AND TECHNOLOGY CHARACTERISTICS

When a technology that brings a certain amount of change is introduced in an organisation, the impact of the change will be determined by the nature of the technology (Wang & Qualls, 2007). Some technology may require changes in business practice while others can be implemented with less impact. The technology introduced can be product-oriented or process-oriented. Product-oriented technology is described as an application that creates new products or services to meet an external market or user need (Wang & Qualls, 2007). If a technology introduces new ways of conducting business and transforms business practices, it is said to be process-oriented (Wang & Qualls, 2007). Most technology adopters value product-oriented technologies because process-oriented technologies are perceived to be less advantageous. Process-oriented technologies support the delivery of an outcome, while product-oriented technologies are used to deliver outcomes themselves. Wang and Qualls (2005) claim that product-oriented technology gains more managerial attention, especially in hospitality organisations, because managers are interested in producing results.

4.5 MANAGEMENT SUPPORT IN TERTIARY EDUCATION INSTITUTIONS

Management support for technology adoption and usage in an organisation is one of the main contributory factors to successful implementation (Leornard-Burton & Deschamps, 1998; Lewis *et al.*, 2003; Wang & Qualls, 2007). Lewis *et al.* (2003) argued that management influences technology usage at different levels, and those levels are top management and senior management. Thong, Yap and Saman (1993) have researched the effect of top management support in the organisation as will be discussed.

The support of top management is in the form of guidance in planning, design and implementation of technologies. It is also the responsibility of top management to make sure that sufficient resources are allocated if technology implementation is to be successful. In the case of small institutions, the top management is involved in many aspects of the institution as the decision maker.

Thong *et al.,* (1993) emphasise the importance of external support in the form of consultants and vendors working with small institutions, as a small institution may lack the necessary expertise and experience for technology implementation. Their research question was to find out which is more important in a small institutions: the top management or external support. External support comes in the form of consultancy and vendor support.

The consultant performs information requirements analysis of the business. Hardware and software used in the company is also recommended by the consultant, who would manage recommended technology implementation. Small institutions, because of lack of internal

expertise, would use the external support of the consultant. Thong *et al.,* (1993) state the advantages of using external expertise in small institutions:

- There is no need to maintain an expensive employee when the technology implementation is completed, and maintenance is usually low.
- There is no need to provide training to keep specialised support staff up to date with new technologies.
- The small institution will be spared the difficulties of struggling to keep employees with specialised skills.

Another form of external support that a small institution may use because of lack of expertise, is the vendor. The duties of a vendor usually include providing hardware, software, technical support, and the training of users for the small institution.

There is no conclusive evidence to justify that technology usage and adoption by users is greatly improved by management involvement, in the form of a top management in small institutions (Thong *et al.*, 1993). This is because the contribution by the top management is overshadowed by the quality of support provided by external vendors. The contribution of the top management is important as it makes the necessary resources available, but in the end the consultants and vendors are the implementers of the technology (Thong *et al.,* 1993).

4.6 MANAGERIAL INFLUENCE THROUGH INTERVENTIONS

Managerial interventions are actions taken by management and policies put in place to speed technology adoption and use in a number of ways. Xia and Lee (2000) state that user perceptions about technology change from time to time and as a result, it is necessary that user perceptions should be evaluated from time to time. They emphasise the importance of understanding the factors that affect the change of user perceptions. If such factors are understood, managerial interventions can be planned and implemented to persuade users to adopt and use technologies. Xia and Lee (2000) argue that technology adoption and diffusion is a stage-based process. This process occurs when an individual passes from initial awareness and knowledge of a technology, develops a positive or negative attitude towards the technology, and then makes a decision to adopt or reject the technology. During the process, the user's initial attitude about the technology can be confirmed or reversed. In the process of the user experiencing the technology, the user may stop or continue to use the technology, because the adoption decision is not a one-time decision but an iterative decision process. Xia and Lee (2000) investigated the effect of three factors of managerial interventions: persuasion, training and user direct-use experience. In addition to these three factors, technical support is added and discussed as one of the necessary interventions.

4.6.1 Persuasion

Persuasion is defined as an active attempt to influence people's actions or beliefs by appealing to reason or emotion. It can also be viewed as communication intended to influence choice. Beliefs are said to be ultimate determinants of behaviour, and to change human behaviour, beliefs must be changed. Social influence operates in three processes: internalisation, identification and compliance (Xia & Lee, 2000). Internalisation results from accepting information from expert sources as a reality and accepting it as your personal truth. Identification occurs from feeling a connection with a source, and continues as long as the source seems trustworthy. Compliance results from a powerful source that has control over the message recipient (Xia & Lee, 2000). In the early stages of technology adoption, users lack knowledge and persuasion can be used by managers to signal to the users what management believe about the technology, and convey the expectation that the user must comply. Persuasion has been found to be one of the factors influencing the formation and change of user beliefs and attitudes.

4.6.2 Training

The aim behind training is to impart to the user knowledge about the technology intended to be used, and is used to influence perceptions and attitudes about the new technology. Training increases procedural knowledge and has a positive effect on ease of use (Xia & Lee, 2000).

4.6.3 Direct-Use Experience

Direct-use experience is when users are given the opportunity to use the new technology and to experience its important functions. The objective is to expose users to the system and to influence their beliefs about the technology from experience. Users may change their attitude about the technology and make decisions based on personal experience of working on the technology. Once users are exposed to the new technology their confidence about using the system may increase (Xia & Lee, 2000). This may have the effect on users' perceptions and behavioural intentions formed during training and through persuasion, to change as a result of direct-use experience.

4.6.4 Technical Support

Technical support has been added to TAM as one of the external factors used to determine what leads to acceptance of technology (Ngai *et al.*, 2007). Technical support is defined as "knowledge people assisting the users of computer hardware and software products" (Ngai *et al.* 2007, p.3). Technical support can include help desks, hotlines, online support services, machine-readable support knowledge bases, faxes, automated telephone voice response systems, and remote control software. According to Ngai *et al.*(2007) technical support is one of

the most important factors for acceptance of technology, for teaching and availability of support leads to user satisfaction.

Ngai *et al.* (2007) investigated the relationship between technical support, perceived usefulness, and perceived ease of use, attitude and the acceptance of the Web CT for higher education. Their results showed that technical support has a direct effect on the perceived ease of use and perceived usefulness of an LMS, and an indirect influence on attitude. They concluded that this emphasises the importance of technical support, together with training, as a way of influencing perceptions of users. Ngai *et al.* (2007) conclude that, in implementing a system, the focus should be placed on increasing self-confidence of users and their view of the system. This is based on the view that if the users are struggling, they may conclude that the system is too difficult to use and the benefits of using it are outweighed by the effort of using it. This may lead to reluctance in using the system and thus defeat the purpose of introducing it.

According to Xia and Lee (2000), the managerial interventions of persuasion, training and direct-use experience yielded positive results, and technical support had an influence on the perceptions of ease of use and usefulness. The influences of initial persuasion and training on user perceptions were sustained over time, indicating that they had a great impact. Training has been reported to have a significant impact on the formation of user perceptions on ease of use of the technology. Technical support will be of great help after training in dealing with problems that users of a technology will experience, and will reinforce the perceptions of ease of use and usefulness. Results show that when users are exposed to the technology through direct-user experience they develop a better understanding of the strengths and weaknesses of the technology.

4.7 MANAGERIAL INTERVENTIONS, NATURE AND TIMING

Moser (2007) suggested a model for a technology adoption cycle in an educational institution (see Figure 4.3 below) and emphasises support as a critical factor for success of such a project.

The reason for suggesting this adoption cycle is because of the presumed difficulty in integrating technology into teaching. The adoption cycle model has a number of milestones, referred to as major faculty behaviours. These are:

- Time Commitment
- Competence Development
- Educational Technology Course Design
- Teaching and Learning Experience
- Reflection

These five points will now be expanded upon in the following subsections.

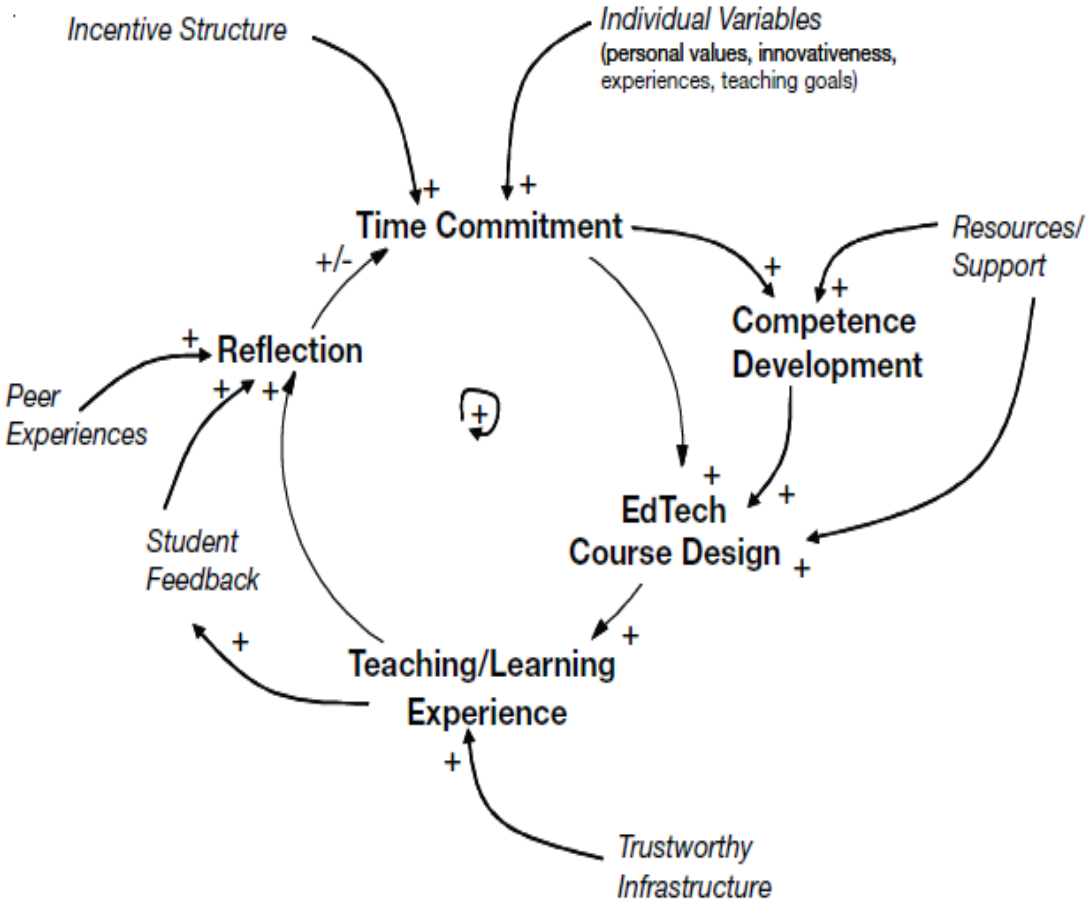


Figure 4.3: Faculty Educational Technology Adoption Cycle (Moser, 2007)

4.7.1 Time Commitment

Time is considered a scarce resource, and time commitment indicates the value and importance assigned to an activity. Time commitment is a prerequisite for a member to be involved in competence development and course design activities. Time allocation is important because integrating technology into teaching is a very complex issue which is underestimated by the people involved (Moser, 2007). Managerial support may be needed in ensuring that involved members are allocated enough time, and may take the form of making sure sufficient resources are allocated (Thong, Yap & Raman, 1993) and allocate those resources at the time they will have a desired effect. Moser (2007) asserts that time allocation is at the core of the model.

4.7.2 Competence Development

Most staff members lack the necessary technical and pedagogical competencies to successfully integrate educational technology into their teaching (Moser, 2007). In order to compensate for the lack of skill, staff have to develop the competencies they are lacking by undergoing

development in the form of training and have to make time available for such development in addition to their other commitments.

Moser (2007) states that time commitment is a prerequisite for competence development and competence development has a positive impact on course design which is one of the necessities for integration of technology into learning and teaching.

4.7.3 Educational Technology Course Design

Course design (or Instructional design) is a determinant of teaching and learning experience. Instructional design is defined as a systematic process that is employed to develop education and training programs in a consistent and reliable fashion (Reiser & Dempsey, 2007). In addition, instructional design models or theories may be thought of as frameworks for developing modules or lessons that 1) increase and/or enhance the possibility of learning and 2) encourage the engagement of learners so that they learn faster and gain deeper levels of understanding. Well designed courses for delivery through the use of technology will enhance teaching and learning.

4.7.4 Teaching and Learning Experience

Quality of course design has a great impact on the quality of teaching and learning. The quality of teaching and learning can be greatly affected by the reliability of technology (Moser, 2007). It is the duty of management to make sure the necessary resources are made available (Thong *et al.*, 1993), and the necessary technical support is available (Ngai *et al.*, 2007) to the institution's staff who are participating in integrating technology into their teaching.

4.7.5 Reflection

Reflections are in the form of feedback from staff and students. The reflections stage is the right time to identify loopholes and to plan appropriate managerial interventions for both students and staff. The intervention can be in the form of training, persuasion, direct-user experience (Xia & Lee, 2000), technical support (Ngai *et al.*, 2007), or making available other resources that may be necessary.

Reports of negative experiences can have undesirable consequences, influencing bad opinions in the community about the integration, as shown in Table 4.2. "The assessment part of the adoption life cycle may result in increased or diminished time commitment, which will lead to another cycle of design activity and experience" (Moser, 2007).

Moser (2007) emphasises the importance of appropriate and sufficient support to be provided, especially at levels of competence development and course design, to prevent early adopters of the technology from achieving only mediocre quality. The early adopters can have a great influence on the other group of adopters listed in Table 4.2. The early adopters can influence

the early majority if they experience problems, and the early majority will be hesitant to try the technology.

According to Moser (2007), this may badly influence quality course design and, as a result, the early adopters and early majority may end up abandoning the integration of technology to the learning project. The effect of early adopters and the early majority abandoning the project will be that the late majority and laggards will not begin to participate in the technology integration.

Table 4.2: Negative Educational Technology Adoption Scenario (Moser, 2007)

	Innovators	Early Adopters	Early Majority	Late Majority	Laggards
Characteristics	Venturesome, cosmopolitan, technology-driven	Respected, opinion leaders, positive attitude toward technology	"Be not the first by which the new is tried, nor the last to lay the old aside" attitude	Skeptical, adopt as a consequence of peer pressure or of economic necessity	Traditional, the past is point of reference
Primary Motivation	Very diverse individual goals	Unhappy with lecture-style teaching, fascination with technology	Extrinsic		
Barriers	Uninfluenced by institutional environment, self-sustaining regarding the technology	Inappropriate support, unreliable technology	Negative peer experiences, limited time commitment, minimal course design		
Experiences	Students are open to new things	Negative student feedback	Negative student feedback	Not involved in the process unless forced	Not involved in the process
Result of Reflection	Motivation to improve	Abandon technology	Abandon technology	No adoption	No adoption

One of the problems Moser (2007) highlights are high expectations, which will be problematic for the participants when they are not met, and may result in withdrawal from the project. Moser (2007) suggests that adequate expectation levels should be set concerning requirements, and the effort necessary to be successful in the integration project.

4.8 MOTIVATION FOR TECHNOLOGY ADOPTION

A number of factors influence technology adoption and can be grouped as follows: internal (organisational), external, and technological (Del Aguila-Obra & Padilla-Mendelez, 2006). Organisational factors are said to be the most important to organisations and include the following: IT users' community, organisational structures, firms' processes, organisation size, technological capabilities of the organisations' members, the technological and financial resources available, the culture of the organisation, process of selecting and implementing the

IT, management backing and support for the project, and the project leader (Del Aguila-Obra & Padilla-Mendelez, 2006). Del Aguila-Obra and Padill-Mendelez (2006) also state that perceived benefits, organisation readiness, external pressure, perceived ease of use, and perceived usefulness are also among motivating organisational factors for technology adoption.

There are benefits for managers when their organisation adopts technology. Some of those benefits include: saving costs and generating some income, opportunities in new markets, marketing, and publicity, depending on the nature of the technology adopted.

The benefits and factors for technology inclusion in an organisation should be known beforehand in the planning phase, as a justification for embarking on the technology project. These should be uncovered during the first steps taken in enquiring about the technology. According to literature, the technology adoption process has a number of steps but can be summarised into initiation and implementation phases as one way of looking at it (Del Aguila-Obra & Padilla-Mendelez, 2006).

The initiation phase consists of the following steps; the organisation considering the need to introduce the technology, searching for information, training company employees to work on the new technology, suggesting required resources for implementation of the technology, evaluating the process, and making the decision to adopt. It is during the first steps of the initiation phase that managers should be convinced of the benefits of the technology to the organisation, and be able to persuade other organisational employees, and to intervene effectively when the need arises in later stages.

In the implementation phase an organisation has adopted the technology and the technology will be used for the first time. Necessary modifications in the organizational routines may have to be made for proper use of the technology.

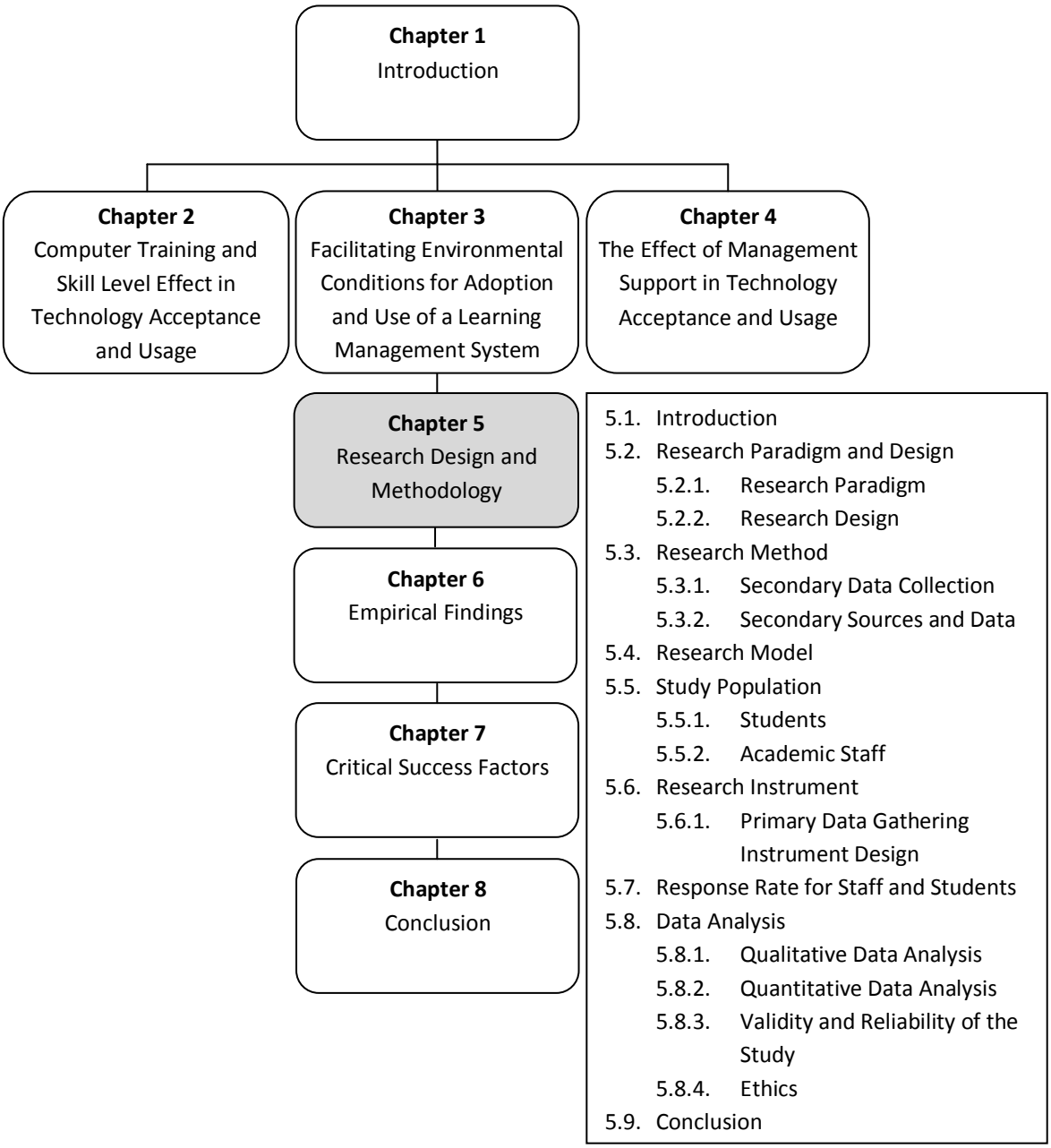
4.9 CONCLUSION

In conclusion, a number of ways management affect technology use and adoption have been discussed. The topics included: perceived management directives and messages of support; management levels and their roles in influencing use and adoption; looking at the impact of the different roles played by managers; management support and technology characteristics; management support in small organisations, and managerial influence through interventions. The interventions covered are: persuasion, training, direct-user experience and technical support; managerial interventions; nature and timing. The chapter concluded with looking at some motivations for technology use and adoption by management in organisations.

This has been an important chapter because management support is a primary influence on e-learning strategy and on staff and student influence. The next chapter will discuss the Research Design and Methodology used in the study.

CHAPTER 5:

RESEARCH DESIGN AND METHODOLOGY



5.1 INTRODUCTION

This study will investigate technology acceptance and continued use of a Learning Management System (LMS) at UFH. The lecturers are divided into two groups, a group that has experience in using the Blackboard Learning Management System (LMS), and those lecturers with no Blackboard experience. The student participants have all used the Learning Management System (Blackboard).

This chapter will briefly cover the research paradigm upon which this study is aligned. The outline of the research design is followed by the specific details of the implementation of the design in the form of the research method. In the method section the following will be covered; data collection, research model, study population, and data analysis.

5.2 RESEARCH PARADIGM AND DESIGN

5.2.1 Research Paradigm

Walliman (2005) defines a paradigm as established methods and techniques of problem solving which are used by those working in a certain field. Oates (2006) links research strategies with philosophical paradigms. Oates (2006) suggests that surveys are strongly associated with positivism, as researchers using surveys look for patterns in the sample frame so that they arrive at a conclusion that the patterns discovered in the sample frame are true for a wider population. The data used to arrive at such conclusions is quantitative data, and statistical analysis is used to find the patterns between the data (Oates, 2006).

The people who work in the positivist paradigm share the view that the world is independent of humans and that humans can observe and measure the world. In the process, models that explain how the world works and is organised, are developed. Such models, in the form of theories or hypotheses, are tested, and can either be confirmed or rejected (Oates, 2006). Testing usually occurs in the form of statistical analysis.

Criticism against positivism is that it is well suited to studying the natural world, but not the social world of people, with organisations, structures people build, cultures people develop and their meaning. Other philosophical paradigms are *interpretivism* and *critical research*.

This study is leaning towards positivism; it is a test of attitudes, beliefs and perceptions of staff and students about the Learning Management System (LMS) at the University of Fort Hare, and to make use of generalisations based on the analysis of collected data about the direction LMS adoption is taking at the institution.

5.2.2 Research Design

Hofstee (2006) lists a number of research designs that include: extended literature review, survey-based research, case studies, comparative analysis and others. The research design for this study is survey-based and gives a brief outline of the strategies informing the method that has been used in this study, with minor variations.

According to Oates (2006), a survey is used with the aim of getting same kind of data from a large group of people. After the data has been collected there is a search for patterns that can be generalised to a larger population than the group originally targeted.

5.3 RESEARCH METHOD

This research method has been informed by the research design outlined in the design section above. This section reports on the practical application of the design outlined in this study.

5.3.1 Literature Review

Oates (2006) states that the purpose of conducting literature review is two-fold. The first purpose is for finding suitable research ideas and discovering relevant material about a possible research topic. The second purpose occurs when a topic has been chosen, and the researcher concentrates on literature focusing on the specific research topic that has been chosen.

Hofstee (2006) describes literature as the body of work previously published by other scholars, and further states that the literature section is not the place to present your own work as the research report writer, except if your own work that you are including, has been previously published.

Table 5.2: The Purpose of a Literature Review (Hofstee, 2006; Oates, 2006)

Hofstee (2006)	Oates (2006)
That you are aware of what is going on in the field.	Show that the researcher is aware of existing work in the chosen topic area.
That there is a theory base for the work you are proposing to do.	Place the researcher's work in the context of what has already been published.
To show how your work fits in with what has already been done.	Point to strengths, weaknesses, omissions or bias in the previous work.
That your work has significance.	Identify key issues or crucial questions that are troubling the research community.
That your work will lead to new knowledge.	Point to gaps that have not previously been identified or addressed by researchers.
	Identify theories, genres, methods or algorithms that will be incorporated in the development of a computer application.
	Identify research methods or strategies that the researcher will use in the research.
	Enable subsequent researchers to understand the field, and the researcher's work within that field.

Oates (2006) and Hofstee (2006) agree on the purpose of literature review. In this study literature review has been conducted along the objectives stated above in Table 5.2. Relevant literature in TAM, ECM, training, computer access, computer skill, administrative and management support has been used in this study.

The use of the relevant literature serves to ensure that the study is relevant and the researcher is well informed about the current literature on acceptance, use and continued use of LMS and technology.

5.3.2 Secondary Sources and Data

Data that has been subjected to interpretation and used in another study is called secondary data and is from secondary sources (Walliman, 2005). The secondary sources can be books, newspapers reports, CD-ROMs and online databases, online dissertation abstracts, excerpts articles and publications (Walliman, 2005; Hofstee, 2006). Books, online databases, articles, dissertations, and publications have been used in this study.

5.4 RESEARCH MODEL

The theory base of this research is TAM and ECM, applied in the local context to determine Critical Success Factors that will influence acceptance and continued use of a Learning Management System by students and lecturers at the University of Fort Hare. The external factors derived from the research questions, TAM and ECM, form the base of the research model for acceptance and continued use.

Figure 5.1 shows the combined research model for LMS acceptance and use at UFH, which is the proposed research model for this study, that is being tested. The model combines aspects of both TAM and ECM constructs, including the external factors that were added, based on literature and local context in determining the Critical Success Factors that will influence acceptance and continued use of a learning management system by students and lecturers at the University of Fort Hare. This is not a new model and it is not the goal of this study to come up with a new model, but merely a combination of the two models to facilitate the process of finding answers to the research questions.

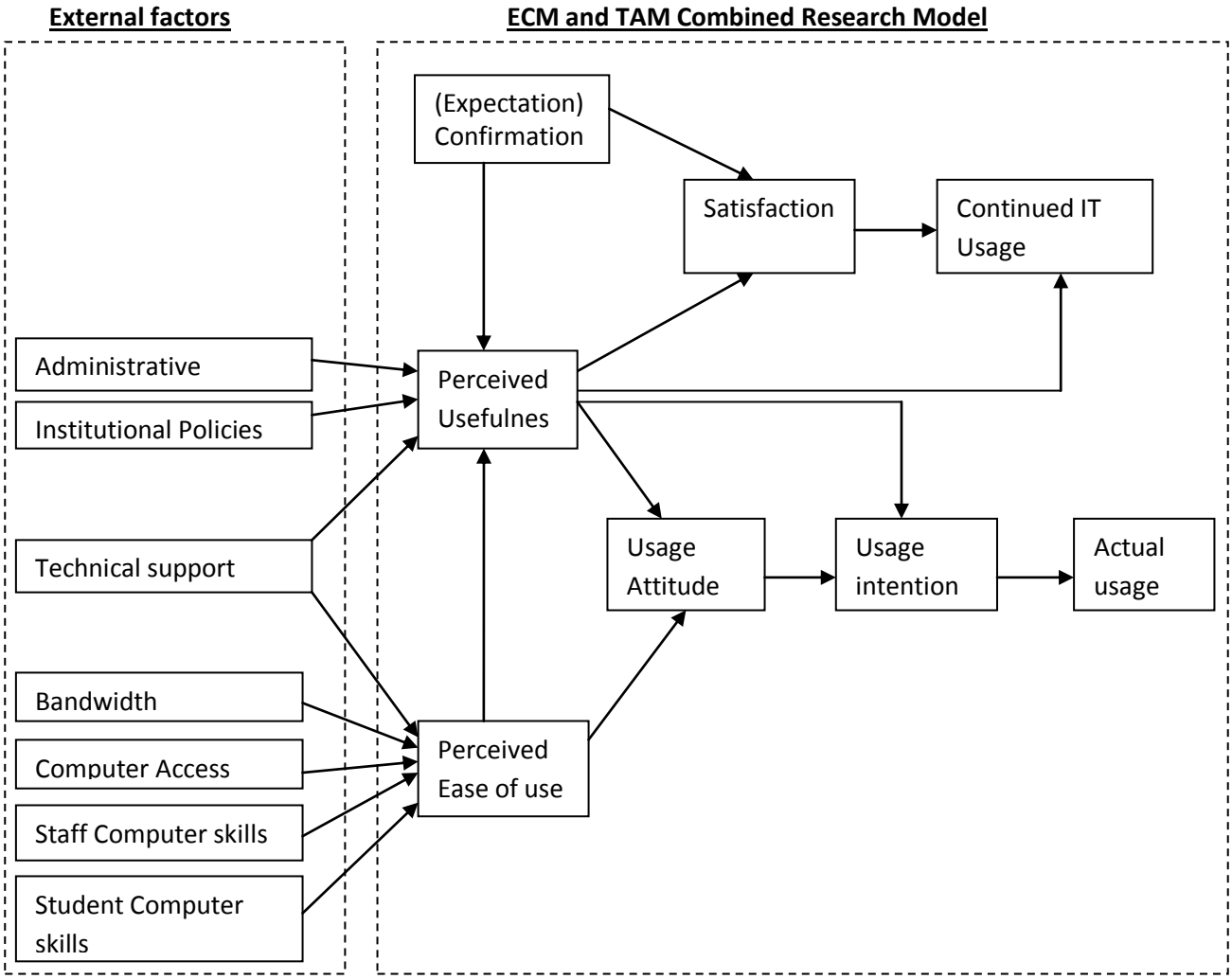


Figure 5.1: Research Model for LMS Acceptance and Continued Use at UFH

5.5 STUDY POPULATION

The research location is the University of Fort Hare. The University has three campuses, namely the Alice main campus and two satellite campuses which are East London and Bisho. The study covers the Alice and East London campuses. The Bisho campus is excluded from the study because the LMS technology with which this study is concerned, is not being used at present. The study population includes both students and staff from these two campuses.

5.5.1 Students

The target students for this study are all students who have used the LMS at UFH. The students have used Blackboard, either because their lecturer has been part of the pilot project for the use of Blackboard at UFH, or because the lecturer is one of the very few who have been using the LMS before the Pilot programme.

Some students are not currently using this (in 2010) but have used the LMS in 2008 or 2009. Electronic mail was sent to all students who have used Blackboard, informing and inviting them to participate in the study. A link to the survey which was hosted on a SharePoint server was

included in the e-mail. The link to the survey was also placed on Blackboard for the current users.

The choice of a hosting server was based on a number of reasons and the competitors were Blackboard, SharePoint and Open Source. The original intention was to host on Blackboard, but a decision was made, in the end, to use SharePoint as it was the reliable choice based on the current context. Even though Blackboard was the original choice for hosting the survey, there were limitations in terms of availability and uptime the number of concurrent users, based on the amount of available RAM in the current context, and there were possibilities of the LMS crashing because of overload. The Open Source surveys were of acceptable standard, and the only limiting issue was the very low bandwidth available, which was painfully slow to work with as it was outside our local network. The SharePoint server offered a far better service based on our UFH context, was easier to access, quicker to connect to, and more reliable.

5.5.2 Academic Staff

Academic staff are the decision makers in terms of use of the LMS. Twelve academic staff members have been participating in the UFH Blackboard pilot programme. There are also a few academics that have used the LMS in previous institutions. The rest have had no previous experience. Academic staff with the experience of using the LMS and those with no experience were included in the study as it was important to get the views of current and future users to gain a better understanding of their perceptions.

A separate questionnaire was designed for staff members with experience. An invitation to participate in the study was sent via e-mail. This was a closed group in the sense that only a specific number was invited based on the fact that they have LMS use experience. Staff members with no experience were also invited, and the link to a specific questionnaire for them was included in the e-mail. This questionnaire did not include questions about specific use of the LMS as they had no experience. The questions were covering other issues, such as biographical information, bandwidth issues, access to computers, computer skills, and technical support.

The target number for staff with Blackboard experience was 24, which included the twelve Blackboard pilot programme participants and another twelve who had gained experience either from other institutions they worked at before, or the few who had used the LMS at UFH before but, were not part of the Blackboard pilot programme.

5.6 RESEARCH INSTRUMENT

The research instruments for this study were questionnaires for students, staff with Blackboard experience, and staff with no Blackboard experience. Five questionnaires for each group were

piloted to test if there were any ambiguous or 'difficult to understand' questions. After that, the questionnaires were further refined. The questionnaires can be found in the appendix section of this dissertation.

A number of questions were obtained from use and acceptance of technology literature for both TAM and ECM and were made to fit the current study. In the beginning there were on average about 60 questions for each questionnaire, but after the refining and piloting processes the numbers were significantly reduced. In the end, for the students' questionnaire there were 19 questions, for staff with Blackboard experience, 26 questions, and for staff with no Blackboard experience there were 17 questions.

The design of the questionnaire was guided by literature as well as the local context as briefly explained below. The questions asked covered external factors, TAM and ECM constructs.

The external factors; *administrative support*, *institutional policies*, *technical support*, *bandwidth*, *computer access*, *staff computer skills*, and *student computer skills* were all covered by the questions in the questionnaire.

The TAM and ECM constructs; *perceived usefulness*, *perceived ease of use*, *usage attitude*, *usage intention*, *confirmation*, *satisfaction* and *continued use* were also covered.

Although there was literature for questions about TAM constructs, (Teo, Lee, & Shai, 2008; Davis, 1989; Mao & Palvia, 2006; Renaud & van Biljon, 2008; Averweg, 2008) these were used as guidelines to ask relevant questions and were not adopted because of the need to ask questions that fitted the local context and user profiles. The objective was that the questions should be easy to understand and not ambiguous.

5.7 RESPONSE RATE FOR STAFF AND STUDENTS

It has been noticeable in staff responses that the majority of staff members responded on the day they received the mail with the link to the survey. Responses were mainly during the first and second day after the invitation was sent out. After that responses came sparingly, until they dwindled to nothing. Staff members were invited the first time, and then a reminder was sent after about a month, and the same pattern of response was observed.

The invitations that were sent to staff had some incentives to respondents in the form of prizes that could be won, but in this study the impact of the prizes is not known.

According to Oates (2006), it is advisable to have a plan to increase the number of responses. One of the strategies to increase responses included persuasion, by explaining the purpose of the survey in writing or face-to-face. Follow-ups were another strategy employed, because the researcher was monitoring responses and staff members who had not responded were politely

asked to respond. These strategies included an explanation of the relevance of the study to the university community at large.

A similar approach was followed with students: the students were invited and then reminded. The student response rate was a little different from that of staff members: A significant number responded on the first and second days, and responses kept coming for quite some time. Even though it was not in big numbers, there was continuity.

5.8 DATA ANALYSIS

Data analysis for this study was done using the statistical package SPSS. Inductive data analysis was applied (Oates, 2006).

5.8.1 Qualitative Data Analysis

Qualitative data analysis includes non-numeric data such as words, images, sounds and others that can be found through the use of interview tapes, researcher diaries, company documents, websites and developer models (Oates, 2006). Oates (2006) states that “qualitative data is generated by case studies, ethnography and action research”. It is used and analysed by interpretive and critical researchers. According to Walliman (2005), analysis of data must be directed by the research problem. If that is not taken into consideration a lot of time will be wasted. Appropriate methods for analysing must be chosen, even though a lack of analytical skill may be a problem leading to the use of inappropriate methods.

Walliman (2005) states that the reasons for analysing data, as listed in Table 5.3, are the same reasons as for conducting research. It is important that a researcher takes the relevant reasons into consideration when analysing data. This study is more aligned to quantitative data analysis, as will be discussed in the following section.

Table 5.3: Main Reasons for Analysing Data (Walliman, 2005)

To measure
To make comparisons
To examine relationships
To forecast
To test hypotheses
To construct concepts and theories
To explore
To control
To explain

5.8.2 Quantitative Data Analysis

Oates (2006) defines quantitative data as evidence based on numbers generated by surveys and experiments. Quantitative analysis uses mathematical operations to investigate the properties of data (Walliman, 2005). In the process of analysing, the researcher looks for patterns in the data and draws conclusions.

According to Oates (2006) data analysis at the simplest level includes tables, charts or graphs with the aim of finding patterns. The following level includes simple descriptive statistics where more statistical patterns can be found. The use of more complex statistical techniques will help the researcher to establish if patterns identified in the data really exist, and are not just the result of chance (2006).

Graphs, tables and charts will be used in this study for simple analysis of the data. In addition to simple analysis, complex statistical analysis will be done to compare relationships between external factors TAM and ECM constructs. Tests will be done to make sure that the relationships are not a matter of coincidence, but are significant. Some of the tests to be done include Chi-square tests and t-tests. The choice of a quantitative data analysis approach has been informed by the philosophical paradigm to which this study is aligned.

5.8.3 Validity and Reliability of the Study

This study uses a positivist approach as compared to interpretivist approach. Intepretivist approach is the most dominating approach in information systems research but the positivist approach has been used depending on the nature of the study being conducted. The academic background of the person may also play a role as some researchers may originate from other fields before doing Information Systems research as stated in Pather and Remenyi (2004).

A criterion for evaluating both the positivist and interpretivist approaches has been suggested in Oates (2006), as shown in Table 5.4.

Table 5.4: Criteria for Evaluating Research (Oates, 2006)

Positivism	Interpretivism
Validity	Trustworthiness
Objectivity	Conformability
Reliability	Dependability
Internal validity	Credibility
External validity	Transferability

The questionnaire based research as used in this study falls under positivism. As shown by Oates (2006) validity, objectivity, reliability, internal validity, and external validity of the study are very important.

Validity refers to authenticity of the study's research model and its fundamental assumptions. This refers to how well the research method investigates what it intends to and the extent to which the researcher gained full access to participants' knowledge and meaning.

It is important to achieve similarity of understanding between the participants and the researcher in ensuring that the research is credible. It is important to demonstrate the appropriateness of the research method for answering questions and providing explanations. Validity interpretation is concerned with how convincing the data analysis process and the researcher's interpretations are. Data analysis approaches and transparency of researchers' interpretations are also important to demonstrate validity.

Internal validation is enhanced by adopting a constant comparative method and recognising the importance of deviant cases in acquiring a greater understanding for theory development.

Winter (2000) gives a number of definitions of *validity* based on Information Systems literature. Some of the given definitions are:

- An agreement between two efforts to measure the same thing with different methods
- The measure that an instrument measures what it is supposed to
- Accuracy
- Degree of approximation of 'reality
- Are we measuring what we think we are?
- To the extent that differences in scores yielded…reflect actual differences

According to these definitions a study is valid if it is accurate, uses the right instruments such as theories and methods for a particular study, and the study can be conducted and similar results can be obtained by another person using a different method.

Reliability is largely concerned with whether a study can be repeated. Reliability is also concerned with demonstrating that the researcher has not invented or misinterpreted data or been careless in data recording or analysis. The procedures that led to the research findings need to be outlined in a transparent way by checking through interpretations and systematically analysing the evidence, and by supporting interpretations with evidence and offering a balanced perspective thereby ensuring *reliability* of the findings.

The reliability of the data in a quantitative study is concerned whether a questionnaire will yield the same results if given to the same respondent a number of times showing that the responses are reliable. That would confirm that respondents thought about the questions, even though they might have changed their minds and respond differently because of that. Another

disadvantage may be that respondents remember the answer they provided before and simple respond the same way as before. Reliability is difficult to assess (Oates, 2006).

Again Winter (2000) defines *reliability* according to definitions provided in Information Systems literature as:

- An agreement between two efforts to measure the same thing with the same methods
- Ability to measure consistently
- Reproducibility of the measurements…stability
- Capacity to yield the same measurement…stability
- Accuracy or precision of a measuring instrument?
- To the extent that the average difference between two measures obtained in the same classroom is smaller than…in different classrooms

Winter (2000) states that the degree to which a study is believed to be generalisable is a factor that clearly distinguishes qualitative and quantitative research approaches. The author states that the ability to generalise findings to wider groups and circumstances is one of the most common tests of 'validity' for quantitative research and yet is considered to be of little, or even no importance for many qualitative researchers.

Moody and Buist (1999) describe information systems as the study of application of information technology in society and organisations. They claim that the main aim of information systems is gaining a better understanding of how individuals, groups, organisations and society can use information systems more effectively and efficiently. They argue that information systems is an applied rather than pure discipline and therefore have two primary objectives, which is a theoretical and practical one. The theoretical objective is concerned with increasing knowledge while the practical one is to improve practices which may result in useful social outcomes.

Moody and Buist (1999) raise a concern over the fact that researchers have become both producers and consumers of research knowledge. They state that consumers of research should be practitioners and not only other researchers. They introduced a criterion to be used to make sure information systems research is balanced.

Moody and Buist (1999) propose the following criteria for evaluating the quality of research under these circumstances:

- Relevance: Is this an important research question? Does it address a practical need?
- Theoretical soundness: Has appropriate theory been used to support the research findings?

- Methodological rigor: Is this an appropriate research method to answer the research question?
- Utility (practical significance): Can the results of this research be used to help improve practice?
- Contribution to knowledge (theoretical significance): Has the research increased our understanding of information systems?
- Understandability: Can it be understood by the average practitioner?

Ethical considerations can contribute in classifying whether a study is valid and reliable. Ethical considerations include making sure no participants were forced in any way to participate in the study. During the time this study was conducted there was no policy in place regarding the consent to participate in research, and the decision rested with the individual participants which were academic staff members and students of the institution. All participants must have the choice to respond to the questionnaire or reject it. Issues of bias involving discrimination against age, cultural diversity, disability, gender and sexual orientation must be avoided as stated by Walliman (2005).

Pather and Remenyi (2004) suggest that a Positivist researcher sometimes referred to as quantitative researcher should be objective in conducting the research, be independent, and that the results are valid, reliable and replicable.

The questionnaire was administered to staff with Blackboard experience, staff with no Blackboard experience, and students with Blackboard experience. Care was taken to make sure no individual would respond more than once and only the intended respondents could respond: for example, for staff with Blackboard experience, the respondents were known and the access rights to the SharePoint server were set so that only those invited were given rights to respond to the questionnaire, and others would be denied based on the network domain access rights. The respondents were also not allowed to respond a number of times. The student respondents were individually invited and also could not respond more than once, even though their responses were anonymous. Based on the domain access credentials the SharePoint server easily detected any second attempted, and access would be denied on the basis that the respondent had already completed the questionnaire. Only completed questionnaires were accepted for submission. The staff with no Blackboard experience were subject to the same control measures. Only UFH academic staff were allowed and given access, based on rights of access to the UFH domain. Different questions were asked based on experience: for example, questions covering the use of Blackboard were asked only to those with Blackboard experience, and were adapted to their level and responsibility depending on whether the target respondent was a student or a lecturer. The reason for the difference is

because staff and students play different roles, even though both have the experience of using Blackboard LMS.

The study uses TAM and ECM as a theoretical base. Data collection methods have been outlined and explained in this chapter. Walliman (2005) states that data provides a partial glimpse of events, opinions, beliefs or conditions. Walliman additionally states that what may be a valuable opinion today may be irrelevant and incorrect tomorrow, and concludes that data is ephemeral and corruptible. A researcher should never believe in the infallibility of the research data and findings derived from them, but should be humble when stating research results and use terms such as ,"it seems that", "it is likely that", "one is led to believe that" (Walliman, 2005).

This study is valid for the local context, as reasons for the limited use of LMS at UFH were never previously investigated. The institution has invested in, and will get a return on the investment only if the LMS is sufficiently used.

5.8.4 Ethics

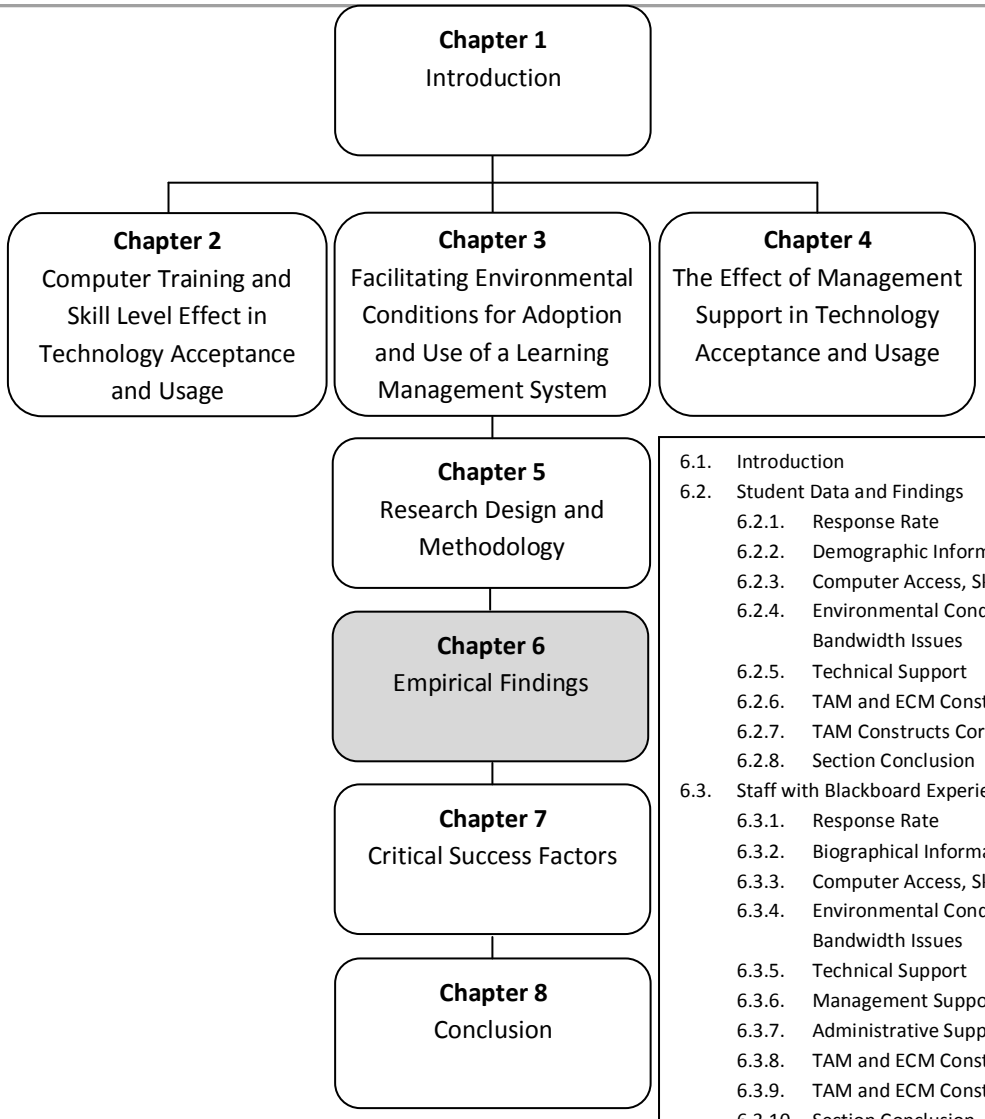
Ethical considerations include making sure that no participants were forced in any way to participate in the study. During the time this study was conducted there was no policy in place regarding the consent to participate in research, and the decision rested with the individual participants which were academic staff members and students of the institution. All participants had the choice to respond to the questionnaire or reject it, as the majority did not even know the researcher, and their participation was anonymous; this applied to both academic staff and students. Issues of bias involving discrimination against age, cultural diversity, disability, gender and sexual orientation were avoided.

5.9 CONCLUSION

This chapter discussed the research design for this study, followed by a research method which has been an implementation of the design. In explaining the research method the theory on which this study is based has been discussed, and the research model used has been explained. The data gathering instruments, pilot study of the questionnaires and method of distribution, response rate and data analysis have been discussed explaining how the study was conducted. In addition, ethical and validity issues have been discussed in relation to this study, in the UFH context. The following chapter will discuss the empirical findings of the study.

CHAPTER 6:

EMPIRICAL FINDINGS



6.1 INTRODUCTION

In the previous chapter the research design and methodology for this study was discussed. The discussion included the positivism philosophical paradigm on which this study is based. In this chapter the data is analysed and the empirical findings are discussed. The different sections in this chapter are based on the research questions, and external factors tested on TAM and ECM, including the TAM and ECM constructs. The discussion is conducted under three main sections; students in section 6.2 and its sub sections, staff with Blackboard experience in section 6.3 and its sub sections, and staff with no Blackboard experience in section 6.4 and its subsections. The conclusion is in section 6.5.

The students section will be a presentation of the student results of the study, followed by a discussion of the correlations between TAM constructs based on student responses. The staff with Blackboard experience section will be a presentation of the findings with correlations between TAM and ECM constructs presented and discussed. The last section will be a presentation of results for the staff with no Blackboard experience.

6.2 STUDENT DATA AND FINDINGS

6.2.1 Response Rate

A total of 679 students were invited to participate in the study. The invitation was through electronic mail with a link to the questionnaire. All the invited students had used the Blackboard Learning Management System (LMS) before in at least one of their courses. A total of 195 out of 679 students responded, representing a 29% response rate. According to Oates (2006), it is common to get a response rate of 10%.

In research conducted at Monash University about the use of Web Course Tools (WebCT), a Learning Management System (LMS) which is very similar to Blackboard, of a total of 20,000 student users of WebCT, only 1314 (6.6%) students responded (Weaver, Spratt, & Nair, 2008). In the same University, with a staff population of 2500 WebCT users, only 96 (3.8%) responded. The invitations were sent only to the academics who were using WebCT for teaching.

6.2.2 Demographic Information

Out of the 195 (29%) students who responded, only 20 (10.3%) students were from the East London campus and 179 (89.7%) students from the Alice campus. Of the respondents, 98 (50.3%) students were male and 97 (49.7%) of the students were female.

Of the majority of the student respondents, 67 (34.4%) are at first year level, 53 (27.2%) at second year level, 36 (18.5%) at third year level, 30 (15.4%) at fourth year level, 6 (3.1%) at honours level, and 3 (1.5%) at masters level.

The majority of the respondents, 59 (30.3%) were in the age group 21-22 years, followed by 55 (28.2%) in the age group under 21 years, 18 (9.2%) in the age group 26 -30 years, and 16 (8.2%) in the age group of over 30 years.

The majority of the students, 146 (74.9%) matriculated from government schools, followed by 19 (9.7%) students from private schools, another 19 (9.7%) from non-specified schools, and 11 (5.6%) from former Model C schools.

6.2.3 Computer Access, Skill and Training

Out of all the 195 (100%) students, 94 (48.2%) students had never been exposed to computers at school, while 60 (30.8%) students had been exposed to computers at high school only. 32 (16.4%) students had been exposed to computers at both primary and high school, and 9 (4.6%) had been exposed to computers only at primary school.

170 (87.2%) of the students had not taken Computer Application Technology (CAT) or Information Technology (IT) as a school subject, and only 25 (12.8%) of the students had taken CAT or IT at school level.

In the use of Internet and e-mail, 176 (90.3%) of the students reported that they use Internet and e-mail regularly, while 19 (9.7%) reported that they do not use Internet and e-mail regularly.

6.2.4 Environmental Conditions: Access and Bandwidth Issues

In response to the question of frequency of computer access, 127 (65.1%) of the students indicated that they have access to a computer, while 27 (13.8%) indicated that they have access every second day, followed by 28 who have access once a week, and those who often make use of computer lessons, 13 (6.7%).

The majority of students 135 (69.23%) indicated that they have access to computers through the use of the general university computer lab, followed by 35 (17.9%) who use their own computers, 13 (6.7%) who use computers at departmental computer labs, 8 (4.1%) who use the computers at the university library and 1 (0.5%) who uses some other non-specified computer.

6.2.5 Technical Support

Three questions covering technical support were asked of the respondents. The questions are listed below, and the results on findings on technical support are presented.

- How often do you experience the following problems in using the computers in the university: *No Internet access, Very slow Internet, Computer files infected by a virus, Faulty computers, Computers very slow, Printers and Photocopiers not working, Laboratory always full, not easy to gain access, Laboratory not open in the evening*?
- What support is available when you have problems?

- On average, how long does it take for assistance to arrive?

How often do you experience the following problems in using the computers in the university*?*

No Internet access

The majority of the students, 78 (40%) indicated that it never happens that there is no Internet access, with 76 (39%) indicating that it rarely happens, 15 (7.7%) indicating that it happens often, and with 26 (13.3%) indicating that it happens very often.

Very slow Internet

The majority of the students, 113 (57.9%) indicated that they experience very slow Internet very often, with 52 (26.7) indicating often, 20 (10.3%) indicating that they rarely experience very slow Internet, and 10 (5.1%) indicating that they never experience slow Internet.

Computer files infected by a virus

The response to this question showed that 69 (35.4%) of the students rarely experience virus infection of computer files, with 80 (41%) indicating that they experience it often, 35 (17.9%) very often, and 11 (5.6%) indicating that they have never experienced a virus infection at the institution.

Faulty computers

The results of the study show that 77 (39.5%) of the students believe they have often worked with faulty computers, with 64 (32.8%) indicating very often, 43 (22.1%) rarely, and 11 (5.6%) indicating that they never experience working with faulty computers.

Computers very slow

The number of students who believe that they have been working with very slow computers very often is 79 (40.5%), with 56 (28.7%) who believe that they have worked with slow computers often, 40 (20.5%) indicating rarely, and 20 (10.3%) indicating that they have never experienced very slow computers.

Printers and Photocopiers not working

In response to the question of printers and photocopiers not working, 60 (30.8%) of the students believe that it rarely happens, with 48 (24.6%) indicating that it never happens, 47 (24.1%) indicating it happens very often, and 40 (20.5%) indicating it happens often.

Laboratory always full; not easy to gain access

The number of students who indicated that it is often not easy to gain access to computer labs is 85 (43.6%), with 60 (30.8%) indicating that it happens very often, 44 (22.6%) indicating that it rarely happens, and 6 (3.1%) indicating it never happens that the lab is full and not easy to gain access.

Laboratories not opened in the evening

The majority of 99 (50.8%) students' respondents indicated that it rarely happens that the computer laboratories are not opened in the evening, with 50 (25.6%) indicating that it happens often, 28 (14.4%) indicating that it never happens, and 18 (9.2%) indicating that it happens very often.

Which support is available when you have problems?

The following responses were obtained from the student respondents. The responses in this category are presented under the following subheadings: a technician on site, telephone support, remote desktop support, e-mail support, a frequently asked question file and call centre support.

A technician on site

110 students (56.4%) indicated that there is no technician available on site to provide support, while 85 (43.6%) students indicated that there is a technician on site.

Telephone support

180 students (92.3%) indicated that there is no telephone support available for students' technical problems and 15 (7.7%) students indicated that telephone support is available.

Remote desktop support

164 students (84.1%) indicated that there is no remote desktop support available to them and only 31 (15.9%) students were of the view that there is remote desktop support.

E-mail support

127 (65.1%) of the students indicated that there is no e-mail support available to students and 68 (34.9%) of the students indicated that there is e-mail support for students when they experience technical problems.

Frequently asked questions file

149 students (76.4%) indicated that there is no 'frequently asked question' file, while 46 (23.6%) students indicated that there is such a file for use by students when experiencing technical problems.

Call centre support

166 (85.1%) students indicated that there is no call centre support available in case of technical problems and 29 (14.9%) of the students indicated that there is call centre support.

On average, how long does it take for assistance to arrive?

The results indicate different views students have, with 40 (20.5%) of the students indicating that it takes too long to get technical support. 35 (17.9%) students indicated that technical support is given immediately, while 22 (11.3%) students indicated that it never arrives at all. It is evident from the student response that they hold different views about the rate of service.

6.2.6 TAM and ECM Constructs

Perceived ease of use

Perceived ease of use, refers to the degree to which a person believes that using a particular system would be free of effort (Davis, 1989). The results of this study about students' perceived ease of use are discussed in this section.

Students' perceptions about ease of use range from 68 (34.9%) students indicating that they agree that they find it easy to work with Blackboard. Students who agreed and totally agreed are 33 (16.9%) in each group. Students who were uncertain are 30 (15.4%) and those that disagreed range from 9 (4.6%) that totally disagreed, 6 (3.1%) that strongly disagreed to 16 (8.2%) that disagreed.

In summary 15.9% of the students disagreed, 15.4% were uncertain, and 78.7% of the students agreed. The results are shown in Table 6.1.

Table 6.1: Summary of Responses for Ease of Use of Blackboard

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	134	68.7
Uncertain	30	15.4
Disagree, Strongly disagree, and Totally disagree	31	15.9
Total	**195**	**100.0**

In responding to the statement, "I find it easy to access course material on Blackboard". The total number of students that disagreed was 26 (13.3%), with 27 (13.8%) uncertain, and 142 (72.9%) of the students who agreed. The group of 26 (13.3%) students that disagreed is composed of 9 (4.6%) totally disagreed, 3 (1.5%) uncertain, and the 14 (7.2%) that disagreed. The same approach can be applied to those that agreed as shown in Table 6.2 below. The following section will discuss student responses on perceived usefulness towards Blackboard.

Table 6.2: Summary of Responses for Ease of Access of Blackboard

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	142	72.9
Uncertain	27	13.8
Disagree, Strongly disagree, and Totally disagree	26	13.3
Total	**195**	**100.0**

Perceived usefulness

Perceived usefulness is defined as the degree to which a person believes that using a particular system would enhance his or her job performance (Davis, 1989). The results of this study about students' perceived usefulness are discussed in this section.

The total percentage of all students that agreed that Blackboard is useful for communicating with their lecturer is 65.6 %, with 15.9 % uncertain and 18.5% of the students who disagreed, as shown in Table 6.3.

Table 6.3: Summary of Responses for Perceived Usefulness of Blackboard

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	128	65.6
Uncertain	31	15.9
Disagree, Strongly disagree, and Totally disagree	36	18.5
Total	**195**	**100.0**

The summary of results in Table 6.3 is detailed in Table 6.4. The differing degrees of agreeing and disagreeing are detailed. The following section will discuss student responses to attitude towards Blackboard.

Table 6.4: Student Perceptions about the Usefulness of Blackboard as a Communication Tool

		Frequency	Valid Percent
Valid	totally disagree	7	3.6
	strongly disagree	9	4.6
	disagree	20	10.3
	uncertain	31	15.9
	agree	73	37.4
	strongly agree	30	15.4
	totally agree	25	12.8
	Total	**195**	**100.0**

Attitude

The majority of students, 71.8 % had a positive attitude towards using Blackboard, with 11.3% uncertain and 16.9% disagreeing, indicating that they have no intention to use Blackboard. The

breakdown of the results is listed in Table 6.5. The following section will discuss student responses on intention to use Blackboard.

Table 6.5: Summary of Responses to Attitude in Using Blackboard

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	140	71.8
Uncertain	22	11.3
Disagree, Strongly disagree, and Totally disagree	33	16.9
Total	**195**	**100.0**

Intention to use

162 (83%) of the students indicated an intention to use Blackboard, while 6.2 % of the students were uncertain, and 10.8% showed no intention to use Blackboard. The following section will discuss TAM constructs correlations based on student responses.

6.2.7 TAM Constructs Correlations

Pearson correlations were computed between the TAM constructs for students, and the results are listed in Table 6.6 and in Figure 6.1. In the following subsections, results of the correlation test are presented.

For Perceived Ease of Use (PEU) and Perceived Usefulness (PU)

There are two questions on PEU and one on PU. The score for 'I find blackboard easy to use' and 'Using blackboard was very useful for communicating with my lecturer'' r (195) =.535.

The score for 'I find it easy to access course material on blackboard' and 'Using blackboard was very useful for communicating with my lecturer' r(195)=.642. The correlations are both significant.

For Perceived Ease of Use (PEU) and Usage Attitude (UA)

There are two questions on PEU and one on UA. The score for 'I find blackboard easy to use' and 'Using blackboard to supplement teaching and learning is a good idea' r (195) =.560. The score for 'I find it easy to access course material on blackboard' and 'Using blackboard to supplement teaching and learning is a good idea' r(195) =.561. The correlations are both significant.

Table 6.6: Student Pearson Correlation Test and Significance Values for TAM

	Perceived Usefulness		Usage Attitude		Usage Intention	
	Corr.	**Sig.**	**Corr.**	**Sig.**	**Corr.**	**sig**
Perceived Ease of Use (PEU)	.535** .642**	.0005 .0005	.560** .561**	.0005 .0005		
Perceived Usefulness (PU)			.621**	.0005	.581**	.0005
Usage Attitude (UA)					.633**	.0005

*.Correlation is significant at the 0.05 level (2-tailed)

**. Correlation is significant at the 0.01 level (2-tailed)

For Perceived Usefulness (PU) and Usage Attitude (UA)

The score for 'Using Blackboard was useful in communicating with my lecturer' and 'Using Blackboard to supplement teaching and learning is a good idea', r(195) =.621. The correlation is significant.

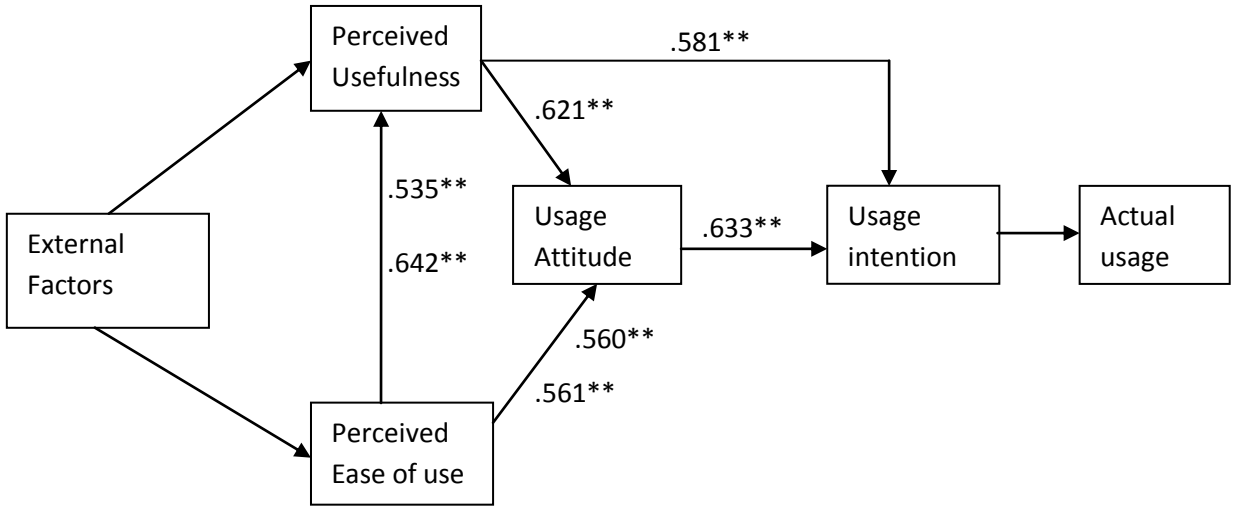


Figure 6.1: Pearson Correlation Values Between TAM Constructs for Students

For Perceived Usefulness (PU) and Usage Intention (UI)

The score for 'Using Blackboard was useful in communicating with my lecturer' and 'Assuming I have access to Blackboard, I intend to use it', r(195) =.581. The correlation is significant.

For Usage Attitude (UA) and Usage Intention (UI)

The score for 'Using Blackboard to supplement teaching and learning is a good idea' and 'Assuming I have access to Blackboard, I intend to use it', r(195) =.633. The correlation is significant.

6.2.8 Section Conclusion

In this section students' empirical results have been presented. Pearson correlation was computed between TAM constructs and the results show the correlations are significant. The role played by external factors such as technical support, computer skill of the students, and computer access issues is yet to be determined as to what role these external factors play in the significance of the correlation of the TAM constructs to predict and validate factors that may contribute to the use and continued use of learning management system.

6.3 STAFF WITH BLACKBOARD EXPERIENCE FINDINGS

6.3.1 Response Rate

24 staff members with experience in using Blackboard were invited to participate in the study. based on the experience of using Blackboard. They included the 12 e-learning Pilot project members and other staff members who arrived at the institution having had experience from previous institutions. The response rate was 17 out of the 24 invited staff members, which is 71% of the responses.

6.3.2 Biographical Information

Out of a total of 17 staff with Blackboard experience who responded, 7 (41.2%) were from the Alice campus and 10 (58.8%) from the East London campus.

The respondents had different profiles, where 7 (41.2%) were junior lecturers, 7 (41.2%) lecturers, 2 (11.8%) were senior lecturers, and 1 (5.9%) a professor.

If the respondents are divided according to gender, 8 (47.1%) were females and 9 (52.9%) were males.

If they are categorised according to age, 13 (76.5%) were over 30 years of age, with 3 (17.6%) in the age range 26-30 years, and 1 (5.9%) under 21 years.

6.3.3 Computer Access, Skill and Training

In response to the question of training in the use of computers, 4 (23.5%) of the respondents replied 'no' indicating they had never received any formal training, and 13 (76.5%) indicated they had received some form of computer training.

Looking at the question about accessibility of computers, 10 (58.8%) of the respondents indicated that the office computer is more accessible to them, while 7 (41.2%) replied that it was their own computer which they used in the office or at home.

6.3.4 Environmental Conditions: Access and Bandwidth Issues

Looking at the question checking the frequency of experiencing technical problems related to Internet, including bandwidth and related issues, the responses were as follows:

No Internet access

The responses from 8 (47.1%) of the staff members showed that they often experience loss of Internet access, while 6 (35.3%) indicated that they experience loss of Internet access very often, and only 3 (17.6%) indicated that they rarely experience loss of Internet access.

Very slow Internet

In response to this question, 2 (11.8%) staff members indicated that they experience very slow Internet very often while 8 (47.1%) indicated they have experienced slow Internet often, and 7 (41.2%) indicated that they rarely experienced slow Internet.

Computer files infected by a virus

12 staff members (70.6%) indicated that they rarely experience computer files infected by a virus, while 3 (17.6%) indicated that it often happens that computer files are infected by a virus, and 2 (11.8%) indicated that they never experienced computer files infected by a virus.

Faulty computers

'Faulty computers' was indicated as a phenomenon occurring very often, by 6 (35.3%) of the staff members, while 7 (41.2%) indicated that it happens often that computers are faulty, and 4 (23.5%) indicated that they rarely experience faulty computers.

Computers very slow

12 staff members (70.6%) indicated that they rarely experienced very slow computers, and 5 (29.4%) indicated that they often experienced very slow computers.

6.3.5 Technical Support

Looking at the responses to the questions covering technical support, the following responses were obtained from the staff respondents:

A technician on site

7 staff members (41.2%) indicated that there is no technician on site to help in case of technical problems, while 10 (58.8%) indicated that there is a technician available on site to help in case of technical problems.

Telephone support

11 staff members (64.7%) indicated that no telephone support is provided in case of technical problems, while 6 (35.3%) indicated that there is telephone support available.

Remote desktop support

15 staff members (88.2%) indicated that there is no remote desktop support available in cases of technical problems, while 2 (11.8%) indicated that there is some form of remote desktop available.

E-mail support

12 staff members (70.6%) indicated there is no e-mail support provided in case of technical problems while 5 (29.4%) indicated that there is some form of e-mail support.

'Frequently asked questions' file

16 staff members (94.1%) indicated that there is no frequently asked question file available, while 1 (5.9%) staff member indicated that such a file is available in case of technical problems.

Call centre support

7 staff members (41.2%) indicated that there is no call centre support available, while 10 (58.8%) indicated that call centre support is available in case a staff member needs technical support.

How long does it take for technical assistance to arrive?

1 staff member (5.9%) indicated that response to a technical support request never arrives, and another staff member indicated that it takes too long to arrive. 2 staff members (11.8%) indicated that they will get technical assistance after they have lodged a complaint about the technical services that have not responded to their initial request for support, while another 2 staff members (11.8%) indicated that they get help after repeatedly continuing to remind the technical services of their initial request for technical support. 5 staff members (29.4%) indicated that they get technical assistance after waiting from a day to a week after the initial request, while 4 (23.5%) indicated that they get help within 24 hours, and 2 (11.8%) indicated that they get help immediately.

Rating the service offered by technical support

In rating the service offered by technical support services, 5 (29.4%) staff members rated the services offered as good, while 8 (47.1%) rated the services offered as fair, and only one staff

member (5.9%) rated the service as very good. There is 1 staff member (5.9%) rating in each of the following: very bad, bad, and poor.

6.3.6 Management Support

Policy for provision of infrastructure

The staff responses are listed and have been summarised in Table 6.7. The staff members that agree that there is a need for a policy make up 76.47 % of the respondents. About 11.76% of staff members are uncertain and 11.76% disagree.

Table 6.7: Summary of Responses for Policy on Infrastructure

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	13	76.48
Uncertain	2	11.76
Disagree, Strongly disagree, and Totally disagree	2	11.76
Total	**17**	**100.00**

A policy for training staff members

In response to the question of policy provision for training of staff members in use of technology for teaching and learning, 76.50% agreed with the statement while 23.50% were uncertain, and no respondent disagreed, as shown in Table 6.8.

Table 6.8: Summary of Responses for Policy on Training

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	13	76.50
Uncertain	4	23.50
Disagree, Strongly disagree, and Totally disagree	0	0.00
Total	**17**	**100.00**

6.3.7 Administrative Support

University encouragement in the use of Blackboard for teaching and learning

In relation to support given by management, 23.50% agreed that there was support from management side while 53.00 % were uncertain, and 23.50% disagreed that management offers support in the form of encouragement. The results are shown in Table 6.9.

Table 6.9: Summary of Responses for University Encouragement

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	4	23.50
Uncertain	9	53.00
Disagree, Strongly disagree, and Totally disagree	4	23.50
Total	**17**	**100.00**

University recognition of efforts in using Blackboard for teaching and learning

In recognition of efforts in teaching and learning, 17.60% agreed that management recognises the efforts while 41.20% were uncertain, and 41.20% disagreed with the statement, as shown in Table 6.10.

Table 6.10: Summary of Responses for University Recognition

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	3	17.60
Uncertain	7	41.20
Disagree, Strongly disagree, and Totally disagree	7	41.20
Total	**17**	**100.00**

Faculty encouragement in the use of Blackboard for teaching and learning

The staff responses to faculty encouragement are listed in Table 6.11, and in response to the question 52.90% agreed, while 23.50 % were uncertain, and 23.60% disagreed.

Table 6.11: Summary of Responses for Faculty Encouragement

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	9	52.90
Uncertain	4	23.50
Disagree, Strongly disagree, and Totally disagree	4	23.60
Total	**17**	**100.00**

Department HOD support

In response to the statement about HOD support, 64.70% of the staff agreed that there is support at departmental level while 23.50% were uncertain, and 11.80% disagreed with the statement. The results are shown in Table 6.12.

Table 6.12: Summary of Responses for HOD Support

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	11	64.70
Uncertain	4	23.50
Disagree, Strongly disagree, and Totally disagree	2	11.80
Total	**17**	**100.00**

6.3.8 TAM and ECM Constructs

Perceived ease of use

In response to the statement, “I find Blackboard easy to use”, 82.30% of the academic staff with experience agreed while 11.80% were uncertain, and 5.9% disagreed with the fact that Blackboard is easy to use, as shown in Table 6.13.

Table 6.13: Summary of Responses for Ease of Use

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	14	82.30
Uncertain	2	11.80
Disagree, Strongly disagree, and Totally disagree	1	5.90
Total	**17**	**100.00**

In response to a more specific statement about ease of use, “I find it easy to provide my students access to course material in Blackboard”, 58.80 % agreed with the statement while 5.90% were uncertain, and 35.30% disagreed with the statement. The results are shown in Table 6.14.

Table 6.14: Summary of Responses for Access in Ease of Use

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	10	58.80
Uncertain	1	5.90
Disagree, Strongly disagree, and Totally disagree	6	35.30
Total	**17**	**100.00**

Perceived usefulness

12 respondents, 70.60%, agreed that Blackboard is useful for communicating with students, while 11.80% were uncertain and 17.60% disagreed. The results are shown in Table 6.15.

Table 6.15: Summary of Responses for Blackboard Usefulness

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	12	70.60
Uncertain	2	11.80
Disagree, Strongly disagree, and Totally disagree	3	17.60
Total	**17**	**100.00**

Attitude

In checking attitude towards Blackboard, 82.30% of academic staff with experience agreed that the use of Blackboard is a good idea, which indicates they have a positive attitude, while 5.90%

were uncertain and 11.80% disagreed, which indicates that they have a negative attitude towards Blackboard, as shown in Table 6.16.

Table 6.16: Summary of Responses for Attitude Towards Blackboard

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	14	82.30
Uncertain	1	5.90
Disagree, Strongly disagree, and Totally disagree	2	11.80
Total	**17**	**100.00**

Intention to use

About 76.40 % of the staff agreed that they have the intention to use Blackboard, as shown in Table 6.17, while 11.80% were not sure, and another 11.80% disagreed, indicating that they have no intention to use Blackboard.

Table 6.17: Summary of Responses for Intention To Use Blackboard

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	13	76.40
Uncertain	2	11.80
Disagree, Strongly disagree, and Totally disagree	2	11.80
Total	**17**	**100.00**

Expectation confirmation

8 of the staff members, 47%, agreed that their expectations were exceeded by Blackboard, while 11.80% were uncertain and 41.20% did not agree with the statement. The results are shown in Table 6.18.

Table 6.18: Summary of Responses for Experience with Using Blackboard

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	8	47.00
Uncertain	2	11.80
Disagree, Strongly disagree, and Totally disagree	7	41.20
Total	**17**	**100.00**

Dealing with the nature of academic staff expectations, 52.90% of the staff agreed that they had positive expectations about Blackboard, while 11.80% were uncertain and 35.30% disagreed with the statement, indicating they had negative expectations about Blackboard. The results are shown in Table 6.19.

Table 6.19: Summary of Responses for Expectations From Using Blackboard

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	9	52.90
Uncertain	2	11.80
Disagree, Strongly disagree, and Totally disagree	6	35.30
Total	**17**	**100.00**

Satisfaction

Indicating satisfaction, 82.30% of the staff agreed that they were satisfied with the tools available in Blackboard, while 5.90% were uncertain and 11.80 were dissatisfied with the available tools, as shown in Table 6.20.

Table 6.20: Summary of Responses for Satisfaction with the Tools (e.g., Collaboration, E-mailing, Assessment, reporting) Available on Blackboard

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	14	82.30
Uncertain	1	5.90
Disagree, Strongly disagree, and Totally disagree	2	11.80
Total	**17**	**100.00**

The majority (76.40%) of the staff also indicated they are satisfied with the use of Blackboard in addition to traditional classroom teaching, as shown in Table 6.21, while 11.80% were uncertain, and another 11.80% were dissatisfied.

Table 6.21: Summary of Responses for Satisfaction with the Use of Blackboard

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	13	76.40
Uncertain	2	11.80
Disagree, Strongly disagree, and Totally disagree	2	11.80
Total	**17**	**100.00**

6.3.9 TAM and ECM Constructs Correlations

Pearson correlations were computed between the TAM constructs and between ECM constructs for students. The results are listed in Tables 6.22 and 6.23 and in Figures 6.2 and 6.3.

TAM Constructs Correlations

For Perceived Ease of Use (PEU) and Perceived Usefulness (PU)

There are two questions on PEU and one on PU. The score for 'I find Blackboard easy to use' and 'Using Blackboard was very useful for communicating with students' r (17) =.422. The correlation is insignificant.

The score for 'I find it easy to access course material on Blackboard' and 'Using Blackboard was very useful for communicating with students' r(17) =.582. The correlation is significant.

Table 6.22: Staff with Blackboard Experience – Pearson Correlation Test and Significance Values for TAM

	Perceived Usefulness		**Usage Attitude**		**Usage Intention**	
	r	**p**	**r**	**p**	**r**	**p**
Perceived Ease of Use (PEU)	.422 .582*	.092 .014	.261 .357	.312 .160		
Perceived Usefulness (PU)			.576*	.016	.553*	.021
Usage Attitude (UA)					.754**	.0005

*.Correlation is significant at the 0.05 level (2-tailed)

**. Correlation is significant at the 0.01 level (2-tailed)

For Perceived Ease of Use (PEU) and Usage Attitude (UA)

There are two questions on PEU and one on UA. The score for 'I find Blackboard easy to use' and 'Using Blackboard to supplement teaching and learning is a good idea' r (17) =.261. The score for 'I find it easy to access course material on Blackboard' and 'Using Blackboard to supplement teaching and learning is a good idea' r(17) =.357. The correlations are both insignificant.

For Perceived Usefulness (PU) and Usage Attitude (UA)

The score for 'Using Blackboard was useful in communicating with my lecturer' and 'Using Blackboard to supplement teaching and learning is a good idea', r (17) =.576. The correlation is significant.

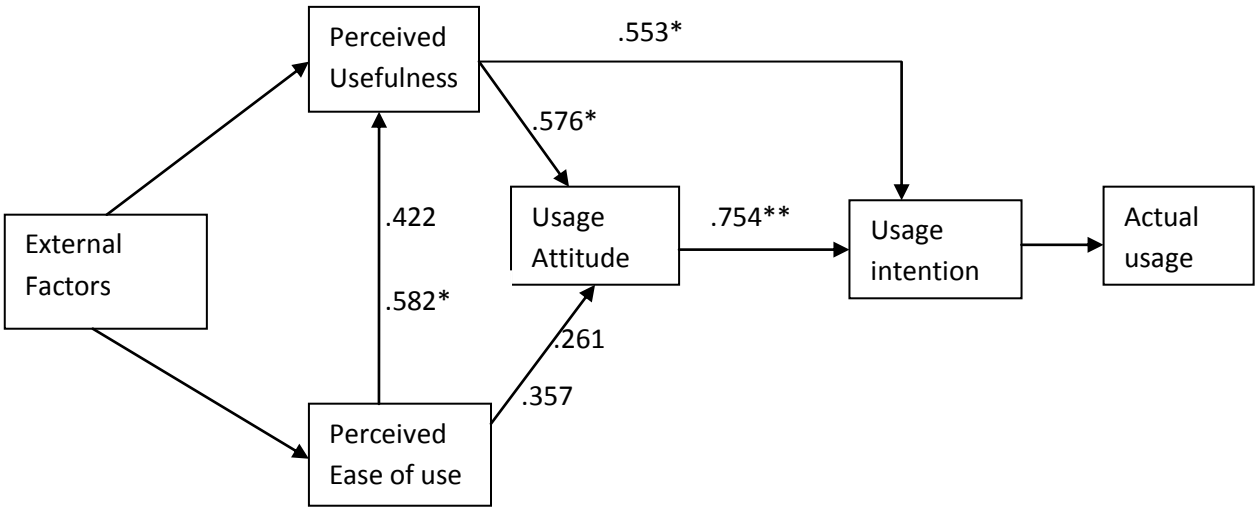


Figure 6.2: Pearson Correlation Values Between TAM Constructs for Staff with Blackboard Experience

For Perceived Usefulness (PU) and Usage Intention (UI)

The score for 'Using Blackboard was useful in communicating with my lecturer' and 'Assuming I have access to Blackboard, I intend to use it', r(17) =.553. The correlation is significant.

For Usage Attitude (UA) and Usage Intention (UI)

The score for 'Using Blackboard to supplement teaching and learning is a good idea' and 'Assuming I have access to Blackboard, I intend to use it', r(17) =.754. The correlation is highly significant.

ECM Constructs Correlations

The correlations for ECM constructs are shown in Table 6.23 and Figure 6.3 and will be discussed in the following subsections.

Table 6.23: Staff with Blackboard Experience – Pearson Correlation Test and Significance Values for ECM

	Perceived Usefulness (PU)		**Satisfaction (S)**		**Continued IT Usage Intention (CIUI)**	
	r	**p**	**r**	**p**	**r**	**p**
Expectation Confirmation (EC)	.516* .409	.034 .103	.032 .212 -0.014 .629**	.903 .414 0.958 .007		
Perceived Usefulness (PU)			.006 .520*	.981 .033	.553*	.021
Satisfaction (S)					-0.100 .0005**	.701 .000

*.Correlation is significant at the 0.05 level (2-tailed)

**. Correlation is significant at the 0.01 level (2-tailed)

For (Expectation) Confirmation and Perceived Usefulness

For 'My experience with using Blackboard was better than expected' and 'Using Blackboard was very useful for communicating with students, r(17) =.409. The correlation is insignificant. For 'Overall, most of my expectations from using Blackboard were positive' and 'Using Blackboard was very useful for communicating with students', r(17) =.516. The correlation is significant.

For (Expectation) Confirmation and Satisfaction

For 'My experience with using Blackboard was better than expected' and 'I am satisfied with the tools (e.g., collaboration, emailing, assessment, reporting) available in Blackboard for teaching and learning', r(17) =.032. The correlation is not significant. For 'My experience with using Blackboard was better than expected' and 'I am satisfied with the use of Blackboard in addition to traditional classroom learning', r(17) =.212. The correlation is insignificant.

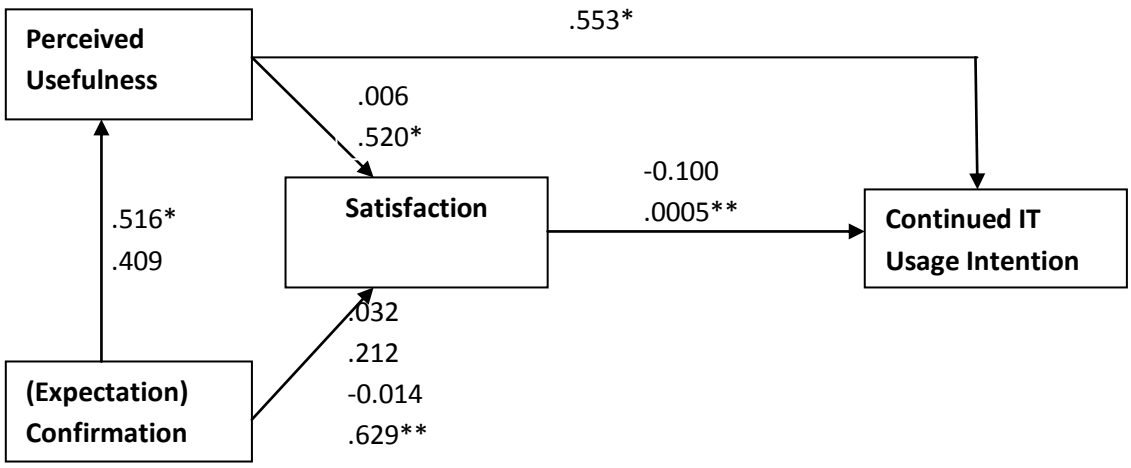


Figure 6.3: Pearson Correlation Values Between ECM Constructs for Staff with Blackboard Experience

For 'Overall, most of my expectations from using Blackboard were positive' and 'I am satisfied with the tools (e.g. collaboration, emailing, assessment, reporting) available in Blackboard for teaching and learning', r(17) =-0.014. The correlation is not significant. For 'Overall, most of my expectations from using Blackboard were positive' and 'I am satisfied with the use of Blackboard in addition to traditional classroom learning', r(17) =.629. The correlation is significant

For Perceived Usefulness and Satisfaction

For 'Using Blackboard was very useful for communicating with students' and 'I am satisfied with the tools (e.g., collaboration, emailing, assessment, reporting) available in Blackboard for teaching and learning', r(17) =.006. The correlation is insignificant. For 'Using Blackboard was

very useful for communicating with students' and I am satisfied with the use of Blackboard in addition to traditional classroom learning', r(17) =.520. The correlation is significant.

For Perceived Usefulness and Continued IT Usage Intention

For 'Using Blackboard was very useful for communicating with students' and 'Assuming I have access to Blackboard, I intend to use it', r(17) =.553. The correlation is significant.

For Satisfaction and Continued IT Usage Intention

For 'I am satisfied with the tools (e.g., collaboration, emailing, assessment, reporting) available in blackboard for teaching and learning' and 'Assuming I have access to Blackboard, I intend to use it', r(17) =-0.100. The correlation is insignificant. For 'I am satisfied with the use of Blackboard in addition to traditional classroom learning' and 'Assuming I have access to Blackboard, I intend to use it', r(17) =.893. The correlation is highly significant.

6.3.10 Section Conclusion

In this section staff with Blackboard experience empirical results have been presented. Pearson correlation was computed between TAM constructs and ECM constructs, and the results show that some correlations are significant while others are not. The role played by external factors such as technical support, computer skill of the students, and computer access issues are yet to be determined as to what role these external factors play in the significance of the correlation of the TAM constructs, so as to predict and validate factors that may contribute to the use and continued use of the learning management system.

6.4 STAFF WITH NO BLACKBOARD EXPERIENCE

6.4.1 Response Rate

There are 400 staff members in the institution and 40 responded to this study, which is a 10% response rate.

6.4.2 Biographical Information

If the respondents are grouped according to campus, 24 (60.0%) are from the Alice campus while 16 (40.0%) are from the East London campus.

According to positions, 13 (32.5%) are junior lecturers, 16 (40%) lecturers, 9 (22.5%) are senior lecturers and 2 (5.0%) professors.

If grouped according to gender, 24 (60.0%) of the respondents are males and 16 (40.0%) are females. In terms of age 11 (27.5%) are in the age group 26 to 30 years, 29 (72.0%) are over 30 years old.

6.4.3 Computer Access, Skill and Training

In response to the question: How often do you use a computer? 39 (97.5%) indicated that they use the computer everyday, and only 1 (2.5%) indicated the use of a computer only once a week.

In response to the question of training, 30 (75%) indicated that they did receive some form of formal training in the use of computers, and 10 (25%) indicated that they had never received any formal training.

Looking at accessibility of computing devices, 30 (75%) indicated that they mostly use their office computer, with 10 (25%) of the staff members indicating that they make use of their own computers.

6.4.4 Environmental Conditions: Access and Bandwidth Issues

Looking at the question of checking the frequency of experiencing technical problems related to Internet, including bandwidth and related issues, the responses were as follows:

No Internet access

2 staff members (5%) with no experience indicated that they had never experienced the loss of Internet, 8 (20%) indicated that it does happen but is rare, 15 (37.5%) indicated that it happens often, and another 15 (37.5%) indicated that this happens very often.

Very slow Internet

2 staff members (5%) with no experience indicated that they never experienced very slow Internet, with 18 (45%) indicating that it rarely occurs, 15 (37.5%) indicated that it occurs often, and 5 (12.5%) indicated that it occurs very often.

Computer files infected by a virus

5 (12.5%) staff members indicated that they have not experienced computer virus infection, with 17 (42.5%) indicating it rarely happens, 13 (32.5%) saying it happens often, and 5 (12.5%) indicating it happens very often.

Faulty computers

1 (2.5%) staff member indicated that there was no experience of faulty computers, 5 (12.5%) indicating it rarely happens, 15 (37.5%) indicating it happens often, and 19 (47.5%) indicating that it happens very often.

Computers very slow

4 (10%) staff members indicated that they never experienced slow computers, 21 (52.5%) indicated it rarely happens, 14 (35%) indicated it happens often, and only 1 (2.5%) indicated it happens very often.

6.4.5 Technical Support

Looking at the responses to the questions covering technical support, the following responses were obtained from the staff respondents:

A technician on site

9 staff members (22.5%) indicated that there was no technician available on site, while 31 (77.5%) indicated that there was a technician on site.

Telephone support

22 members (55%) indicated that there was no telephone support, while 18 (45%) indicated that there was telephone support.

Remote desktop support

34 staff members (85%) indicated that there was no remote desktop support offered, while 6 (15%) members indicated that there was remote desktop support offered.

E-mail support

28 (70%) indicated that there was no e-mail support, while 12 (30%) of the members indicated that there was e-mail support.

Frequently asked questions file

38 (95%) off the members indicate that there was no frequently asked question file, while 2 (5%) think that there was a frequently asked question file.

Call centre support

28 (70%) staff members indicate that there was no call centre support, and 12 (30%) of the members indicated that there was call centre support.

How long does it take for technical assistance to arrive?

4 (10%) of the staff members indicated that the technical support team responds immediately, 7 (17.5%) indicated that the response is within 24 hours, 12 (30%) indicated that the response is within a day to a week, 8 (20%) indicated that there is a response after a follow up from the

initial request a number of times. 2 members (5%) indicated that there is a response but only after lodging a complaint because there was no response after the initial requests, 4 (10%) indicated that the technical support team simply takes too long to respond, and 3 (7.5%) indicated that the technical support team simply never responds.

6.4.6 Management Support

Policy for provision of infrastructure

36 (90%) of staff members agreed that there is a need for a policy on provision of infrastructure for teaching and learning, while 1 (2.5%) member was uncertain and 3 (7.5%) disagreed with the statement, as shown in Table 6.24.

Table 6.24: Summary of Responses for Policy on Infrastructure

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	36	90.00
Uncertain	1	2.50
Disagree, Strongly disagree, and Totally disagree	3	7.50
Total	**40**	**100.00**

A policy for training staff members

The responses are listed in Table 6.25. 34 staff members (85%) agreed that there is a need for a training policy on use of technology in teaching and learning, while 3 (7.5%) were uncertain and another 3 (7.5%) disagreed.

Table 6.25: Summary of Responses for Policy on Training

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	34	85.00
Uncertain	3	7.50
Disagree, Strongly disagree, and Totally disagree	3	7.50
Total	**40**	**100.00**

6.4.7 Administrative Support

University encouragement in the use of Blackboard for teaching and learning

Twelve (30%) agreed that there is encouragement when using Blackboard from the university management, 14 (35%) were uncertain and another 14 (35%) disagreed, as shown in Table 6.26.

Table 6.26: Summary of Responses for University Encouragement

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	12	30.00
Uncertain	14	35.00
Disagree, Strongly disagree, and Totally disagree	14	35.00
Total	**40**	**100.00**

University recognition of efforts in using Blackboard for teaching and learning

11 (27.5%) staff members agreed that the University recognises efforts in using Blackboard as shown in Table 6.27 while 19 (47.5%) of the members were uncertain, and 10 (25%) disagreed with the statement**.**

Table 6.27: Summary of Responses for University Recognition

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	11	27.50
Uncertain	19	47.50
Disagree, Strongly disagree, and Totally disagree	10	25.00
Total	**40**	**100.00**

Faculty encouragement in the use of Blackboard for teaching and learning

13 (32.5%) staff members agreed that there is encouragement at faculty level, while 12 (30%) were uncertain and 15 (37.5%) disagreed, as shown in Table 6.28.

Table 6.28: Summary of Responses for Faculty Support

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	13	32.50
Uncertain	12	30.00
Disagree, Strongly disagree, and Totally disagree	15	37.50
Total	**40**	**100.00**

19 (47.5%) of staff members agreed that the HOD thinks that using Blackboard is valuable, while 15 (37.5%) were uncertain and 6 (15%) disagreed with the statement. The results of views about the HOD support on Blackboard are listed in Table 6.29.

Table 6.29: Summary of Responses for HOD Support

	Frequency	Valid Percent
Agree, Strongly agree and Totally agree	19	47.50
Uncertain	15	37.50
Disagree, Strongly disagree, and Totally disagree	6	15.00
Total	**40**	**100.00**

6.4.8 Section Conclusion

In this section staff with no Blackboard experience, responses and results have been presented. The staff members have strong views on issues of policy for the provision infrastructure and training in preparation for teaching and learning at the institutions. The following section is a conclusion of this chapter on empirical findings.

6.5 CONCLUSION

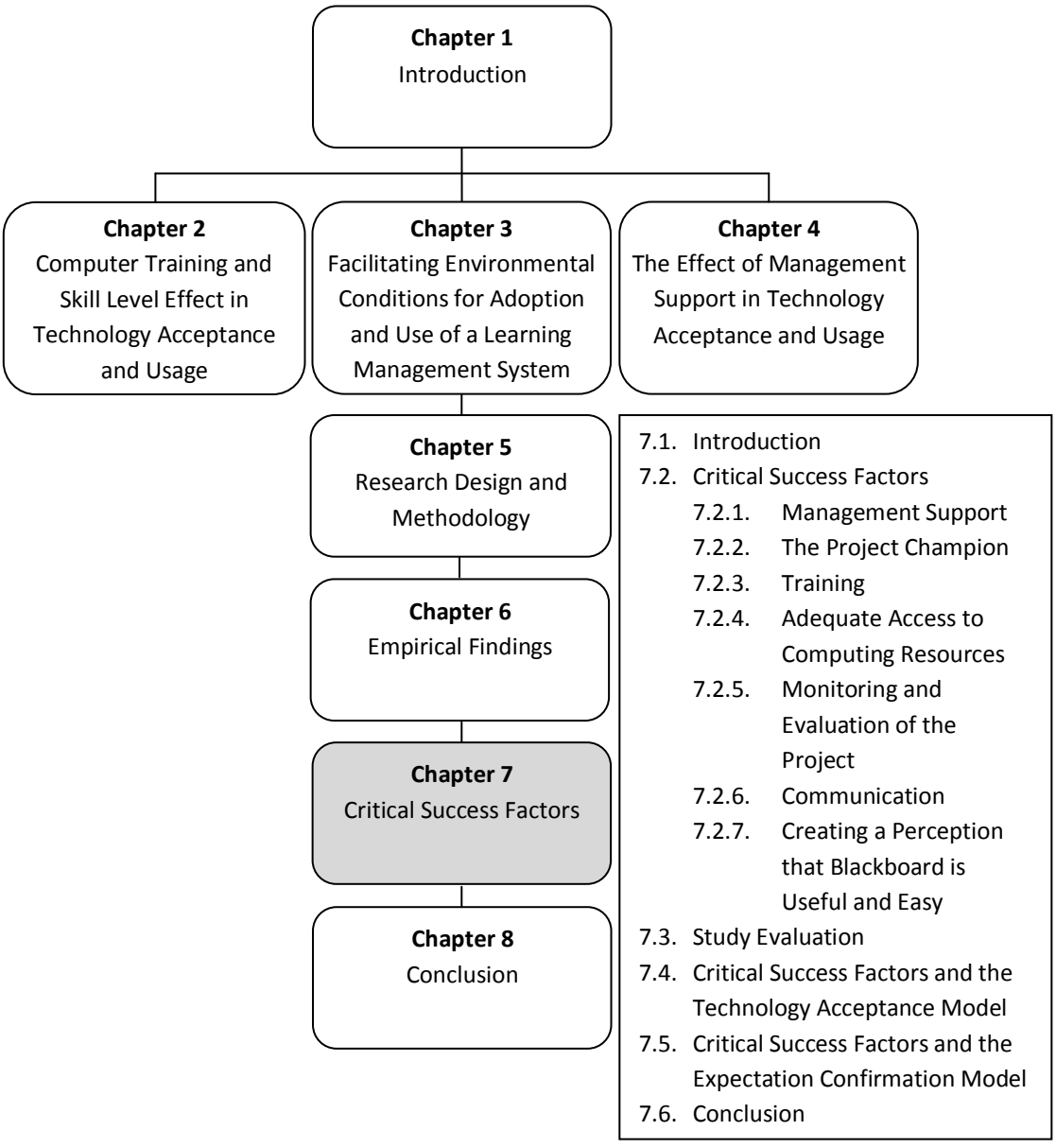
In this chapter, study results have been presented. These include students and staff with Blackboard experience and staff with no Blackboard experience results. These results include data on technical support, computer skill and access for both staff and students, and management support. The results of data for TAM and ECM constructs have been presented; these include perceived Ease of Use, Perceived Usefulness, Usage Attitude, and Usage Intention. The TAM and ECM constructs correlations have been calculated and presented.

External factors such as administrative support, institutional policies, technical support, bandwidth, computer access, and computer skills have also been discussed. Statistically, the majority of external factors are insignificant, but respondents' responses show that they are a driving force for their use and continued use, as they overwhelmingly indicated the importance of such factors.

The next chapter will discuss the Critical Success Factors for this study, drawing from findings of this study, interpretation of the findings, secondary literature, and making recommendations.

CHAPTER 7:

CRITICAL SUCCESS FACTORS



7.1 INTRODUCTION

The Critical Success Factors that will make the adoption and use of the Blackboard Learning Management System a success will be identified and discussed, based on the findings of this study. The Critical Success Factors can be used as recommendations for the implementation and support of the technology integration project in institutions similar to the institution this study has been conducted. The last section will be the conclusion of this chapter.

The aim in this chapter is to address the main research question of this study, which is:

What management and environmental Critical Success Factors will have influenced the acceptance and continued use of a Learning Management System at the University of Fort Hare?

In order to answer the main research question, the results of this study have been interpreted and analysed. The results included responses from questions covering external factors to Technology Acceptance Model (TAM) and Expectation Confirmation Model (ECM), and the responses to questions covering both TAM and ECM constructs. The external factors were tested on TAM and ECM as to whether they will lead to the use, and continued use of Blackboard through perceptions of ease of use and usefulness. The Critical Success Factors are developed based on the results of the study, and being used to suggest what should be considered in the environment, indicated by the study findings and their interpretation. The institution could create an environment for staff and students where they will have the perception that the technology is easy to use and useful, and will see the need to continue its use. Both TAM and ECM indicate that a perception that an individual has about a certain technology can eventually lead to its use. According to TAM the perception may directly lead to an intention to use the technology, or the intention may be mediated by the attitude. Another aspect that is addressed is whether these Critical Success Factors will influence acceptance, according to TAM, through Perceived Usefulness or Perceived Ease of Use or through both Perceived Usefulness and Perceived Ease of Use.

The next section will discuss Critical Success Factors of this study. The context that led to a development of the need for a CSF will be briefly introduced, and then the CSF.

7.2 CRITICAL SUCCESS FACTORS

Critical Success Factors (CSFs) are those things that must be done if a company is to be successful, and should be few in number, measurable and controllable (Selim, 2007). According to Selim (2007) e-learning CSFs within a university environment can generally be grouped into four categories:

- Instructor
- Student
- Information Technology and
- University Support

In this study CSFs are identified, with the aim of identifying aspects that will lead to acceptance of a Learning Management System.

7.2.1 Management Support

Institutional Policy

The majority of staff with Blackboard experience (76.47%) indicated that they agree there should be policy guidelines on the provision of the infrastructure necessary for academic staff to easily participate in teaching with technology. The other staff with Blackboard experience (11.76%) were uncertain as to whether the policy formulation will add any value, while another 11.76% indicated that they do not believe policy formulation is necessary.

90% of the staff with no Blackboard experience, indicated that there is a need for policy on the provision of infrastructure, while 2.5% were uncertain and 7.5% indicated they felt there is no need for policy formulation. In both groups of staff members above there is a majority support for policy formulation.

In responding to the question of policy for training of academic staff members to participate fully and effectively in integrating technology in their teaching, 85% of staff with no Blackboard experience agreed that there should be policy, 7.5% were uncertain, and another 7.5% saw no need for policy guidelines. Also, the majority of 76.5% of staff with Blackboard experience agreed that policy is necessary, while 23% were uncertain.

It is clear from the results that the majority of academic staff members from both groups strongly feel the need for policy on these two issues as there is no policy. The policy guidelines may be helpful as guidance on what the minimum requirements are for a staff, in terms of skill and infrastructure to get started with technology integration in teaching. The policy could possibly help on how a staff member, who does not meet minimum requirements, has to go about getting started. Since policy is defined as the allocation of goals, values and resources, to be expressed in overt support, structures and systems (Czerniewicz & Brown, 2009), this will make sure management commit itself, and all academic staff members are assured there is solid support for integrating technology in their teaching. It has been claimed that there is evidence that in the South African environment, staff members experience many barriers because of the absence of support by their institutions (Czerniewicz & Brown, 2009b as cited in Czerniewicz & Brown, 2009).

The way forward is for stakeholders in technology integration to meet and brainstorm a way to formulate a policy as a guideline and mapping of the different roles and responsibilities. Achievable targets should be set so as to be in agreement between management and staff.

Administrative Support

In relation to support given by management, 23.50% of the staff with Blackboard experience agreed that there is support from management, while 53.00 % were uncertain, and 23.50% disagreed that management offers support. Of the staff with no Blackboard experience, 30% of them agreed that there is encouragement from the University management when using Blackboard, 35% were uncertain and another 35% disagreed.

It seems that only a few staff members believe there is support from management, whilst quite a big percentage of them are uncertain, and also disagree.

In recognition of efforts in teaching and learning, 17.60% of the staff with Blackboard experience agreed that management recognises their efforts, while 41.20% were uncertain, and 41.20% disagreed with the statement. Of the staff with no Blackboard experience, 32.5% agreed that there is encouragement at faculty level, while 30% were uncertain and 37.5% disagreed.

Again it seems there is no real consensus as to whether there is recognition for those staff members who have already engaged themselves in integration of technology in teaching**.**

The staff with Blackboard experience responses for faculty encouragement, indicated that 52.90% agreed, while 23.50% were uncertain and 23.60% disagreed. Of the staff with no Blackboard experience, 32.5% agreed that there is encouragement at faculty level, while 30% were uncertain and 37.5% disagreed.

Of the staff who have already integrated technology in the use of Blackboard, (52.9%) indicated there is support at faculty level, while only 32.5% of the staff with no Blackboard experience agreed with this. This may be an area to be explored in order to encourage them to think of integrating Blackboard in their teaching. This indicates that the situation may also be different in different faculties, with some heads of departments supporting technology integration, while others may not be vocal about their support.

In response to the statement about HOD support, 64.70% of the staff with Blackboard experience agreed that there is support at departmental level, while 23.50% were uncertain, and 11.80% disagreed with the statement. Staff members with no Blackboard experience (47.5%) agreed that the HOD thinks using Blackboard is valuable, while 37.5% were uncertain and 15% disagreed with the statement.

A Way Forward

76.47% staff members with Blackboard experience indicated the need for policy on infrastructure. The staff members with no Blackboard experience indicated the need for policy with a 90% majority for infrastructure and 85% majority for training.

It seems plenty of work still has to be done at university level, going down to faculty and departmental levels. There are indications that there is support and encouragement offered but it is clear that the view of some staff members is that it is not enough and a lot can be done to improve the situation. The majority of staff engaged in technology integration view support as present and view that there is encouragement. It may be possible that those who say not enough support is available have an outsider's view of technology integration, and that may be what is delaying their involvement. If that is the case a lot of communication is necessary. Certain strategies, such as showcasing successful integration of Blackboard technology into teaching and learning at the institution may have to be done so as to show that successful integration can be achieved under the current circumstances. That may affect the views of those who think there are not enough resources, and lead to change in their attitudes and beliefs about technology integration at the University of Fort Hare.

The picture painted by staff responses indicated that there are different views. There should be communication regarding the status of ICT integration, to inform and familiarise current and prospective technology integrators among staff about learning and teaching technology available and also available support. Various communication channels can be used, enabling staff to know where to find the information they want on the integration of technology into teaching and learning. Another approach will be having the face of technology integration in the institution.

The fact that there are different views may indicate poor communication between the parties, and that some parties are lagging behind and are not aware of the current state of affairs in the institution.

The need for policy should be to have a strategy, which is clear to everyone, on the way forward in technology integration. The policy would be outlining what the management's responsibility is, and what roles the faculties, departments and individuals can play towards the success of the technology integration. Included in the policies should be the allocation of funds for such a project and the formation of support structures.

The policy should address the following issues as a result of analysis of the results:

- Instructional Design Support
- Training Support

- Monitoring and Evaluation
- Financial Sustainability
- Promoting the Project
- Technical Support and Administration
- Project Milestones and Deliverables
- The Project Champion

Policy statements are said to be a way that top management shows commitment and ownership of the technology adoption, and is believed to be an act, on management's side, that will speed up the process of adoption and use of a technology (Boezerooij *et al.*, 2007; Nichols, 2008 as cited in Czerniewicz & Brown, 2009). This will form some sort of agreement between management and the university academic staff.

Having a policy will also help everyone to know the role that will be played by each stakeholder. Some of the staff with Blackboard experience and staff with no experience, hold the view that there is no support from the management side for technology integration. With a policy in place, each stakeholder could be held accountable for not playing his/her role, based on policy guidelines. It is important that the policy establishes a favourable environment for technology integration and not be used as a form of coercion for integration. A persuasion strategy should be employed for academic staff, taking into consideration the load the support services for this project could manage, and the capacity of the technology used. In Weaver (2008) it was discovered that students were not satisfied with online courses when the lecturer was instructed to integrate technology in teaching.

Management should not be involved in policy formulation only; they should be involved in the whole life cycle of the technology integration project. Top management should make an effort to be present at necessary meetings, such as strategic meetings, and the faculty and department management should be present at implementation meetings. The presence and participation of management teams would send a message of importance about the project.

7.2.2 The Project Champion

There is a need for an individual who will manage the project and coordinate all the activities and workings of various teams working on sub projects. This individual would:

- Organise project-wide meetings
- Make sure the teams are fulfilling their mandates
- Be part of the monitoring and evaluation team
- Make sure project key deliverables are realised
- Organise support for struggling teams
- Report at management level

This person would make sure the project runs smoothly and according to plan.

7.2.3 Training

Computer Skills

In response to the question of formal computer training in the use of computers, 76.5% of the staff with Blackboard experience indicated that they had formal training, with 23.5% indicating they had not received any formal training.

In response to the same question of training, 75% of the staff with no Blackboard experience indicated that they did receive some form of formal training in the use of computers, and 25% indicated that they had never received any formal training.

The majority of students (87%) who participated in this study indicated that they had not done computer studies, computer application technology, or information technology at secondary school. The students specified that they were only exposed to computers at school, which is not necessarily a formal exposure as in a taught school subject. About 51.8% of the students indicated some exposure to computers, while 48.2% indicated they were not exposed at all to computers at school level.

About 75% of staff members in both groups have received formal training in the use of computers, and only about 25% of each group have not received formal training. The staff members with no training are using computers and have acquired the skill in some other way. About 80% of the students also come to the university with no formal computer training, but some exposure which enables them to use computers. The majority of students do not have the necessary skills to use computers for the successful completion of their studies, and they may have to gain this along the way through various forms of training. Dednam (2009) conducted a research at a university in South Africa, and came to the conclusion that even though the number of students with computer experience increases as they enter university, research shows that they do not possess the skills as required by the university standard.

There is research literature indicating that training is a critical intervention in technology implementation (Sharma & Yetton, 2007; Xia & Lee, 2000) and has an effect in terms of user attitudes, perception of ease of use and perception of usefulness.

The training in basic computer skills for general use of computers is not enough for students to use the Blackboard Learning Management System. They will have to receive some training if they need to master computer use at the basic level of accepted usage necessary for functioning at university level.

Technical Support

Technical support for students and staff with Blackboard experience has been discussed. The majority (58.8%) of staff members with Blackboard experience indicated that a technician on site is the type of support visible to the majority of staff members, together with telephone support. These may be common types of support with staff members because they are the types of support that require less effort to request help. That may be because it does not take too much time to request support through the telephone, as compared to other forms of use, such as e-mail, where response time will vary as it may be some time before one receives response. There is also a possibility with e-mails that one's request might be misinterpreted and one only discovers it later when responding, and that may cause further delays in getting a solution to a technical problem.

E-mail support was indicated as the support that is offered by 29.4%, which is one of the highest percentages after the percentage for a technician on site and telephone support. There is a possibility e-mail support can be one of the most recognised support type. It may have the advantage because it is the highest used form of official communication in the institution and as a result, all staff members get their communications through e-mail. Everybody is familiar and comfortable with using e-mails. There is an opportunity that could be exploited in using e-mails, to request technical support, but there are issues that need to be considered before that could happen.

Other types of support are, remote desktop support at 11.8%, and frequently asked questions at 5.9%. Remote desktop and the frequently asked question file may require a lot of effort at the beginning, for people who are challenged with working with computers and merely possess basic skills.

Since staff members indicated telephone and call centre support as the most support available, it must be taken into consideration that this does not translate to their technical problems being solved immediately, as only 11.8% indicated an immediate solution is provided to the staff member, and that may be due to a number of reasons. These may include the complexity of the problem, the experience of the technical service person attending to the problem, the ability of the staff member to accurately explain the problem or to show it to the support person, and the technical services centre being understaffed.

A Way Forward

Some of the staff with Blackboard experience (76.6%) and 75% of staff with no Blackboard experience indicated that they received formal training in the use of computers. The majority of students (87%) indicated that they entered university with no formal training in computers, and have been exposed to computers without receiving any training. Even though the majority of

staff in both groups of academic staff had been trained to use computers, that does not guarantee they would automatically be able to use the Learning Management System. and Therefore, provisions should be made to train staff members and students in the use of the Learning Management System. The training can be in the form of short informal workshops for staff. These workshops can cover basics at first, and gradually move to advanced aspects of the technology. The staff can then introduce their students into the Learning Management System based on the features the staff member is using. Care must be taken not to crowd the students with too much information. The students should be influenced to see the Learning Management System as easy to use and useful for their studies, and the lecturer has an opportunity to contribute towards these goals if the goals for technology integration are to be achieved. According to Alshare, Gradon and Miller (2004), low use of installed systems has been found to be the cause of low returns in organisational IT investments. What will surely lead to increased use is the students' belief that Blackboard is easy to access and use.

The staff training should also include strategies on conducting online learning classes, to make sure there is an excellent presentation of learning material online, and clear understanding between the lecturer and students indicating what the lecturer's role is, and also the role the students will play. This will be necessary as students will be introduced to a new learning environment.

Another area to be considered for staff is that the content to be posted online must be in a form suitable for online access by students. If such considerations are not observed, a number of challenges could be experienced by students, such as not being able to retrieve a file because it is in a format for which students need a specific application programme to open, and which may be an application the institution is not licensed to use. Considerations for such situations could be part of the staff training, or workshops where staff are encouraged to use commonly available applications in packaging student materials, to be made available through the Learning Management System.

Student training should also include making them aware of all support available when having problems, because students have only been aware of support in the form of a technician on site, as indicated in the findings of this study.

The technical support team needs to be empowered to be more efficient in the use of limited human resources. If the technical support department is understaffed, the solution may not be as simple as to employ more technicians. Sometimes inefficiencies may be found in the strategy used to deliver services. It may be the fact that the majority of technical problems are not solved immediately is not due to inefficiency of the technical support but some environmental conditions. It should be clearly communicated to the staff by technical support, informing staff about their expected turnaround times. An example would be that if a staff member reports a

problem on Friday afternoon, the technical support team would attend to it on the first working day of the following week. Information could be given to staff to make them aware of certain problems they can expect, so that those can be solved immediately. Others may take some time to solve. Even for those that will take a long time, the time should be specified in terms of days and weeks and not simply ‘a long time’.

7.2.4 Adequate Access to Computing Resources

Computer Access

Access to computers is mostly through general university open laboratories, as opposed to departments, as the majority of students (69.2%) indicated. However, there is not enough access for students, as 74.4% of the students indicated according to findings of this study. Very often it is difficult to gain access to the laboratories because they are filled to capacity, leaving students with no access to computers.

For staff with Blackboard experience, access is not a challenge as they indicated they have access to office computers (58.8%) and some have their own computers (41.2%). The staff should generally be covered as it is the university policy to provide every staff member with an office equipped with a computer.

The 75% of staff with no Blackboard experience, indicated they mostly use office computers, while 25% use their own computers. It seems they have access to computing devices. Even for those that use their own computers it is a question of preference, maybe because the computing power of their own machines meets special computing needs which are not met by their office computers, which may have minimum acceptable computing power.

Computer access does not come up as a problem for staff members, but there may be reasons worth investigating, with 41,2% of staff with Blackboard experience, and 25% of staff with no Blackboard experience using their own computers, while they have office computers.

The student population indicated that they mostly use general university open laboratories (69.23%) more than departmental laboratories (6.7%), while the rest use their own computers (17.9%), the university library laboratory (4.1%), and 0.5% who use some uncategorised computers. On the student side there may be a problem that needs to be addressed, because students indicated that sometimes they cannot gain access to the laboratories because they are full, with 74, 4% of the students indicating that that happens often and very often, and 22.6% of the students indicating that it rarely happens. There is a possibility that computer access for student use of Learning Management System may be a problematic area to be looked at.

Bandwidth and Internet Access

The staff with Blackboard experience (82%) indicated that it is often, and very often, that they have no Internet access as per findings of this study. A slight majority of 58.8% of the staff with no Blackboard experience indicated that when it happens that they have Internet access it is very slow.

The staff with no Blackboard experience (75%), indicated that often, and very often, there is no Internet access, with 20% indicating that it rarely happens, and 5% indicating that it does not happen at all. The 45% of staff with no Blackboard experience, indicated it rarely occurs that even if Internet is available it is very slow, while 50% indicated that it occurs often, and very often, while 5% indicated that they have no experience of slow Internet.

The students (82%) indicated that often, and very often, they have no Internet access.

84.2% of the student respondents indicated they experience very slow Internet when they have access.

Both staff and students indicated prominently that there is a problem in the area of Internet in terms of access and the speed of access. This may have an effect on Blackboard use, as it is accessed through Internet and Intranet.

A Way Forward

According to student responses adequate access for students is yet to be realised,. Even though there are departmental laboratory computers, open laboratory computers and library laboratory computers, students indicated they access general laboratory computers. They indicated that they access computers everyday but the laboratories are always full and access is not easily gained. The results indicated that majority of students that have difficulty in accessing computers are first years, followed by second years and continuing in that order.

The solution may not be to say ‘buy more computers and open more open access labs’. The use of departmental labs can be revised so as to allow the labs to be used, not only for sessions where there is a lecturer in the lab during contact time, but to be open when the department students could use the labs without lecturer or tutor supervision. The only supervision should be that of making sure the labs are properly and safely used. That would mean that departments will have to contract people to be in charge of the labs if they are opened for more time than usual.

Computer access is not a challenge for staff members. A common challenge for both staff and students is very slow Internet access. The slow Internet is indicated by 82% of staff members with Blackboard experience and 65.1% of staff members with no Blackboard experience.

84.6% of students also indicated they struggle with slow Internet access. The management should make sure there is a reliable internet access for students, otherwise slow and unreliable Internet will play a great role in making students have a negative attitude towards Blackboard, and may lead to the perception that Blackboard is not easy to access. The same attitude may develop with staff members if they cannot always access Blackboard. If they cannot access Blackboard it will not be useful to them.

The Internet backbone of the institutions has been reported to be average in terms of bandwidth compared with other institutions with even more students and staff. This indicates that the solution may be multidimensional and the problem cannot be simply solved by increasing bandwidth. Certain control measures should be applied where abuse of Internet by some students could be prevented by allocating a certain amount of bandwidth over certain periods. Such an approach needs to be applied fairly and should not be used as a new income-generating stream which may have a bad impact on poor students. Again, such an approach could meet a lot of political resistance and therefore should be thought through and applied in a very considerate manner, with support from various stakeholders in the institutions. Bonus bandwidth could be allocated to students who mainly consume their bandwidth on strictly education-related material. The disadvantage of this approach would be the overhead costs of implementing it.

Another issue could be that of bottlenecks in the internal network, and the value of the available bandwidth is not realised. The issue of slow computers could be solved with the use of some third party software. Technical support is mostly aware of such solutions, but the problem is always the licensing fee. The issue of use-efficient computers should be given attention and be prioritised, and management should be made aware of the importance of solving such problems.

7.2.5 Monitoring and Evaluation of the Project

The strategy for technology integration in an institution must include a programme for monitoring and evaluation. The monitoring must serve the purpose of making sure the project milestones are reached, because if no milestones are set there will be no way of determining if the project is progressing as intended. There should be status report meetings where reports by various sub-project or team leaders are given. The reports can be given by leaders on the following sub-projects:

- Instructional design support
- Training support team
- Project promotion team
- Technical support and administration team

- Monitoring and evaluation team

The reports should be given according to set deliverables in the respective sub-projects' mandates. The monitoring and evaluation team should be using standards for evaluation that are transparent and have been agreed up on by stakeholders. The monitoring should include measures of quality control and should be done continuously.

7.2.6 Communication

Good communication is necessary for the success of the technology integration in the form of a Learning Management System. There should be good communication and coordination between the various sub-project teams and constant feedback to avoid misinformation. Challenges should be addressed and a way forward be mapped to make sure the project is on target.

Community of practice should be established between academic staff integrating technology, so as to make sure they share challenges and learn from each other and from the support team. These should be open sessions, not formal, and usually very short, without any meeting or workshop formalities. The project champion could be tasked with organising such informal sessions.

7.2.7 Creating a Perception that Blackboard is Useful and Easy

The majority of the respondents of the study indicated that Blackboard is useful for doing their work and is easy to use. The university management team may easily provide funding if they are convinced of the usefulness of a project and will be able to support the reason for funding, and be able to account for their decision to provide funding. The management will be empowered to openly support a project if they know its value in terms of usefulness and the return on investment for the institution. It is important that everyone be made aware of the usefulness and what has to be gained. Informing everyone about what is to be gained will create expectations. Those expectations must be dealt with because according to the Expectation Confirmation Model, this will affect continued usage. If those expectations are not confirmed, it could lead to a possibility of discontinuing the use of Blackboard.

Everybody must be made aware of what is to be gained from the effort that must be put into getting the required results, and the time to be spent to achieve such results should be explained, so that everybody will have realistic, measurable and achievable expectations. The effort required to achieve certain goals, using Blackboard, may include: time to be spent in training for its use, the funding necessary for the smooth running of the project, the amount of time needed to build a course site before you can enjoy the benefits of having a course online, and the support you will need to complete the project.

The students must be made to feel that Blackboard is easy to use through a number of interventions. The interventions may include training and efficient support, so that they do not experience difficulty in using the system. Usefulness and easiness must go together because the absence of easiness may lead to a person not using Blackboard, even though that person thinks it useful. Davis (1989) indicates that sometimes the effort to use a system may be too much for a user, such that it outweighs the need to use it.

The perception that Blackboard is useful and easy is a Critical Success Factor, supported by TAM and ECM. All the above CSFs should feed into this CSF, and that will influence attitude, and eventually lead to usage.

7.3 STUDY EVALUATION

This study has been conducted with validation techniques taken into consideration as suggested by Moody and Buist (1999) and Oates (2006) criteria (as discussed in Chapter Five).

A criterion suggested by Oates (2006) for a positivist study was also used where the study was conducted to conform to validity, objectivity, reliability, internal validity and external validity.

The focus was on Critical Success Factors and whether they address the Information System and Electronic Learning aspects of successful adoption of a Learning Management System.

The questions used in this study were adapted from Information Systems literature. The questions were adapted from authors Lee *et al* (2001), Lewis *et al* (2003) and Thong *et al* (2006).

7.4 CRITICAL SUCCESS FACTORS AND THE TECHNOLOGY ACCEPTANCE MODEL

This study tested external factors, such as facilitating conditions, management support, and computer skill on both University of Fort Hare staff and students. The research model predicts whether a staff or a students' perception of ease of use or usefulness will be influenced by the external factors. It is believed external factors have an effect on the perceptions of ease of use and usefulness. This study focused on investigating these factors, finding gaps and closing those gaps by suggesting CSFs to make sure the factors will have a great effect on ease of use and ease of access, and lead to use and continued use.

Perceived Usefulness

Staff and students who worked on Blackboard have indicated that Blackboard is easy to use, with 65.6% of students and 70.6% of staff members.

Perceived Ease of Use

Staff and students who worked on Blackboard have indicated that Blackboard is easy to use. It is the minority that believe that Blackboard is difficult to use, which is on average 29.2% of students and 29.6 of staff. It is hoped that, should CSF be applied, it will greatly impact on Perceived Ease of Use.

Usage Attitude

Both students (71.8%) and staff (82.3%) indicated that their attitude to Blackboard was a positive one.

Usage intention

Both students (83%) and staff (76.4%) indicated their intention to use Blackboard.

Section conclusion

The correlations between TAM constructs, such as Perceived Usefulness and Perceived Ease of Use, are significant for students. According to this study's results, Perceived Usefulness and Perceived Ease of Use are determinants of technology use by students, with attitude and intention being mediators.

The correlations for staff are significant for Perceived Usefulness, indicating that an increase in the perception that Blackboard is useful will have a positive effect on the attitude towards, or the intention to use Blackboard. There was no significant correlation between Perceived Ease of Use and Perceived Usefulness, and also between Perceived Ease of Use and Usage Attitude. Lewis *et al.* (2003) had the same results where the correlation between Perceived Ease of Use and other TAM constructs was insignificant, and they stated that cognitive resources released by Ease of Use were not important to individuals' assessments of instrumental outcomes. In this study this may indicate that, for academic staff, Ease of Use is not a dominant factor to them, and therefore their focus is on usefulness of the technology to help them achieve their goals. Perceived Usefulness has come as a determinant of use for staff with the usage attitude and usage intention as mediators.

The Critical Success Factors target improving the external factors that will in turn have an effect on Perceived Usefulness and Perceived Ease of Use, which are the main determinants of use.

7.5 CRTICAL SUCCESS FACTORS AND THE EXPECTATION CONFIRMATION MODEL

There are 47% of staff members with Blackboard experience who agree that their expectations were exceeded by Blackboard while 11.80% are uncertain and 41.20% do not agree with the statement.

Dealing with the nature of academic staff expectations 52.90% of the staff agrees that they had positive expectations about Blackboard, while 11.80% are uncertain and 35.30% disagree with the statement indicating they had negative expectations about Blackboard.

According to correlation results, the determinant of continued use for staff at Fort Hare is Perceived Usefulness as it is the only ECM construct with a significant correlation with continued use. The application of the CSFs will lead to continued use especially through creating a perception that Blackboard is useful and application of other CSFs. The application of CSFs will work on the staff to possible increase positive perceptions that will lead to continued use of Blackboard. Another important aspect will be working on expectations of staff and students as discussed as part of CSFs to make sure reasonable expectations are set and are achievable so as to prevent staff and students having high and not achievable expectations, which may cause the staff to distance themselves as they may be of the view that Blackboard is not relevant to their work and therefore discontinue use.

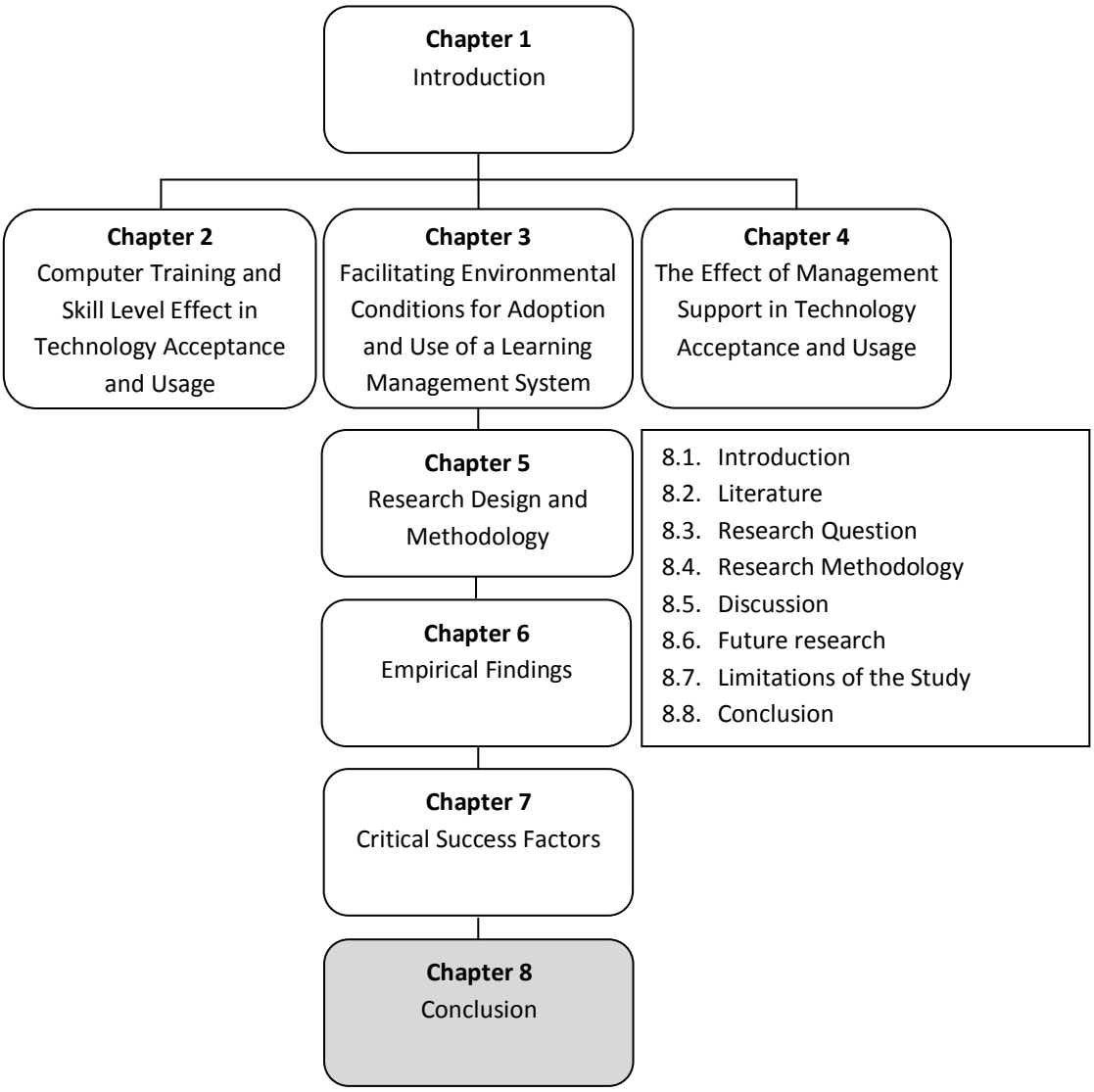
7.6 CONCLUSION

It has been established that much work has to be done to improve the student and staff experiences in areas of bandwidth where there is a problem of slow Internet. The issue of access to computers for students has come up, as they indicated that often, and very often, the open access laboratory is full and is sometimes difficult to gain access to a computer. The student respondents have to be empowered to gain the necessary skills as they enter with no formal training suitable for university study related requirements. They also need training in the use of a Learning Management System. The staff indicated the need for policy guidelines for both the provision of infrastructure and training in preparation for participation in the integration of technology in their teaching. The issue of support from the university management, at faculty level and departmental level, needs some attention, as the majority of staff indicated that there is no support, and were divided about the same issue at faculty and departmental levels; those who use the LMS indicated that there is support and encouragement while others indicated that there is no encouragement.

There is significance between TAM constructs for both students and staff. Both Perceived Usefulness and Perceived Ease of Use are strong determinants of the system usage for students in our context. For staff only Perceived Usefulness is the determinant of system usage. There is only one significant relationship between ECM constructs, that is between Perceived Usefulness and Continued IT Usage and the correlation between the other constructs is insignificant. This indicates that Perceived Usefulness is strong determinant of continued use. This concludes this chapter, and the following chapter will be the conclusion of this study.

CHAPTER 8:

CONCLUSION



8.1 INTRODUCTION

The Critical Success Factors (CSFs) necessary for adoption and use of a Learning Management System (LMS) at the University of Fort Hare were introduced and discussed. The CSFs were as a result of the findings about the staff and students in the University of Fort Hare context, and were informed by literature.

This chapter starts with a short discussion on the literature important to the findings of the study, followed by the research question and methodology, a discussion on the findings of the study, revisiting the CSFs and linking to the research question. The limitations of the study are discussed, followed by suggestions for future research. The chapter is concluded with a summary.

8.2 LITERATURE

This study investigates external factors and their influence on Perceived Ease of Use and Perceived Usefulness of a Learning Management System at the University of Fort Hare.

A number of studies have tested external factors that influence technology adoption using TAM. External factors, such as Management Support, Computer Skills, and Facilitating conditions have been investigated in this study.

Management Support

Wu, Shen, Lin, Greenes, and Bates (2008) found that management support creates a favourable environment for technology adoption. The involvement of management is believed to create a more positive attitude about the system for users, and generally leads to the use of computer systems (Ngai *et al.,* 2007). Ngai *et al.,* (2007) continue by emphasising that users' evaluations of a technology are affected by organisational leaders' attributes, opinions and actions. They are also influenced by each individual's personal interests, needs and skills. The personal interests, needs and skills will determine the user's response to managerial directives about the innovation.

Leornard-Burton and Deschamps (1998) state that not all end-users will respond to the managers as intended, but the response will vary. They state that a message about adoption issued by authority influences the adoption decision of a subordinate, either by making the decision for the receiver or enforcing a decision already made. The intended influence is amplified if the message to adopt an innovation is from a manager, as compared to a message from a person without authority. Even though management messages of support will influence users in an organisation, Leornard-Burton and Deschamps (1998) state that authority does not always ensure compliance. It depends on the nature of the organisation. The nature of the organisation can be outlined as follows:

- A stable organisation where an instruction is issued by the authorities and the subordinates are complying with directives from the management for reasons of legitimacy and the position of the management.
- Where the decision process is highly decentralised, the subordinates are highly professional, communicate freely and there is a loose management structure: In this latter situation Leornard-Burton and Deschamps (1998) argue that persuasion will work better than a formal authority giving a directive to the subordinates to adopt an innovation. The important factor for the success of the persuasion approach is that there is consensus between superiors and subordinates, and the management is seen by the subordinates as being professionally competent to make the decisions.

The University of Fort Hare's nature is a combination of the two, where there are independent professionals who are not necessarily part of the management who can give direction on issues in their specialised areas, and there are junior staff members who are not authorities in their fields and are directed by superiors. Different approaches will have to be used, suitable for each situation. The nature of the institution and policies should dictate the terms of communication between staff members and their superiors.

According to a study conducted by Lewis *et al.* (2003), management support has an effect on ease of use. They stated that this must arise from resources allocation where users will think that the technology in question will be easy to use, because enough resources have been allocated, and because of availability of assistance.

Computer Skills

If technical innovations are to be successful, participants in the implementation process should possess the necessary skills to drive the implementation process. According to Sharma and Yetton (2007), end-user training is a critical intervention of the implementation process. If the training is to be provided to participants, this means the training intervention should be part of the budget provided for technological innovation implementation.

Today the modern day population is exposed to a number of technological innovations, such as cell phones and automatic teller machines (ATMs). Nash (2009) confirmed that student exposure to such technologies does not necessarily mean they have the skills required to be competent in using all computer applications suitable for a number of contexts, such as work and educational environment. In the case of students entering tertiary institution in the Republic of South Africa (RSA), Nash (2009) concluded that students entering for the first time should be trained to gain computer skills, although there are studies internationally concluding that students enter university with enough computer skills to work competently at this level. In the South African situation there is evidence that computer training is still necessary for students

entering tertiary education. Additionally, according to Nash's (2009) findings, computer training should be continued for students entering university in RSA, especially black students coming from a disadvantaged background.

Nash's (2009) findings are also supported by Dednam (2009) who conducted a study at a university in South Africa and came to the conclusion that even though the number of students with computer experience increases as they enter university they do not possess the skills required at the university standard.

Alshare, Gradon and Miller (2004) embarked on a research project trying to understand the relationship between computer literacy, attitudes, perceived ease of use and perceived usefulness as determinants of computer use. Their results showed that computer literacy, attitudes, perceived ease of use and perceived usefulness had a significant impact on computer usage.

If computer literacy is a determinant of computer usage, together with attitude, perceived usefulness and perceived ease of use, it is very important that staff members are also empowered with training, starting from computer literacy and progressing to Blackboard related training, influencing the perception of ease of use and usefulness and their attitudes to increasing the rate of use. Emphasis should be put on staff Blackboard training as they make decisions to use Blackboard, as compared to students who start using it based on the decision of a staff member.

Facilitating Conditions

Facilitating conditions are defined as the degree to which an individual believes that an organisational and technical infrastructure exists to support the use of the system (Al-gahtani, Hubona, & Wang, 2007). Facilitating conditions may include technical support, access to computers and bandwidth related issues. An institution's infrastructure and level of support are pre-requisites for adoption and use of an LMS. The infrastructure includes computers, the network and bandwidth, necessary for participating in online learning. The amount of bandwidth will determine the speed at which students and lecturers will access learning resources online and will have an impact on student experiences. Support for students and lecturers will go a long way to positively influencing learners and students.

E-learning requires that students and lecturers have access to the Internet, to collaborate with peers and interact with the lecturer for support (Moolman & Blignaut, 2008).

Alexander (2001) suggests that a number of questions should be asked before lecturers embark on an e-learning project. The questions should be about the context of learning, information technology and teaching and learning design. If the required ICT tools for e-learning are not

made adequately available, this will have a great impact on the success of the technology adoption and use of e-learning in an institution.

The unavailability of infrastructure for learning will have a negative impact (Moolman & Blignaut, 2008) on the intention of improving the quality of learning, access to education and training, and on reducing the cost of education (Alexander, 2001) for students will not be fulfilled.

According to Alexander (2001), asking the questions below will provide evidence to determine whether e-learning technology adoption and use will be successful.

- Is this technology available and accessible to this group of learners?
- What is the cost of this technology to the learner?
- Does this technology support the most suitable learning design for this content?
- What kinds of interaction are possible with this technology?
- What level of support does this technology require?
- Is this technology a viable option in this context, and does it enable the most appropriate learning strategies to be used for this particular content, for this group of learners?

According to Hitch and MacBrayne (2003), for e-learning to be effective the institutions must have:

- A flexible yet solid technological infrastructure,
- One-stop student services that mirror the programmes found on the campus but that are delivered more cohesively and conveniently,
- Creative faculty and academic development support.

If technology adoption and use is to be achieved, the right infrastructure has to be in place (Alexander, 2001) and such technology should be accessible to students. The necessary support should be available so that it is accessed when needed, otherwise, if an institution cannot meet those requirements it is not ready for e-learning. E-readiness is described as,"the availability and access to IT infrastructure, and policies to support and to participate in the international global network" (Moolman & Blignaut, 2008 p 169).

According to Teo, Lee, and Chai (2008) facilitating conditions are determinants of Perceived Usefulness and Perceived Ease of Use, and have a positive effect on attitude (Ngai *et al.* 2007, Teo, 2008 & Groves and Zemel, 2000). In Teo (2009) facilitating conditions were the main determinants of Perceived Ease of Use, followed by attitude.

8.3 RESEARCH QUESTION

The main research question is:

"What management and environmental Critical Success Factors will have influenced the acceptance and continued use of a Learning Management System at the University of Fort Hare?

In order to answer the main research question, the following sub research questions will be addressed:

- What facilitating environmental conditions are necessary for the adoption and continued use of a Learning Management System?
- What effect does management support have on the decision to make use of a Learning Management System?
- What role does the computer skill level of a user have on the likelihood of a Learning Management System being adopted and used?

Once these questions had been investigated, Critical Success Factors were developed for the technology adoption project at the University of Fort Hare, outlining the topics that must be considered and addressed in order to increase the success rate of the technology adoption and use, from initial adoption to full adoption.

The theoretical framework on which this study is based includes Technology Acceptance Model (TAM) and Expectation Confirmation Model (ECM).

The Technology Acceptance Model (TAM) was developed by Davis in 1986 and has been used to predict and validate factors that influence technology adoption, acceptance and use. It is one of the most cited theoretical frameworks (Teo, 2009). The model is an attempt to derive the determinants of computer acceptance.

The model has been used to determine technology use by university lecturers (Park *et al.,* 2007), and pre-service and in-service teachers (Teo *et al.*, 2008; Teo, 2009). It has been tested in a number of cultural environments: in an African environment, (Anandarajan *et al.,* 2002; Averweg, 2008) a Chinese cultural environment (Yaobin *et al.*, 2008), in a Singaporean and Malaysian environment (Teo *et al.*, 2008) and in a Singaporean environment (Teo, 2009). It has been validated in users' acceptance of instant messaging (Yaobin *et al.*, 2008) and has also been used in explaining how attitudes determine Internet usage (Porter *et al.*, 2006). TAM has been used to predict acceptance of technology in different fields; healthcare (Wu *et al.*, 2008),

adoption of e-government (Horst *et al.*, 2007), education, (Teo *et al.*, 2008) and many other fields.

While the Technology Acceptance Model (TAM) deals with intentions to adopt, accept and use technology, the Expectation Confirmation Model (ECM) deals with the post-adoption environment, where users decide whether to continue or stop using a technology (Thong *et al.*, 2006). Thong *et al.* (2006) state that, until the post-adoption usage of the technology can be confirmed, it is premature to classify a technology adoption as a success. According to Thong *et al.* (2006), it is important that post-adoption beliefs be investigated and dealt with, because if enthusiasm over initial adoption of technology diminishes after users have gained experience, the technology will suffer from decreased use. That will have an impact on organisations that built their services around that technology and would need to write off significant investments used in implementing the technology. Thong *et al.* (2006) states that there are potential benefits in increasing user retention rate, like reduction in operating costs and possible increase in profit for organisations. While initial acceptance of e-learning is an important first step towards realising e-learning success, long term viability of e-learning and its eventual success depend on its continued use, rather than first time use.

This led to the use of a model to research adoption and the use of a Learning Management System at Fort Hare, as shown in Figure 8.1 below. The following section covers the research methodology of this study.

8.4 RESEARCH METHODOLOGY

This study made use of a positivist approach. The research strategy adopted for this study was a quantitative approach making use of an online survey. Online questionnaires were developed to survey the research study participants, which included students with Blackboard experience, staff members with Blackboard experience, and staff with no Blackboard experience. A questionnaire was developed for each group. A pilot study was conducted before the main research study and the questionnaires were found to be user friendly. The questionnaires were sent via e-mail with a link to the SharePoint Server hosting the questionnaire.

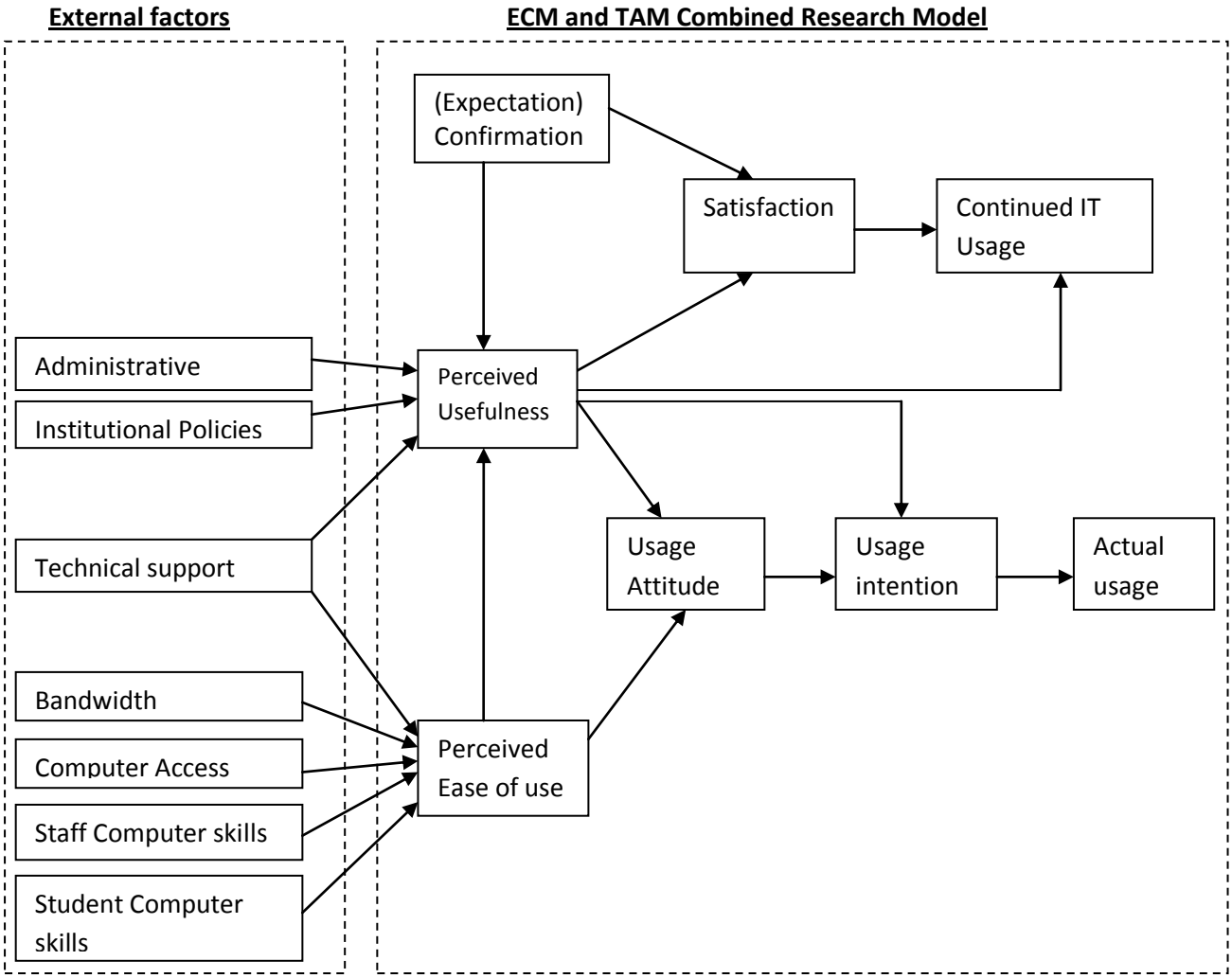


Figure 8.1: Research Model for LMS Acceptance and Continued Use at UFH

The data analysis was done using SPSS; the services of a statistician were enlisted for guidance in data analysis using statistical methods. The Critical Success Factors were developed based on the findings and Information Systems literature.

The following ethical considerations were considered during the research project: The questionnaire was completed anonymously by the study participants ensuring privacy and confidentiality. Study participants were informed in the invitation e-mails of the purpose of the study, which also informed them that participation in the study was voluntary.

8.5 DISCUSSION

The analysis of data revealed that the majority of staff at the University of Fort Hare is of the view that University top management does not support the use of Learning Management System (LMS) for teaching and learning. Staff with Blackboard experience are divided in their views in indicating whether or not the faculty and department managers encourage and support

the LMS usage. The majority of staff with Blackboard experience are of the view that there is no encouragement and support at faculty and departmental levels.

A good strategy is to address staff views as this will influence their perceptions and attitude about the LMS.

The majority of staff members have been trained to use computers, while for the majority of students there is no evidence of adequate computer skills. The staff and students should both be trained to use the Blackboard LMS, and staff members should cope well as they have a foundation in using computers, while students may experience challenges because of lack of exposure to computers. Such issues could be addressed by not overloading students with a lot of new information, in training them about the use of the LMS but, beginning only with the immediate tools they have to use.

Computer access has been indicated as a challenge by students. Considering that the student computer ratio is not different to some of the institutions considered to be well resourced, the solution may be in the allocation of access to such resources, and equal distribution amongst students. The findings are that there is access, but certain issues which make students think that there is insufficient access, should be investigated.

Included is also the problem of slow Internet access for both staff and students. A number of issues need to be looked at, such as appropriate distribution of bandwidth, addressing bottle-necks and dealing with possible issues of bandwidth abuse by using it for inappropriate activities that may be consuming a lot of bandwidth.

The findings indicate that staff members are of the view of a policy formulation is needed for the provision of infrastructure and training for staff members to participate in the use of Blackboard. This may be because they feel they do not have the roadmap for how to go about and get started in technology integration, and therefore think policy guidelines will be a starting point in mapping a way forward. They indicated that the policy should include issues of provision of infrastructure where it will provide some form of agreement between the university stakeholders in indicating the agreed direction the institution is taking on use of technology for teaching and learning. There are structures in place for support of staff in technology usage set up by management, and this may indicate that either staff members are not aware of how they operate, or have not used their services, or are not satisfied with such structures and think more should be done. Another reason may be that, irrespective of the support structure, some think that without the necessary infrastructure it is difficult to pursue integration. It seems communication has to be strengthened between all the players, as it may be possible that some of the perceptions are not based on a true reflection of the state of affairs in the institution, but

are informed by individual attitudes which may need to be addressed if integration of technology into teaching and learning is to be successfully realised.

Following from the above findings, the Critical Success Factors were developed from the data collected. In answering the main research question the three sub research questions were addressed. The research question and Critical Success Factors are identified and linked below:

Table 8.1: Matching Sub Research Questions with Critical Success Factors in Answering the Main Research Question

Sub research question	Critical Success Factors
What facilitating environmental conditions are necessary for the adoption and continued use of a Learning Management System?	Training Support Technical Support and LMS administration Adequate infrastructure provision and adequate access Monitoring and evaluation of the project Creating a Perception that Blackboard is easy and useful
What effect does management support have on the decision to make use of a Learning Management System?	Policy formulation and Implementation The project champion Financial Sustainability Plan Monitoring and evaluation of the project Creating a Perception that Blackboard is easy and useful
What role does the computer skill level of a user have on the likelihood of a Learning Management System being adopted and used?	Training Support Technical Support and LMS administration Monitoring and evaluation of the project Communities of practice Creating a Perception that Blackboard is easy and useful

8.6 FUTURE RESEARCH

This study investigated the adoption and use of a Learning Management System at the University of Fort Hare. Perceived Ease of Use and Perceived Usefulness were the driving determinants of acceptance for students, and for staff members the main motivation is Perceived Usefulness. Students were lacking in computer skills and it showed it was important to them that the LMS is easy to use. The issue of management support and policy were one of the issues indicated by staff as necessary in this institution. The staff perceptions about management support can be further investigated on a wider range over two or three institutions, and how it affects staff perceptions and attitudes towards technology integration into teaching and learning.

8.7 LIMITATIONS OF THE STUDY

This study was conducted over the two campuses of University of Fort Hare which are the East London campus and the Alice campus. The sample for staff with Blackboard experience was very small, with 24 staff members and 17 who responded. Even though 17 out of 24 is a big percentage, the sample was very small. Of the staff with no Blackboard experience, the population was about 350, of which 40 responded. Of the students, about 679 were on

Blackboard and 195 responded, which may not be enough to generalise the results to the whole of the country, because of the mostly rural setting of the institution and the dominating rural and underdeveloped background of the majority of the students. Infrastructure may be different in well-resourced, formerly white universities, as compared to under-resourced traditionally black and disadvantaged universities.

The staff and students responses can be influenced by their understanding and view of the local environment in issues related to the integration of technology into teaching and learning, and that has shown in their responses about management and environmental factors. There is a possibility that their responses were motivated by their personal interest and what is best, in their view, for the project of adopting and using a Learning Management System. In the findings of this study it has been taken into consideration the fact that there are different views about what is necessary for the adoption and use of the Learning Management System to be a success. In order to come up with Critical Success Factors different views had to be taken into consideration and measures for validity and reliability of responses and findings had to be applied.

8.8 CONCLUSION

In this study, Critical Success Factors that will lead to use, and continued use of an LMS were identified and presented, particularly with regards to environmental and management issues. They were matched to the research sub questions in answering the main research question.

The Critical Success Factors can be used by the management who are policy makers at institutional level, to come up with a plan for implementing the integration of technology into teaching and learning at the university. Universities and other institutions of higher learning with similar profiles to that of the University of Fort Hare can also benefit by considering the Critical Success Factors, and implementing them in a way that will fit their context and the profiles of their students and academic staff.

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APPENDIX A - QUESTIONNAIRES

QUESTIONNAIRE FOR STAFF WITH BLACKBOARD EXPERIENCE

Please choose the appropriate answer

SECTION A : DEMOGRAPHICS

1. Campus

   a. Alice b. East London

2. Position

   a. Junior Lecturer b. Lecturer

   c. Senior Lecturer d. Professor

3. Gender

   a. Male b. Female

4. Age

   a. under 25 years b. 26 -30 years

   c. over 30 years

SECTION B : Computer Access, Training, Skill, and technical Support

5. How often do you use a computer?

   a. Every day b. Every second day

   c. Once a week c. less often

6. Have you received any formal training in the use of computers?

   a. Yes b. No

7. Which computer is easily accessible to you?

   a. Office computer c. Own computer

8. How often do you experience the following problems in using the computers in the university?

For this question rate your answers from 1 to 4. 1=never; 2=rarely; 3=often and 4=very often

No internet access	1	2	3	4
Very slow internet	1	2	3	4
Computer files infected by a virus	1	2	3	4
Faulty computers	1	2	3	4
Computers very slow	1	2	3	4
Printers and photocopiers not working	1	2	3	4

9. Which support is available, when you have problems? (Select all that apply)

A technician on site	Telephone support	Remote desktop support	e-mail support	Frequently asked questions file	Call centre support

10. On the average approximately how long does it take for assistance to arrive?

Immediately	Within 24 hours	A day to a week	After following up on the request for a number of times	After I have lodged a complaint	Too long	Never arrives

11. Rate the service offered by technical support services in providing technical support.

Rate your answers from 1 to 7. 1=very bad; 2=bad; 3=poor; 4=fair; 5=good; 6 =very good and7=excellent. Choose the appropriate number.

1	2	3	4	5	6	7

SECTION C

For the questions that follow, rate your answers from 1 to 7. 1=totally disagree; 2=strongly disagree; 3=disagree; 4=uncertain; 5=agree; 6 =strongly agree and 7=totally agree. Choose the appropriate number.

Perceived Ease of Use

12. I find Blackboard easy to use.

1	2	3	4	5	6	7

13. I find it easy to provide my students access to course material on Blackboard.

1	2	3	4	5	6	7

Perceived Usefulness

14. Using Blackboard was very useful for communicating with students.

1	2	3	4	5	6	7

Attitude

15. Using Blackboard to supplement teaching and learning is a good idea.

1	2	3	4	5	6	7

Intention to Use

16. Assuming I have access to Blackboard, I intend to use it.

1	2	3	4	5	6	7

Policy

17. A policy for the provision of infrastructure for teaching and learning using technology is necessary.

1	2	3	4	5	6	7

18. A policy for training staff members in teaching and learning using technologyis necessary

1	2	3	4	5	6	7

University management (adapted from Lewis *et al.* 2003)

19. The university strongly encourages the use of Blackboard for teaching and learning

1	2	3	4	5	6	7

20. The university recognises efforts in using blackboard for teaching and learning

1	2	3	4	5	6	7

21. My faculty strongly encourages the use of Blackboard sites for teaching and learning

1	2	3	4	5	6	7

22. My department HOD thinks that using blackboard is valuable for teaching and learning

1	2	3	4	5	6	7

Confirmation

23. My experience with using Blackboard was better than expected

1	2	3	4	5	6	7

24. Overall, most of my expectations from using Blackboard were positive

1	2	3	4	5	6	7

Satisfaction

25. I am satisfied with the tools (e.g. collaboration, emailing, assessment, reporting) available in Blackboard for teaching and learning

1	2	3	4	5	6	7

26. I am satisfied with the use of Blackboard in addition to traditional classroom teaching

1	2	3	4	5	6	7

QUESTIONNAIRE FOR STAFF WITH NO BLACKBOARD EXPERIENCE

Please choose the appropriate answer

SECTION A : DEMOGRAPHICS

8. Campus

   a. Alice b. East London

9. Position

   a. Junior Lecturer b. Lecturer

   c. Senior Lecturer d. Professor

10. Gender

    a. Male b. Female

11. Age

    a. under 25 years b. 26 -30 years

    c. over 30 years

SECTION B : Computer Access, Training, Skill, and technical Support

12. How often do you use a computer?

    a. Every day b. Every second day

c. Once a week d. less often

13. Have you received any formal training in the use of computers?

a. Yes b. No

14. Which computer is easily accessible to you?

a. Office computer b. Own computer

8. How often do you experience the following problems in using the computers in the university?

For this question rate your answers from 1 to 4. 1=never; 2=rarely; 3=often and 4=very often

No internet access	1	2	3	4
Very slow internet	1	2	3	4
Computer files infected by a virus	1	2	3	4
Faulty computers	1	2	3	4
Computers very slow	1	2	3	4
Printers and photocopiers not working	1	2	3	4

12. Which support is available, when you have problems? (Select all that apply)

A technician on site	Telephone support	Remote desktop support	e-mail support	Frequently asked questions file	Call centre support

13. On the average approximately how long does it take for assistance to arrive?

Immediately	Within 24 hours	A day to a week	After following up on the request for a number of times	After I have lodged a complaint	Too long	Never arrives

14. Rate the service offered by technical support services in providing technical support.

Rate your answers from 1 to 7. 1=very bad; 2=bad; 3=poor; 4=fair; 5=good; 6 =very good and 7=excellent. Choose the appropriate number.

1	2	3	4	5	6	7

SECTION C

For the questions that follow, rate your answers from 1 to 7. 1=totally disagree; 2=strongly disagree; 3=disagree; 4=uncertain; 5=agree; 6 =strongly agree and 7=totally agree. Choose the appropriate number.

Blackboard is a Learning Management System (LMS). A Learning Management System (LMS) provides an instructor with a way to create and deliver content, monitor student participation and assess student performance. For students, a LMS provides them with the opportunity to make use of various interactive features to aid their learning. Most LMSs are web-based in order to allow anytime, anywhere access to both students and lecturers (SearchCIO.com, 2003).

The questions below mostly are about the Blackboard LMS available to Fort Hare academic staff.

For the questions that follow, rate your answers from 1 to 7. 1=totally disagree; 2=strongly disagree; 3=disagree; 4=uncertain; 5=agree; 6 =strongly agree and 7=totally agree. Choose the appropriate number.

Policy

15. A policy for the provision of infrastructure for teaching and learning using technology is necessary

1	2	3	4	5	6	7

16. A policy for training staff members in teaching and learning using technology is necessary

1	2	3	4	5	6	7

University management (adapted from Lewis *et al.* 2003)

17. The university strongly encourages the use of Blackboard for teaching and learning.

1	2	3	4	5	6	7

18. The university recognises efforts in using blackboard for teaching and learning.

1	2	3	4	5	6	7

19. My faculty strongly encourages the use of Blackboard sites for teaching and learning.

1	2	3	4	5	6	7

20. My department HOD thinks that using blackboard is valuable for teaching and learning

1	2	3	4	5	6	7

STUDENT QUESTIONNAIRE

Please choose the appropriate answer

SECTION A : DEMOGRAPHICS

1. Campus

   a. Alice b. East London

2. Degree year level

   a. 1st c. 2nd

   d. 3rd d. 4th

   e. Honours f. Masters

   g. PhD

3. 3. Gender

   a. Male b. Female

4. Age

   a. Under 21 b. 21 – 22

   c. 23-25 d. 26 -30

   e. over 30

   5. School where matriculated

Former model C	Private	Government	other

SECTION B : Computer Access, Training, Skill, and technical Support

5. What was your exposure to computers at school? (Tick one option only)

Primary school only	High school only	Both primary and high school	Never exposed to computers at school level

6. There are subjects called Computer Applications Technology (CAT) and Information Technology (IT) at high school. Did you take any of them at school level?

a. Yes b. No

7. Do you use internet and e-mail?

a. Yes b. No

9. How often do you have access to a computer?

Every day	Every second day	Once a week	Less often

10. Which computer is easily accessible to you?

Department laboratory computer	General University laboratory computer	Library lab computer	Own computer	Friends computer	Other

11. How often do you experience the following problems in using the computers in laboratories?

For this question rate your answers from 1 to 4. 1=never; 2=rarely; 3=often and 4=very often

No internet access	1	2	3	4
Very slow internet	1	2	3	4
Computer files infected by a virus	1	2	3	4
Faulty computers	1	2	3	4
Computers very slow	1	2	3	4
Printers and photocopiers not working	1	2	3	4
Laboratories always full, not easy to gain access	1	2	3	4
Laboratory not open in the evening	1	2	3	4

12. Which support is available, when you have problems? (Select all that apply)

A technician on site	Telephone support	Remote desktop support	e-mail support	Frequently asked questions file	Call centre support

13. On average approximately how long does it take for assistance to arrive?

Immediately	Within 24 hours	A day to a week	After following up on the request for a number of times	After I have lodged a complaint	Too long	Never arrives

SECTION C

For the questions that follow, rate your answers from 1 to 7. 1=totally disagree; 2=strongly disagree; 3=disagree; 4=uncertain; 5=agree; 6=strongly agree and 7=totally agree. Choose the appropriate number.

Perceived Ease of Use

14. I find Blackboard easy to use.

1	2	3	4	5	6	7

15. I find it easy to access course material on Blackboard.

1	2	3	4	5	6	7

Perceived Usefulness

16. Using Blackboard was useful for communicating with my lecturer

1	2	3	4	5	6	7

Attitude

17. Using Blackboard to supplement teaching and learning is a good idea

1	2	3	4	5	6	7

Intention to use

18. Assuming I have access to Blackboard, I intend to use it

1	2	3	4	5	6	7