Quality assurance practice

in online (web-supported) learning in higher education:

An exploratory study

A thesis by

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ABSTRACT

Keywords: online (web-supported) learning, quality assurance, self-evaluation, client feedback.

The fields of quality assurance in higher education and e-learning, or technology-enhanced learning, are current and topical, yet seldom overlap (Reid, 2003). Higher education institutions are experiencing pressure to become more client focused and compete on the global stage, especially with respect to technology-enhanced learning. We are on the brink of a genuine pedagogical revolution (Moon, 2003) and calls for quality promotion, accountability, self-evaluation, value for money and client satisfaction cannot go unheeded.

Three knowledge domains provide the context for this study: quality assurance, higher education and web-supported learning. Their intersection locates the research problem that was investigated, namely the quality assurance of web-supported learning in higher education.

The research design is an instrumental case study, focusing on web-supported learning as a supportive medium in a flexible, blended learning model at the University of Pretoria, South Africa. The research methods include the literature survey, case analysis meetings, a student survey, lecturer interviews, expert consultation and task teaming.

The conceptual framework for this study (Figure 2.5) is based on the confluence of the existing theories: quality assurance theory, instructional systems design and systems theory. The updated conceptual framework (Figure 7.1) and the synthesized findings (Table 7.1) reflect the holistic nature of the process-based quality management system for web-supported learning that characterises this study.

The value of this study to the academic community is in the findings, which include a taxonomy of critical success factors for web-supported learning, the identification of factors which promote student and lecturer satisfaction (or frustration) with web-

supported learning experiences, and lessons learnt by applying standard quality assurance theory to the instructional design process.

The self-evaluation exercise in an academic support unit provides a precedent and contributes criteria that will be useful to the Higher Education Quality Committee in South Africa, as well as to other higher education institutions.

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for e-lady
doing e-work
on e-lessons
on e-learning
e's-slow
on e-uptake
of e-offers
of e-love
here's e-lesson
for e-lady
in e-language
of e-love

e-lesson

e-nough's
e-nough
e-silly
e-stuff

e-need
e-love
e-me

e-mmediately

John Fresen 7 February 2004

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LIST OF ACRONYMS

ADDIE	Instructional Design Model: Analysis, Design, Development, Implementation, Evaluation
AIS	Academic Information Service (Library) at the University of Pretoria
ALN	Asynchronous Learning Networks
ASQ	American Society for Quality
ASTD	American Society for Training and Development
BSI	British Standards Institute
BEM	Business Excellence Model
CBE	Computer-Based Education
CHE	Council on Higher Education
CMC	Computer-mediated Communication
CUP	Committee for University Principals
EFMD	European Foundation for Management Development
EFQM	European Foundation for Quality Management
ELIP	E-Learning Quality Improvement Programme
ETD	Education, Training and Development
ETQAs	Education and Training Quality Assurance bodies
EQO	European Quality Observatory
FOTIM	Foundation of Tertiary Institutions of the Northern Metropolis
HEQC	Higher Education Quality Committee
ICT	Information and Communications Technology
IHEP	Institute for Higher Education Policy
ID	Instructional Design
ISD	Instructional Systems Design
IT	Information Technology
IR	Information Retrieval
LMS	Learning Management System
NADEOSA	National Association for Distance Education of South Africa
NCHE	National Commission on Higher Education
NQF	National Qualifications Framework
NSBs	National Standards Bodies
ODL	Open and Distance Learning
QA	Quality Assurance
QC	Quality Control

QMS	Quality Management System
QPU	Quality Promotion Unit
SA(B)EM	South African (Business) Excellence Model
SAEF	South African Excellence Foundation
SAIDE	South African Institute for Distance Education
SAQA	South African Qualifications Authority
SAQI	South African Quality Institute
SAUVCA	South African Universities Vice Chancellors' Association
SERTEC	Certification Council for Technikon Education
SGBs	Standards Generating Bodies
SLA	Service Level Agreement
SNQAF	SAUVCA National Quality Assurance Forum
SSM	Soft Systems Methodology
TLEI	Department of Telematic Learning and Education Innovation
TQM	Total Quality Management
UNISA	University of South Africa
UP	University of Pretoria
VLE	Virtual Learning Environment (used in the UK synonymously with LMS)
WSL	Web-Supported Learning

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Asynchronous Learning Networks (ALN)	"Asynchronous learning networks (ALN) – an important variant within what is commonly known as 'online learning' or 'e-learning' – emphasizes computer and Internet technologies to facilitate interactive communication between an instructor(s) and students in an online environment" (Lorenzo & Moore, 2002, p. 3).
Benchmarking	Benchmarking is "a means of establishing 'good' and 'best' practice to diagnose problems and see oneself in the mirror of 'best' practice elsewhere. The central purpose is to provide an external reference for evaluating quality, cost-effectiveness of activities and processes" (Schofield, cited by Ogunrinade, 2000, p. 141).
Blended learning	Blended learning is a mixed methodology of traditional, face-to-face classroom sessions, and remote asynchronous learning sessions where material is made available and interaction takes place in a virtual learning environment (Whaymand, 2004).
Computer-based education	The use of a computer, whether standalone or networked, to manage and access large amounts of information and present it in a novel, interactive and interesting way (Volery & Lord, 2000).
Distance education **Distance learning**	• Distance education covers the various forms of study at all levels, which are not under the continuous immediate supervision of tutors present with their students in lecture rooms or on the same premises. Students nevertheless, benefit from the planning, guidance and teaching of a supporting organisation (Holmberg, 1995). • Distance learning refers to learning environments centering upon the physical separation of the learner, or a group of learners, from the source of learning (Kochtanek & Hein, 2000). • "Distance learning can be defined as any approach to education delivery that replaces the same-time, same-place, face-to-face environment of a traditional classroom" (Volery & Lord, 2000, p. 217).
Distributed learning	• Distributed learning describes a learning community with multiple sources of information, including the students themselves. "The focus is not so much on delivery mechanisms as it is on learning experiences and resources in support of student interactions and learning" (Kochtanek & Hein, 2000, p. 282). • A blended model, incorporating asynchronous, synchronous, face-to-face sessions, and a heavy reliance on technology and self-learning on the part of the student (Volery & Lord, 2000).

e-learning **e-education**	• The design, development and delivery of technology-enhanced learning experiences, using a variety of media, for example web-based (online), computer-based (multimedia CD-Roms), interactive television broadcasting, audio- and video-tape, video conferencing. • Instructional content or learning experiences delivered or enabled by electronic technology. It includes a variety of learning strategies and technologies (American Society for Training and Development, n.d.). • "e-Learning is content, tasks, problems and most importantly feedback and collaboration, mediated through a networked computer" (Reeves, 2001, workshop).
Flexible learning	The creation of student-oriented teaching and learning environments, which allow the student flexibility in terms of: • entrance to and exit from the learning programme; • modes in which teaching and learning take place; • programme compilation; • assessment methods; • time and place of study; • pace at which learning occurs. (University of Pretoria, 1998).
Formative evaluation (in Instructional Design)	"Formative evaluation is a judgement of the strengths and weaknesses of instruction in its developing stages, for purposes of revising the instruction to improve its effectiveness and appeal" (Tessmer, 1993, p. 11).
Instructional Design	The art of designing instructional interventions that promote student cognition, learning, interaction and performance - putting yourself in the shoes of the student, anticipating their difficulties, accommodating different learning styles, offering meaningful learning activities, all in order to enhance the achievement of the desired learning outcomes.
Online / web-based learning	• Use of the Internet and the World Wide Web (WWW) to deliver interactive learning experiences to students, independent of distance, time and place. This includes both synchronous and asynchronous modes of interaction. • "Any learning that uses the Internet to deliver some form of instruction to a learner or learners separated by time, distance or both. Online learning may occur among people scattered across the globe or among co-workers at a single facility via corporate intranets and local area networks (LANs). What defines online learning is the use of network communications systems as the delivery medium" (Reiser & Dempsey, 2002, p. 283).

Open learning	Open learning means that the learner has a certain degree of choice with respect to entry criteria, time, pace and place of learning. Learners can work through an open learning programme on their own, and make choices to suit their life style and learning styles (Race, 1989).
Prototype	A prototype is a "preliminary version or a model of all or part of a system before full commitment is made to develop it" (Smith, p. 42, quoted by Nieveen, 1999, p. 128).
Quality Assurance	• A planned and systematic set of procedures which are designed to build quality into a product or service, that is, to carry it out correctly the first time (Boyd, 2001b). • "Quality Assurance is about ensuring that there are mechanisms, procedures and processes in place to ensure that the desired quality, however defined and measured, is delivered" (Harvey & Green, 1993, p. 21).
Quality Control	A procedure for checking work after it is done and then correcting it if faulty (Boyd, 2001b).
Quality Management System (QMS)	• "A quality management system can be defined as a system designed to manage the continuous improvement of all processes in an organisation in order to meet customer expectations" (Meyer, cited by Fourie, 2000, p. 51). • "A quality management system is the sum of the activities and information an organisation uses to enable it to better and more consistently deliver products and services that meet and exceed the needs and expectations of its customers and beneficiaries, more cost effectively and cost efficiently, today and in the future" (SAQA, 2001b, p. 9).
Six Sigma	A recent and popular (in the USA) quality improvement methodology, based on statistical methods (Hoerl, 2002).
System	"A system is defined as a set of two or more interrelated elements of any kind. It is not an ultimate indivisible element but a whole that can be divided into parts" (Fourie, 2000, p. 52).
Telematic learning	The University of Pretoria extends the semantic definition of the word 'telematic' (*tele* – over a distance; *matic* – by means of) to incorporate a flexible learning model delivered through a variety of media and enhanced by technology (Fresen, 2002).

Total Quality Management (TQM)	A holistic management philosophy which harnesses the efforts of everyone in the organisation to achieve continuous improvement (Fresen, 2002). “It is a philosophy with a number of practical suggestions for its own self-perpetuation and implementation. Essentially it is a philosophy that can be simply summed us as ‘doing things properly’ in order to maximize competitiveness and profit” (Harvey & Green, 1993, p. 30). “Total Quality Management focuses on achieving quality and can be defined as a philosophy and a set of guiding principles that intend to meet and exceed the needs and expectations of various external and internal customers” (Steyn, 2000, p. 175). “TQM is an approach to improve the competitiveness, effectiveness and flexibility of an entire organisation. It is essentially a way of planning, organising and understanding every activity in the organisation and depends on each individual at all levels within the organisation” (Smit, 2001, p. 50).

Chapter 1

Introduction

1.1 Introduction

This study is an exploratory case study, focusing on the quality assurance of web-supported learning in higher education. Although the domains of quality assurance and web-supported learning are extremely topical, they seldom overlap (Reid, 2003). This study attempts to bring the two discourses closer together by applying quality assurance theory to the field of web-supported learning, in the context of the e-learning design and production unit at the University of Pretoria, South Africa.

Quality assurance practice has become ubiquitous, extending to the public domain of operators, managers, entrepreneurs and educators. In higher education, as in business, globalisation is an ever-present phenomenon and traditional communication and knowledge barriers are disappearing. In the global workplace, an understanding of quality has become an essential life skill that is as fundamental to the success of companies and institutions as literacy and numeracy (SAQI, 2000).

The concepts *quality, quality assurance* and *quality management* mean different things to different people. The terms are vague, ambiguous and difficult to define (Gosling & D'Andrea, 2001; Harvey & Green, 1993). Their meanings are explored in section 1.6.2, as well as in the literature review (chapter 2, sections 2.3 and 2.4). In this study, *quality* means continuous improvement in the search for excellence, *quality assurance* and *quality management* refer to initiatives (either internal or external to an organisation), which are undertaken in the quest to assure and manage quality.

In higher education, where government agencies generally initiate and implement external quality assurance mechanisms, there is seldom mutual agreement about the intentions and definitions (Hope, 2001; Vroeijenstijn, 1995). "There is a shared belief that the academics and the state 'just know' what they are talking about" (Jeliazkova & Westerheijden, 2002, p. 438).

Although there is a growing literature on quality assurance in higher education, the field is still in its formative stages of development (Baijnath, Maimela & Singh, 2001). Kistan (1999) and Van der Westhuizen (2001) concur and suggest that further initiatives are required, especially with a focus on niche areas such as distance education.

No study of the quality of learning interventions should ignore the vital and often neglected (Reeves & Hedberg, 2003) practice of *evaluation.* The purpose of *evaluating* learning materials is directly linked to ascertaining and improving their quality. This study does not evaluate learning materials directly, but incorporates user evaluation of web-supported learning, in the sense of client reaction and client satisfaction. The link between quality and evaluation is explored in the conceptual framework at the end of chapter 2, together with the theories of quality assurance, instructional systems design and systems thinking.

1.2 Problem statement and purpose of this study

In South Africa, prior to 1994, the higher education sector was fragmented, uncoordinated and unwieldy. There were 21 universities, 15 technikons and 140 teacher training colleges, within separate areas of governance (Smout, 2002). There were historically white Afrikaans institutions, historically white English institutions; historically black institutions and specialised distance education institutions. These various types of institutions demonstrated vast quality differentials in terms of resourcing, academic provision, research outputs and student access (Webbstock & Ngara, 1997).

After the nation's emergence from the apartheid era in the mid 1990's, significant attention was given to re-engineering and revitalising the education system in general and higher education in particular. Part of these transformation initiatives was a greater need for and attention to quality assurance in the higher education sector. Other transformation initiatives involve the rationalisation of degree programmes and mergers among higher education institutions.

Although the attention of national and international quality agencies has focused on quality assurance in higher education (see chapter 2, section 2.4), the *quality discourse* and the *online discourse* have had little to do with each other, for the following reasons (Reid, 2003):

- staff involved in fostering quality assurance and online delivery are usually in different organisational parts of a university (for example, a Quality Promotion Unit and a Teaching and Learning Centre, or similar);
- the *quality discourse* operates mostly at the national level (for example, national quality agencies), while the *online discourse* operates principally at the institutional or operational level;
- each discourse is a fairly recent development in higher education.

These reasons highlight the intellectual target which drives this thesis, namely the need to diminish the divide between quality assurance and web-supported learning in higher education.

The purpose of this study, therefore, is to investigate the application of quality assurance practice to web-supported learning in higher education, by searching for factors[1] and practices which contribute to improving the quality of web-supported learning opportunities provided to students.

[1] The word *factor* is used throughout in the ordinary everyday sense of the word, such as *characteristic* or *aspect*. No statistical factor analysis is implied or intended.

The research questions that were investigated during this study are given in section 1.3. The rationale (section 1.4) amplifies the need for research into the quality of web-supported learning. The beneficiaries of this study are described in section 1.5, illustrating the significance of this research.

1.3 Research questions

The emic meanings held by the participants in this case study gave rise to the issues to be investigated in the course of excavating and reflecting on the 'story' of the case (Stake, 2000). The researcher's exploratory journey is reflected on in the final chapter of this thesis.

The research problem in this case study is operationalised by the following three research questions:

1. What factors promote quality web-supported learning?
2. What factors contribute to client satisfaction (or frustration) with web-supported learning?
3. What lessons were learnt in applying standard quality assurance theory to the instructional design process for web-supported learning?

The first research question focuses on the quality of web-supported learning experiences (*products* – see section 1.7.1). It searches for factors such as pedagogical, institutional, technical and others, and synthesizes a taxonomy of factors that promote the quality of web-supported learning products.

The second research question probes the issue of *client satisfaction*, which is a fundamental tenet of quality assurance and customer relationship management (Harvey & Green, 1993; Prinsloo, 2002). This question pursues, from a client perspective, what aspects of web-supported learning provide satisfaction and what aspects need to be refined or improved. The clients in this case study are described in section 1.7.1.

The third research question applies quality assurance practice in the form of a formal, *process-based* quality management system (QMS), to web-supported learning. There is a debate in the literature (see section 2.4.1) as to whether quality assurance theory can be meaningfully applied in the field of education. The findings for this research question show that such application is possible.

The findings for the three research questions are presented in chapters 4, 5 and 6 respectively.

1.4 Rationale

While working in the field of instructional systems design, I became interested in the evaluation of e-learning interventions from the perspective of standard quality assurance theory. I discovered that much has been written on quality assurance of higher education in general (see section 2.4), but I found little application of quality assurance theory to e-learning or web-supported learning.

I was driven to explore the debate on the meaningful application of quality assurance practice to education in general (see section 2.4.1) and to e-learning in particular. I needed to work towards an understanding of what quality means in e-learning and how e-learning practitioners may approach the task holistically, considering the needs and input of all role players.

My investigation revealed six motivating calls for research into the quality of web-supported learning. The calls are presented below, beginning with international pleas and then focusing on the local scenario. This study is a direct response to these calls[2].

[2] In the paragraphs that follow, the terms *e-learning* and *online learning* are used depending on the given context and the terminology used by the respective authors.

First call: Quality in online courses

Bitter (2001) concluded a keynote address with a call to action "to articulate frameworks for quality online courses" (Bitter, 2001, keynote address). McGorry (2003) pleads for more attention to be dedicated to the nature and quality of online higher education. Zhao (2003) recommends that universities should implement a quality assurance plan aimed specifically at online teaching and learning.

Second call: Systematic use of good practices

In a study of the quality assurance audit manuals of 12 different countries, only two references were found to quality criteria for distance education and no references to such criteria for e-learning (personal communication, L.J. van der Westhuizen, 14 November, 2002). There is a need for a study on how to systematically improve the quality of e-learning opportunities. "Learning on the go and accidental use of good practices may no longer be sufficient" (Jeliazkova & Westerheijden, 2002, p. 437).

Third call: Quality assurance frameworks appropriate for Africa

In a special edition of the *South African Journal of Higher Education*, a call for more research in quality assurance in higher education was expressed, in particular for the development and establishment of quality assurance frameworks and models uniquely relevant to developing countries, particularly in Africa (Strydom, 2000).

Fourth call: Research appropriate for South Africa

The research proposal for this particular study was peer reviewed by the National Research Foundation. Their report acknowledged that the research proposals are groundbreaking, especially in the South African context (National Research Foundation, personal communication, 21 January 2003).

Fifth call: Quality assurance systems appropriate at institutional level

A report commissioned by the South African Universities Vice Chancellors' Association (SAUVCA) highlights the need for South African higher education institutions to build quality assurance systems appropriate to their own institutions (Smout, 2002).

Sixth call: Quality assurance system for web-supported learning at the University of Pretoria

One of the strategic thrusts of the University of Pretoria is *quality* as emphasized by the Vice Chancellor:

> In order for the University of Pretoria to become the university of choice for academics, students, parents and employers, we need to identify a powerful differentiating factor. *Quality* must become such a differentiating factor for the University of Pretoria - quality of academic work, quality of client service, quality of student life, quality of the people who emerge as graduates. Quality is not easy to achieve, nor easy to sustain (C.W. Pistorius, public communication, 5 February 2002, quoted with permission).

The six calls above reflect the need for institutional self-evaluation with respect to the quality of the learning opportunities offered to students, with particular emphasis on how to enhance the quality of web-supported learning.
This international need has prompted the establishment of the European Quality Observatory (EQO)[3], an online database of metadata relating to quality approaches in e-learning (Hildebrandt & Teschler, 2004).

This study directly addresses the pleas described above in that it researches the self-evaluation of a support unit at a higher education institution, with regard to continuous improvement of web-supported learning.

[3] Publications about the EQO emerged in September 2004 after the completion of my study. They are reflected on briefly in chapter 7, section 7.3.2. The recommendations from this study are registered in the EQO, thus promoting its generalisability.

1.5 Beneficiaries of this study

The following parties are beneficiaries of this study:

- the University of Pretoria, which will be able to offer a case study on the application of quality assurance theory to web-supported learning;
- other higher education institutions, in which support units will be able to apply the factors identified to enhance the quality of web-supported learning;
- the Higher Education Quality Committee (HEQC) in South Africa, which will be able to draw on the factors identified to use as criteria for the quality assurance of web-supported learning;
- the academic community in the field of quality assurance of web-supported learning in higher education.

The significance of this study is that it aims to provide the academic community with an understanding of various factors, practices and mechanisms to enhance the quality of web-supported learning in higher education. The study hopes to clarify misconceptions and close gaps in our understanding about what quality means in this context, how quality assurance theory may be applied to web-supported learning and how evaluation and client feedback may be used to promote continuous improvement.

1.6 Terminology

This section clarifies the main terminology used in this thesis. See the List of Terminology in the front matter of this thesis for detailed definitions of these and other terms.

1.6.1 *Learning* terminology

The term *e-learning* embraces a variety of electronic delivery media, for example web-supported, multimedia, interactive television, virtual classrooms, video conferencing, etc. This study focuses on *web-supported learning*, as a subset of *e-learning* (see Figure 1.1).

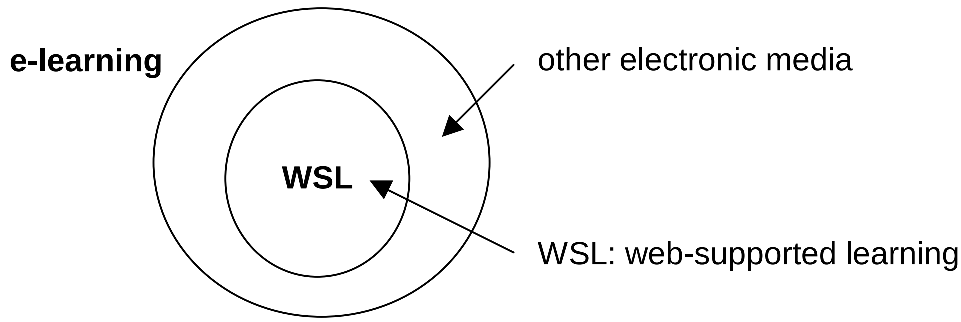


Figure 1.1: Web-supported learning is a subset of e-learning

In this study, the term *e-learning* is used to indicate the broader field. The term *web-supported learning* is used to indicate the use of the Internet to enhance and support learning. The term *web-supported learning* is preferred over *web-based learning (WBL)* since the learning model under consideration is a blended one, which includes varying components of contact time and other delivery media. The learning model under consideration is *not* traditional distance education using online technology. According to Laurillard (1993), a range or blend of teaching and learning media is likely to provide the most effective learning environment. Harris and Yanosky (2004) report that internationally, the use of *supplemental* e-learning is notably higher than pure distance e-learning, amongst both faculty members and students.

Other terms are often used to refer to the use of the Internet to enhance and support learning, for example, *online learning, technology-enhanced learning* or *internet-based distance learning* (American Federation of Teachers, 2000); other variations are *technology-mediated instruction* or *computer-mediated communicatio*n. Some authors use terminology such as *asynchronous* *learning networks* (Bourne & Moore, 2003) or *interactive learning systems* (Reeves & Hedberg, 2003).

1.6.2 *Quality* terminology

This section clarifies various terms associated with the quality movement. The background of the quality movement and the theory of quality assurance are reviewed in detail in chapter 2.

Quality control is generally described as a procedure for checking work after it is done and then correcting it if faulty, as in checking the functionality of a product at the end of the production line (Boyd, 2001b). In web-supported learning this could be interpreted as ensuring technical adequacy and robustness of the web-supported course - does it function as it should, without technical hitches?

Quality assurance on the other hand, attempts to prevent faults and inadequacies from occurring in the first place. Quality assurance can be defined as "a planned and systematic set of procedures which are designed to build quality into a product or service, that is, to carry it out correctly the first time" (Boyd, 2001b, workshop).

A *quality management system*[4] (QMS) is a way of "formally ensuring that an organisation is consistently in control of the quality of product or service which it provides to its customers. It is formal because it consists of a system of controlled, documented processes and procedures which can be audited" (Boyd, 2001a, p. 2). For the purposes of this study, I adopted the South African Qualifications Authority (SAQA) definition of a quality management system: "A QMS is the sum of the activities and information an organisation uses to enable it to better and more consistently deliver products and services that meet and exceed the needs and expectations of its customers and

[4] Note that the word *system* is used in its broad sense, not necessarily implying a *computer* system (see *systems theory*, Appendix B3).

beneficiaries" (SAQA, 2001b, p. 9). This definition clearly implies the use of the word *system* in its broadest sense. The theory of systems thinking is presented in the theoretical framework in chapter 2.

The concept of *Total Quality Management* (TQM) is a holistic management philosophy, which harnesses the efforts of everyone in the organisation to achieve continuous improvement and ongoing innovation. Quality is a people business and without the commitment and involvement of every manager and every worker, it is unattainable. Total Quality Management is the ultimate organisational goal for which to strive. It is doing the right things, right first time, on time, every time (commonly used phrases, quoted by Boyd, 2001b).

Elton (1992) provides a succinct synthesis of quality terms by formulating the following rule of thumb:

- Quality assurance (QA) is the quality 'A's: accountability, audit, assessment (external locus of control);
- Quality enhancement (QE) is the quality 'E's: evaluation, enhancement, empowerment, enthusiasm, expertise and excellence (internal locus of control).

The reference above to either an external or internal locus of control highlights the balance between external accountability and internal self-evaluation respectively. This tension is known in the quality debate as the *Scylla and Charybdis* dilemma (Vroeijenstijn, 1995) (see section 2.4.1).

The current section presented definitions of standard quality assurance terminology. Chapter 2 investigates various philosophical interpretations of the concept *quality*. Following that investigation, my interpretation of quality as applied to web-supported learning is given in my conceptual framework (section 2.8).

1.7 Context

The context of the research problem is described in this section. The unit of analysis for this case study is the Department of Telematic Learning and Education Innovation (TLEI) at the University of Pretoria (UP), South Africa (see section 3.3: *Research Design*). The institutional context is presented here, followed by the national and international context in terms of three knowledge domains: quality assurance, higher education and web-supported learning.

1.7.1 Institutional context

The University of Pretoria is the largest higher education contact institution in South Africa, with approximately 33 000 students and 3 000 academic staff members (South Africa, 2001). The University's core considerations in determining priorities are internationalisation, diversity, relevance and *quality* (University of Pretoria, 2002).

The research culture at the UP contributes to the ongoing quest for quality improvement, particularly in e-learning. Since the introduction of e-learning at UP in 1998, the following studies[5] have considered different aspects thereof in the context of the University:

- Lazenby (2002) researched the establishment of a virtual campus which offers students and lecturers electronic access to support services and online academic courses;
- Greyling (2003) evaluated the use of WebCT® to support e-learning in the Engineering faculty, including a SWOT (strengths-weaknesses-opportunities-threats) analysis on the use of WebCT[6];

[5] In the list that follows, the terms *e-learning*, *web-based* and *online* learning are used depending on the given context and the terminology used by the researchers.

[6] WebCT®: Web Course Tools is a registered trademark. The symbol ® is assumed from now on and is only used with respect to WebCT® in the List of References.

- De Bruyn (2003) used the seven pedagogical principles of Chickering & Gamson (1987) as criteria to evaluate student perceptions of their web-based courses;
- Delport (2003) examined the use of web-supported learning in mathematics teaching and learning.

TLEI is a service department which was established at the UP in 1997. The semantic definition of the word 'telematic' (tele - over a distance, matic - by means of) is interpreted as flexible learning delivered through a variety of media and enhanced by technology. TLEI is the *case* on which this study is based.

TLEI provides support to academic staff members who wish to embrace education innovation, including computer-assisted assessment, multimedia, web-supported learning, interactive television and various other delivery alternatives and combinations. Educational consultation services are offered, as well as a team approach to the instructional design of learning materials. Lecturer training in web-supported learning is provided, as well as student training in the use of the learning management system, WebCT. Technical support is available to lecturers and students.

Standard quality assurance theory refers to *processes, products* and *customers* (clients) (SABS, 2000). Processes, products and clients in the context of this study are shown in Figure 1.2. The interpretation of the diagram is given after the figure.

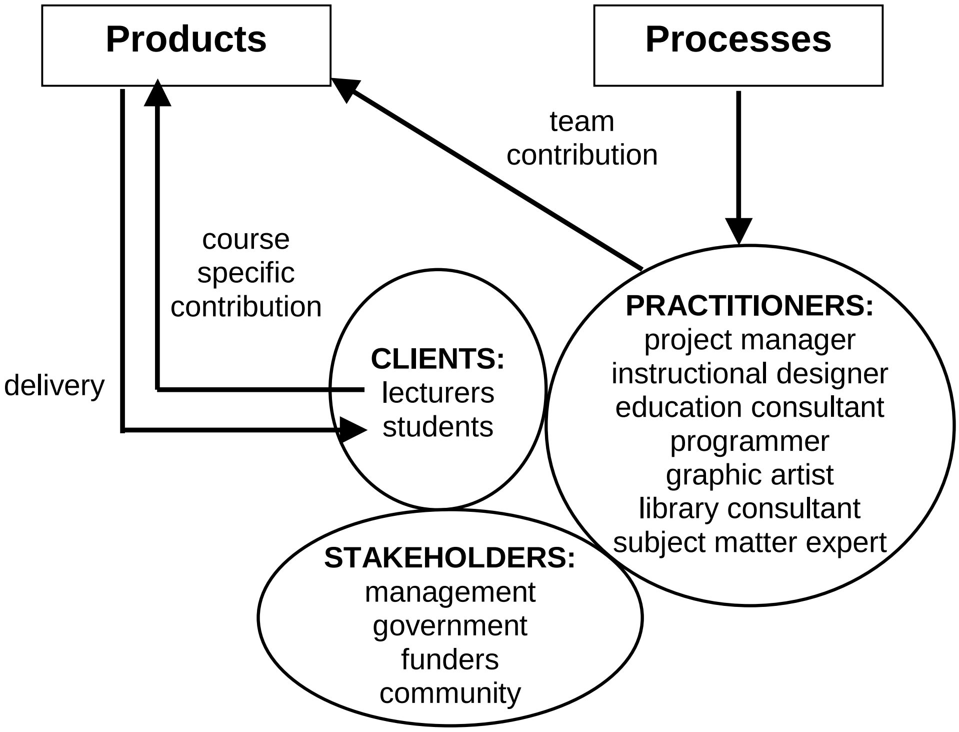


Figure 1.2: Role players in web-supported learning, in terms of products and processes

The direct *clients* of web-supported learning are the academic staff (lecturers) who wish to adopt education innovations in the form of technology-enhanced delivery and facilitation of learning materials. The ultimate clients are the students taking web-supported courses that have been designed, developed and implemented by TLEI. Stakeholders with an interest in the quality of web-supported learning are management of the University, government quality agencies such as the HEQC and SAQA, funders who may contribute to development costs and the broader community, such as parents and employers.

The *product* with respect to web-supported learning is defined to be the *learning opportunity*. The learning opportunity incorporates all processes, materials, skills and professional expertise required to develop, deliver and facilitate a web-supported course, in order to provide added value for students (Fresen & Boyd, 2002).

The *process* of instructional design is generally based on the team approach (Gustafson & Branch, 2002; Smith & Ragan, 1993). Teams within the e-learning production unit in this case study typically consist of the practitioners indicated in Figure 1.2. Complicated inter-dependencies arise between various team members, whose contributions to the instructional design process may be of varying quality.

1.7.2 National and global context

Three broad knowledge domains describe the context of this study, as shown in Figure 1.3:

1. quality assurance;
2. higher education;
3. web-supported learning.

Each domain is discussed briefly below the figure, in terms of national or global issues, as applicable.

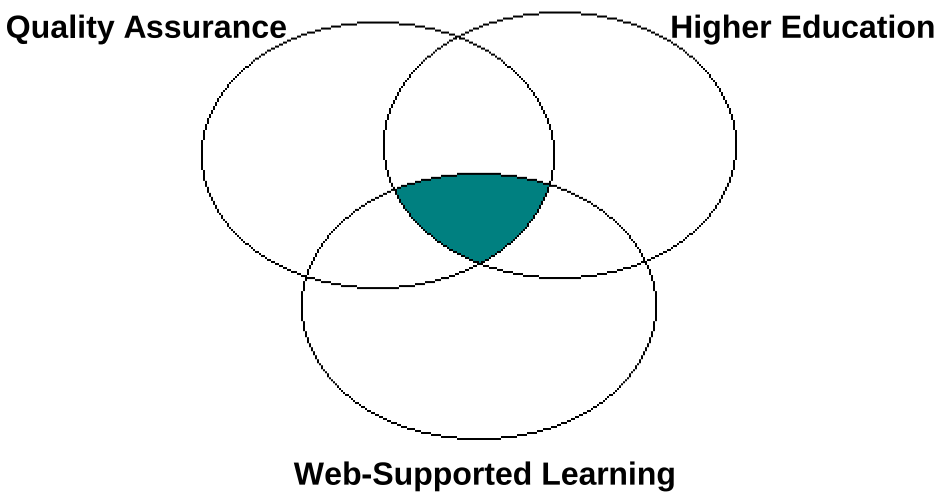


Figure 1.3: Knowledge domains forming the context of this study

The shaded area in Figure 1.3 represents the research problem for this study, namely quality assurance of web-supported learning in higher education.

1.7.2.1 Quality Assurance in general

The quality movement has its origins in industry and commerce in Britain and the United States in the early part of the twentieth century. Industrial organisations committed to national standardisation began in Britain and by 1932 had spread to twenty-five countries (Lewis & Smith, 1994). The factory system and the first assembly lines were attempts to increase productivity and reduce costs.

The founding fathers of the quality movement (for example Taylor, Shewhart and Deming) set out to find ways to eliminate wastage and increase production (Lewis & Smith, 1994). Taylor was particularly interested in applying scientific management techniques to improve productivity in factories. However, his emphasis on the assembly line and the division of labour meant that management held the monopoly on knowledge and skilled workers were not appreciated for their craft (Whaymand, 2004). Taylor's defenders claim that his work was twisted and misapplied, yet today the term "Taylorism" has the connotation of machine over man and productivity at all costs (Gabor, 1990).

Perhaps the most well known expert in Quality is W. Edwards Deming, an American statistician whose career began by trying to understand the effects of variation in managing change in large corporations. Deming's 'fourteen principles' are still quoted in the field today and some educators have attempted to apply them in the field of education (Brennan & Shah, 2000; Lewis & Smith, 1994), with varying degrees of success and acceptance.

In Japan, the Union of Japanese Scientists and Engineers (JUSE) was dedicated to working with American and Allied experts, such as Deming and Juran, to help rebuild Japan after World War II. The Japanese advocate a collaborative, active approach to total quality control that embraces a dynamic, ever-changing definition of quality (Gabor, 1990).

The term *quality control* was coined by Armand Feigenbaum, who wrote a now famous 850-page book on the subject in 1951 (Feigenbaum, 2002). Feigenbaum advocated a special cohort of quality engineers, as opposed to the collaborative approach of the Japanese. Another American quality expert, Philip Crosby, maintained that "quality is free" (Macdonald, 1998, p. 8). In other words, if you do not allow any bad components on your production line, you do not need to spend money on expensive inspections, rejections and rework. This has become known as the concept of *zero defects*.

A recent development in the field of quality promotion is the Six Sigma methodology (Hoerl, 2002), which is a statistically based improvement methodology to pursue quality as a mechanism for benefiting companies and their customers. It appears set to become the *new corporate religion* (Faltin, 2002). Six Sigma has been applied in the fields of manufacturing, engineering, services, health and financial industries.

The above historical overview illustrates that the quality movement has a long history in commerce and industry. Various thinkers in the field have postulated principles, elements, steps and critical success factors in achieving quality and boosting productivity.

In the field of higher education, we can benefit from incorporating this theory, where applicable, into our own practice of quality management. TLEI has used such principles to synthesize a customised quality pledge, which incorporates the notions of fitness for purpose, client satisfaction, cost effectiveness, defined standards, negotiated time frames and continuous improvement of our processes and functions (see Appendix F10).

1.7.2.2 Higher Education

Educational institutions tend to be conservative and resistant to change, both internationally as well as in South Africa (Fullan, 2002; Papert, 1992). However, over the past decade, the field of higher education has experienced a period of dynamic change, growth, reflection and self-evaluation, both nationally and internationally (Hope, 2001; Newton, 2002; Smout, 2002).

Some of the factors currently influencing the higher education landscape are globalisation[7], massification, client needs and expectations, scarce resources, rapid technological change and increased calls for quality assurance.
Each of these thrusts is described briefly below.

Globalisation

Today it is possible for prospective students to be particular in selecting from amongst high profile educational institutions around the globe (Baijnath & Singh, 2001; Randall, 2002). The increased competitiveness of this environment is forcing academics and institutions to demonstrate the quality and effectiveness of their academic programmes and research initiatives (Barrow, 1999; Hay & Herselman, 2001; Van der Westhuizen, 2001).

Massification

Higher education is no longer the preserve of small numbers of privileged students, as it was in past centuries. Society today demonstrates an increased interest in and demand for higher education qualifications, which leads to ever-increasing student numbers. This is commonly referred to as the 'massification' of higher education (Hope, 2001; Jonathan, 2000). The phenomenon of lifelong learning is attracting a wider variety of potential and continuing students into higher education (Collis & Moonen, 2001).

Client needs and expectations

The burgeoning student clientele brings increased expectations on behalf of students as well as other stakeholders such as parents, employers, funders and governments (Randall, 2002; Van Aswegen, 2001). In South Africa, these expectations include issues of access and of redressing the inequalities and disadvantage of the past (Muller, 1997; Smout, 2002).

[7] Critical theorists would question the moral issues behind some of the thrusts described, for example, an anti-globalisation movement exists. However, that debate is beyond the scope of this thesis.

Scarce financial and human resources

Although there has been an explosion of enrolment figures at higher education institutions in both developed and developing countries, the capacity to finance such expansion has not kept pace (Barrow, 1999; Newton, 2002; White, 2000). Not only are financial resources insufficient, but academics are suffering under the burden of additional loads, and often resent the 'quality burden' thrust on them (Gosling & D'Andrea, 2001; Kourie, 2001).

Rapid technological change

Today distance learning is enabled through technological advances, thus changing the higher education landscape and resulting in increased mobility of students (Herrington, Herrington, Oliver, Stoney & Willis, 2001). More than simply the availability of technology in higher education, people in general are becoming more comfortable with the use of the Internet in everyday life and its logical extension to the learning environment (Collis & Moonen, 2001). Even in developing countries, if electricity or access to computers appear to be barriers, satellite access and mobile learning (m-learning) are offering solutions (Wilkinson, Wilkinson & Nel, 2001).

Calls for quality assurance

Calls for quality assurance in higher education institutions are prevalent as governments evaluate both the efficiency and effectiveness of university programmes (Vroeijenstijn, 2001a). These include the need for self-evaluation as well as evidence of improvement and accountability for the use of public funds (Leckey & Neill, 2001; Sursock, 2001). (See section 2.4.1: *Perspectives on the debate*). Quality assurance agencies in South Africa and their recent initiatives are summarised in chapter 2, section 2.4.4.

The pressures described above illustrate the need for higher education institutions to pursue active involvement in quality assurance practices, in order to belie their image of 'ivory tower' exclusivity (Vroeijenstijn, 2001a). Traditional evaluation methods, such as the external moderation of examinations, are no longer sufficient to guarantee the quality of university programmes.

The trends described above are topical and burgeoning in higher education today. This research responds to calls for quality assurance and self-improvement in the provision of e-learning and seeks factors to promote effective (quality) web-supported learning.

1.7.2.3 Web-supported learning

Computer-based education (CBE) is not a new phenomenon. Alessi and Trollip (1991) give a short history of educational computing and describe mainframe systems, such as PLATO, which began in 1960. Reeves and Hedberg (2003) give an overview of older and newer electronic systems to deliver interactive learning.

In South Africa in the late 1980s, various universities, such as the University of the Western Cape, Unisa and Rhodes University, made the move from proprietary mainframe systems for CBE to local area networks (personal experience; Lippert, 1993). In the last decade, rapid technological advances in information and communication technologies (ICTs), such as the ubiquitous presence of the Internet, have made education a global commodity, available in student homes and places of work (Randall, 2002).

Today most universities internationally and in South Africa, are implementing e-learning and attempting to exploit the potential of web-based learning (Mayes, 2001). South African universities currently involved in e-learning include at least the following: Pretoria, Cape Town, Stellenbosch, Natal, Potchefstroom, Free State (e-Degree) and Rand Afrikaans University. This can be seen from papers presented at national conferences, such as the annual World Wide Web (WWW) conference, the biennial Conference on Information Technology in Tertiary Education (CITTE) and the WebCT users' forum.

However, e-learning is generally pursued for economic, political or strategic reasons, such as broadening access to higher education (Czerniewicsz, 2004), or supporting students with historical or physical special needs. Seldom is the driver the quest for quality, as can be seen from calls made for research on the quality of e-learning (see section 1.3: *Rationale*). This study attempts to apply standard quality assurance theory to the field of web-supported learning in higher education, in the context of the University of Pretoria, which claims *quality* as one of its strategic drivers.

1.8 Basic assumptions of this study

In order to clarify the circumstances and practices in the e-learning support unit at the University of Pretoria, certain assumptions are described below, together with their implications for this study.

1. The TLEI team believes strongly in 'pedagogy before technology', i.e. technology is used as a supportive tool to enhance the learning experience. The technology should be transparent to the learner in order to facilitate learning (McGorry, 2003). The justification for embedding technology in a learning programme depends on the nature of the subject, the intended learning outcomes and the skills, needs and abilities of the learners. The importance of the underlying pedagogy prompted research question 1 in this study.

2. Against the background of the quality debate (see chapter 2), we cannot expect to resolve issues of academic excellence and quality by a single 'perfect' quality assurance design effort or quality management system (Jeliazkova & Westerheijden, 2002). The questions researched in this study are part of the journey of increasing awareness of the importance of establishing a quality culture and genuine self-evaluation, whether at institutional, departmental or programme level.

3. In the light of the flexible, blended learning model advocated by TLEI, web-supported courses at the University of Pretoria generally do not contain extensive subject-specific content. This is provided by face-to-face sessions and other media, for example, text books, learning guides,

CD-Roms or content-rich resources on the Internet. By implication, this study is concerned with the quality of web-supported components of a learning programme and not with that of supporting learning materials.

4. Lecturers are responsible for the quality of the content and the language in web-supported learning materials (see *Service Level Agreement* – chapter 6 and Appendix F9).

1.9 Limitations of this study

In every study, certain decisions need to be taken that may limit it from a methodological or theoretical point of view. Such decisions usually enhance the validity of the study and ensure that it is realistic from a practical point of view (Vithal & Jansen, 1997). This study has limitations in the form of constraints, items outside its scope, as well as limitations to the generalisability of the findings. These types of limitations are discussed in turn below.

1.9.1 Constraints

This study is subject to two constraints:

1. The technical infrastructure for streaming media and other emerging technologies, such as Internet access via satellite and mobile learning, is still in the early stages of investigation at the University of Pretoria. By implication, this study is not concerned with the quality of content-rich multimedia materials.

2. Although WebCT is a well-researched and well-established software platform for online learning (WebCT®, 2002), instructional designers are limited in some respects by the functionality provided by the system. As a result, the pedagogical quality of web-supported courses may be constrained by the dependence on a structured learning platform.

1.9.2 Items outside the scope of this study

This study does *not* do the following:

- defend the value of, nor promote, web-supported learning as a delivery option in higher education;
- consider other e-learning delivery media besides web-supported learning, for example multimedia, interactive television, video conferencing, etc.;
- compare the effectiveness of web-supported learning with traditional face-to-face learning (Russell's (1997) meta-analysis showed that from the 1960s until the date of his study, such comparative studies found *no significant differences* in treatment);
- investigate the quality assurance of the University of Pretoria degree programmes, as required by the HEQC;
- investigate institutional auditing, accountability and self evaluation, although the interventions in this study make a strong contribution to departmental self evaluation;
- investigate quality assurance models of governance in South Africa (Mosia, 2002, has completed a doctoral study on this topic);
- discuss political or economic aspects of quality assurance in South Africa.

1.9.3 Generalisability

This study is based on the practice of web-supported learning at one institution: the University of Pretoria (UP), South Africa. Therefore, although international literature has been consulted in depth, this study may have limited generalisability to other e-learning situations, due to their particular contexts. Limited generalisability is a characteristic of exploratory case study research, which seeks to deepen understanding of the specific case (Stake, 2000).

The UP is not a typically 'developing' or 'disadvantaged' university. It was one of the first users of WebCT in Africa and is currently piloting the use of new technologies (such as synchronous audio platforms and video streaming via satellite) to better support and facilitate web-supported learning. UP is second in Southern Africa in terms of the campus-wide application of WebCT (number of web-supported courses offered) (A. van der Merwe, personal communication, 5 May 2003).

Therefore the findings of this study may be more generalisable to equivalent higher education institutions, nationally and internationally, rather than to typical universities in developing countries. Although some aspects of the findings of this study may be generalisable to different e-learning scenarios, it is not known if or how they may need to be adapted for pure distance education.

1.10 Overview of this thesis

The structure and content of this thesis is described below. A graphic overview of the structure of the thesis is given in Figure 1.4.

- Chapter 2 reviews and critically analyses the literature in terms of the three research questions, culminating in the conceptual framework for the study.
- Chapter 3 presents the research design and methodology of this study.
- Chapters 4, 5 and 6 present the data from the primary research and describe the findings of the study in terms of research questions 1, 2 and 3 respectively.
- Chapter 7 'closes the feedback loop' by making recommendations for providers of web-supported learning at higher education institutions, based on the findings from this study. It suggests topics for further research and provides reflection on the exploratory journey and lessons that were learnt.

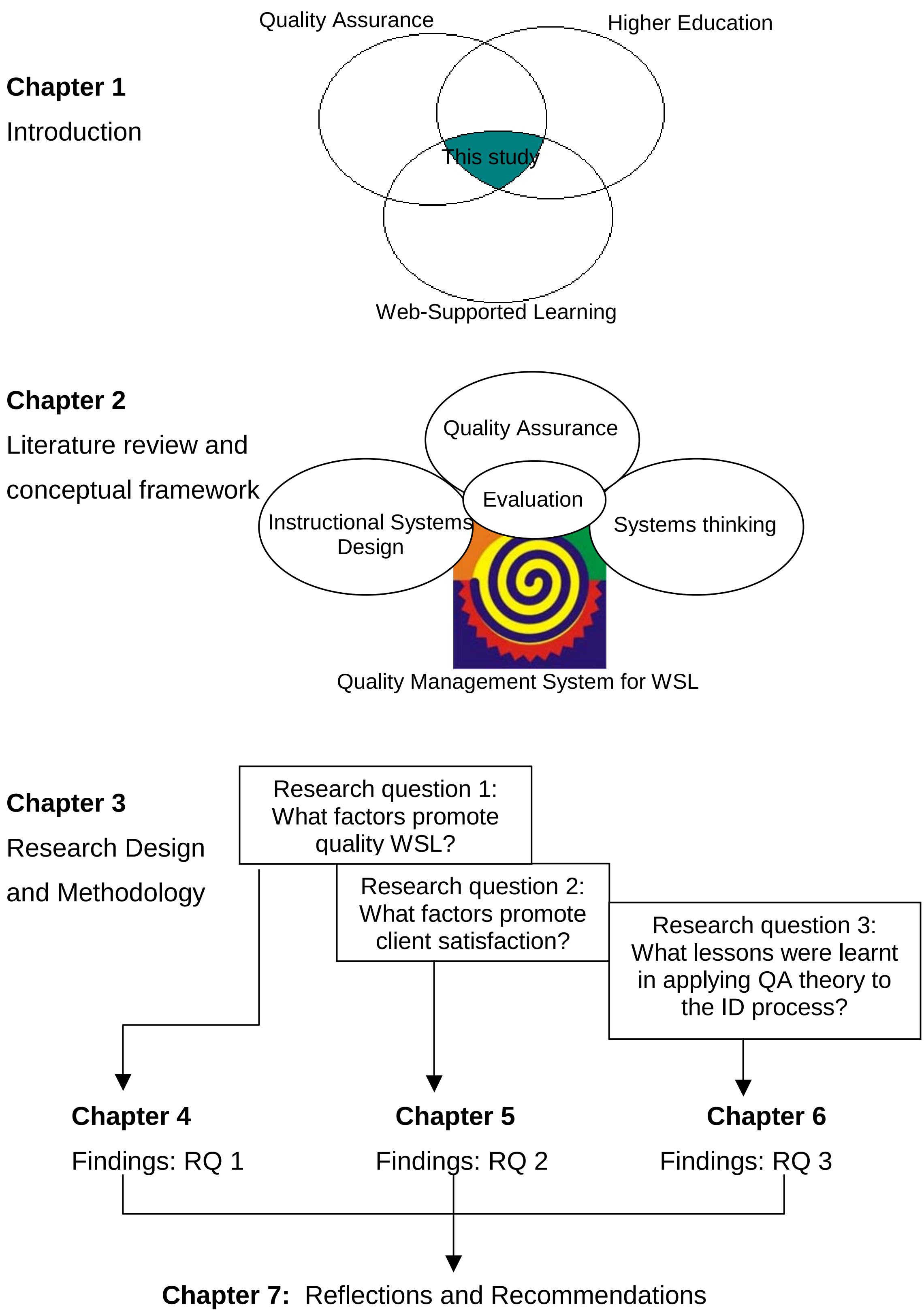


Figure 1.4: Overview of this thesis

Chapter 2

Literature Review

2.1 Overview of this chapter

Much has been written about quality assurance in general and its application to the field of higher education. This chapter reviews the literature with respect to quality in general (section 2.3) and the application of quality assurance to higher education (section 2.4), with particular reference to higher education in South Africa (section 2.4.4).

Guided by the three research questions in this study, the review then investigates what research exists in addressing factors and practices to promote quality web-supported learning (WSL) (section 2.5), client satisfaction with web-supported learning (section 2.6) and quality management systems for web-supported learning (section 2.7). The chapter concludes with the application of the theories of quality assurance, instructional systems design and systems thinking to produce the conceptual framework for this study.

Figure 2.1 is a diagrammatic representation of the structure of this literature review.

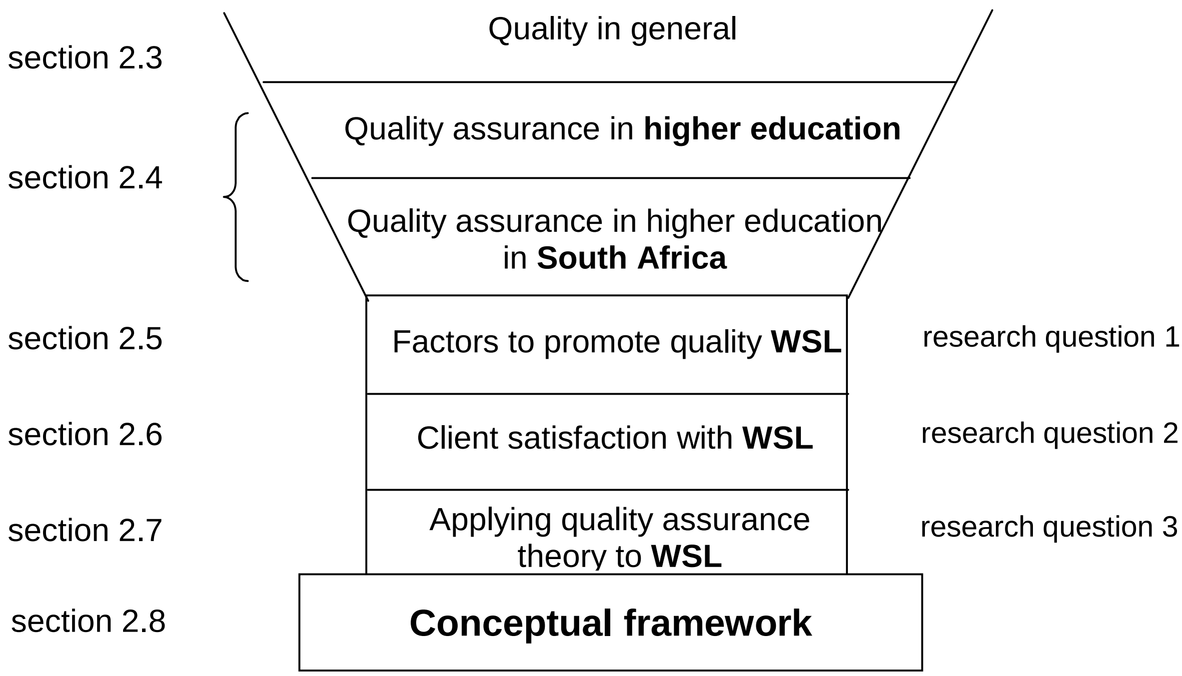


Figure 2.1: Plan for the literature review

2.2 Literature sources

An extensive literature search was undertaken, which includes a variety of reliable and up-to-date reference material. The sources include books, paper-based journals, electronic journals, relevant databases (*ERIC*, *ISAP, SACat*), conference proceedings and websites of international universities and quality assurance agencies. Peer-reviewed and/or accredited journals were sought wherever possible. The bibliographies of journal articles provided a rich source for further investigation.

I used the search phrase "web and learning and quality" to search the databases of current and completed research in South Africa (*Sabinet* and *Nexus*). Only one study close to my research problem was found: Herman (2001): *The applicability of international benchmarks to an Internet-based distance education programme at the University of Stellenbosch*. This M.Phil study attempted to apply 24 international benchmarks (Institute for Higher Education Policy (IHEP), 2000) to a full distance programme offered via WebCT. Herman (2000) concluded that the 24 benchmarks could not be applied in the University of Stellenbosch context. He suggested that the University of Stellenbosch could develop their own benchmarks, taking international guidelines into account. My study explores such guidance in the form of factors and practices to promote quality web-supported learning in higher education institutions.

2.3 Quality in general

A brief historical overview of the *quality movement* was given in chapter 1 (section 1.7.2.1). This current section reviews the literature in terms of the common understanding of the construct *quality* and its associated philosophies. An interpretation of the meaning of quality for this study is given in the conceptual framework at the end of this chapter.

The concept *quality* lends itself to varied and ambiguous interpretations (Harvey & Green, 1993; Herselman, Hay & Fourie, 2000; Vidovich, 1999). Most sources in the literature avoid defining quality *per se* (Vidovich, 1999). "Quality" is a popular term and people tend to rely on intuitive connotations of the everyday word, for example *quality of life* or *quality products* Pirsig (1976), in his popular book *Zen and the Art of Motorcycle Maintenance*, presents a lengthy metaphysical argument that although quality exists, it cannot be defined - one intuitively *knows* what quality is. His character in the book, the scholar Phaedrus, states: "I think there is such a thing as Quality, but as soon as you try to define it, something goes haywire. You can't do it" (Pirsig, 1976, p. 209). Eventually Pirsig concludes that Quality is all-encompassing: "Quality is the IT, it is the everything, it is in anything, or it's not there at all" (Prinsloo, 2002, quoting Pirsig).

At the other extreme of practicality, the British Standards Institute (BSI) defines quality as "The totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs" (BSI, 1991, cited by Sambrook, Geertshuis and Cheseldine, 2001, p. 422).

Harvey and Green (1993) identified five notions of the meaning of quality which are summarised below, drawing also on Herselman et al. (2000). The latter authors synthesized Harvey and Green's ideas with other relevant literature. I have synthesized Harvey and Green's five interpretations of quality in diagrammatic form, with guiding notes (see Appendix A).

- Quality as **exceptional**: excellence, exceptionally high standards or exceeding minimum standards.
- Quality as **perfection or consistency**: the common *zero defects* philosophy of quality based on the production line, whether it is motorcars, computers or whatever consumer items are being produced.
- Quality as **fitness for purpose**: the extent to which a product or service fits its intended purpose, is produced on time and within budget.
  In a service industry like education, this idea should be extended beyond meeting customer requirements, to offering *customer delight* (Harvey & Green, 1993; Bisschoff & Bisschoff, 2002).
- Quality as **value for money**: the concept of accountability to funders and customers. Value, affordability, efficiency and effectiveness become dominant factors in providing services and products.
- Quality as **transformation**: enhancing the performance of students, regardless of their initial level of competence – providing the conditions for a student to be transformed by a life-changing and personally enriching learning experience.

I suggest a sixth philosophy of Quality, namely:

- Quality as **innovation**: customers must be loyal and return again and again for leading-edge products and services. Ultimately management should embrace holistic initiatives to anticipate the customers' needs and wants and in so doing, "make the leap from continual improvement to continual innovation" (Gabor, 1990, p. 10).

Having considered various interpretations of the meaning of quality in general, the next section focuses on the application of quality assurance practice in the field of higher education.

2.4 Quality Assurance in higher education

This section presents an argument that the philosophy of quality assurance may be applied in a sensitive way in the field of education (section 2.4.1). An overview of the emergence of quality assurance as an issue in higher education, together with reasons for its rise to prominence, is given in section 2.4.2. Current trends in Europe, the United Kingdom, the United States of America, Australia and New Zealand are summarised in section 2.4.3.

The context of quality assurance in higher education in South Africa follows in section 2.4.4.

2.4.1 Quality Assurance and education: perspectives on the debate

Education is a dynamic and people-centered activity, with complex relationships between various roleplayers, such as quality assurance agencies, education providers and consumers. My reading of the literature has directed me to synthesize various viewpoints on a debate, which addresses two dilemmas:

- Can educators hope to implement quality assurance practice, which has its origins in the production line and automation of the industrial age?
- How do education providers reconcile internally driven self-improvement initiatives with external demands for accountability?

Each of these dilemmas is described briefly below. For ease of reference, I will refer to the first dilemma as the *industry – education* dilemma and the second one as the *internal improvement – external accountability* dilemma. After describing each dilemma, I give my personal viewpoint as to how the opposing ideas may be meaningfully interpreted in higher education.

With respect to the *industry – education* dilemma, there are various proponents on both sides of the argument. I review first some of the sceptics, followed by the views of those who are of the opinion that quality assurance practice may be meaningfully applied in the field of education.

A provocative viewpoint is expressed by James Beaton, who objects strongly to the introduction of quality assurance in the form of performance indicators in Canadian higher education:

> The rhetoric of accountability and quality is often vague and lacks substance. The built in ambiguity is likely designed to create the appearance of a strong movement around a phrase that is empty of meaning. The fact that the "quality" defining process is structured in such a way as to favour political and business interests and is largely undemocratic will lead to conflict itself. Total Quality Management and Quality Assurance has [*sic*] the potential to disrupt university traditions and culture. (Beaton, 1999, online reference)

Srikanthan and Dalrymple (2002) maintain that attempts to apply quality management models from industry have not been successful, largely because Total Quality Management (TQM), for example, addresses *service* areas of an organisation and therefore is not applicable to the core business of a university, namely education.

On the other hand, McAdam and Welsh (2000) reviewed the literature on the European Model of TQM and concluded that the business excellence model (BEM) provides an integrated map of management issues that is valued by most of the 17 further education colleges in Northern Ireland. The South African experience among the former technikons has shown that industrial models and methods may be successfully applied in the higher education sector (personal communications with Pretoria Technikon[1] – E. Genis, April 2001; Witwatersrand Technikon – B. Smit, April 2001 and Technikon SA – N. Cele, June 2004).

Newton (2002) presents six lessons learned in the area of organisational change and quality policy implementation. As a result of these lessons, he cautions that because quality is a contested issue, managers who continue to

[1] These were the names of the institutions at the time of the communication, before the mergers of 2004.

preach forms of managerialism (i.e. *Taylorism*) will not obtain commitment from their staff in terms of quality assurance policy or systems.

A viewpoint which recognises the challenges, but is sensitive to the issue of ownership, is expressed by Fourie, van der Westhuizen, Alt and Holtzhausen (1999). They maintain that universities need to establish a quality culture and quality assurance systems in such a way as "to promote a sense of ownership among all stakeholders in the institutuion – academic, administrative and professional staff, students, and funders" (p. 37). Although the phrases used in this quotation may be typical of the rhetoric used in the first decade of education transformation in South Africa, they represent noble ideals for which it is still worth striving.

Stevens (1996) maintains that there should be no problem in applying business theory and strategies in the field of education, as long as one does not lose track of the human and personal approach. Even Taylor, the architect of the production line and division of labour, realised the importance of human interaction and relationships, before he died in 1915:

> Taylor found out, the hard way, the importance of the co-operative spirit. He was strictly the engineer at first. Only after painful experiences did he realise that the human factor, the social system and the mental attitude of people in both management and labor had to be adjusted and changed completely before greater productivity could result. (Lewis & Smith, 1994, p. 44)

My perspective on the *industry – education* dilemma is that some of the strong words expressed by the sceptics are rather one-sided and alarmist. Insensitive and undemocratic management practices will surely not gain favour with university communities. I identify strongly with the philosophy that establishing a quality culture and identifying the benefits to be gained will result in a successful application of quality assurance practice in the field of higher education.

All roleplayers need to be gently initiated into a quality culture, in the interests of continuous, meaningful improvement in web-supported learning. Quality *control* aspects should not be overemphasized at the expense of the value-added aspects of quality assurance. As quality practitioners, we must not lose sight of the social and personal nature of our service to lecturers and students. Service quality demands commitment and sensitivity on the part of those offering the service if we are to entice customers and sustain customer loyalty (Prinsloo, 2002).

Indeed, this sensitivity *has* begun to manifest itself in the field of quality assurance in higher education. There has been a perceptible shift from a focus on regulation and control, to improvement and self-evaluation (Baijnath, Maimela & Singh, 2001).

The above observation leads into the second dilemma of the debate, namely the *internal improvement - external accountability* dilemma. This dilemma is well known and frequently mentioned in the literature (Baijnath et al., 2001; Randall, 2002; Singh, 2000). In the case of this dilemma, there are not necessarily opposing views at either end of the continuum, but rather an awareness of the extremes and the need to balance both sides of the scales. Boyd and Fresen (2004) argue that internal improvement and external accountability are not mutually exclusive opposites but are both imperative, in relative proportions, for a successful institutional quality assurance system.

The *internal improvement - external accountability* dilemma is vividly described by Vroeijenstijn (1995) as the Scylla and Charybdis dilemma: approaches which concentrate on internal improvement will be doomed to be shipwrecked against the cliffs of the Scylla because of external demands for accountability. On the other hand, by overemphasizing accountability, a system will disappear in the whirlpool of the Charybdis, because internal improvement and commitment will be hindered.

To avoid thrashing about between Scylla and Charybdis, it appears to me that the sensible option is to pursue the ideal of a quality culture, which in education, refers to "the totality of the student learning environment" (Elton, 1993, p. 140). As educators, we should continually ask ourselves fundamental self-evaluation questions, such as “What am I trying to do or achieve? Why am I doing it in this way? What is the context in which I am doing it? How do I know that it is effective? Is this the best possible way of doing it?” (Singh, 2000, p. 7).

Such an awareness of the need for self-evaluation and the practice thereof, will enable education providers to be in a perpetual state of readiness to demonstrate accountability to external agencies when required to do so. This approach will obviate the reality of spending months preparing for external audits and then, after the departure of the audit panel, reverting to habitual ways of doing things.

To me, such a commitment to self-evaluation is the heart of quality assurance practice in education. It embraces all five of Harvey and Green’s (1993) quality philosophies, namely quality as exceptional, perfection or consistency, fitness for purpose, value for money and transformation. It also reflects Pirsig’s (1976) metaphysical interpretation of the all-encompassing nature of quality.

2.4.2 Quality Assurance as an emerging issue in universities

Traditionally, in small elite universities, academic standards and values were implicit and relied heavily on the reputation and image of the institution (Randall, 2002; Webbstock & Ngara, 1997). Harvey and Knight (1996) use the term *cloisterism* to refer to deeply embedded notions of professional autonomy and collegiality that characterised some higher education institutions. As a result, attempts at external quality assurance both nationally and internationally, were sometimes viewed with suspicion and met with resistance (Boyd & Fresen, 2004; Roberts, 2001; Stephenson, in press).

Approaches to ensuring the quality of the academic provision in higher education, both nationally and internationally, relied traditionally on the following types of review and monitoring (Smout, 2002; Ratcliff, 1997):

- comment from peers;
- attention to quality on an individual, unstructured basis;
- external review of examination question and answer papers;
- external examiners for masters and doctoral theses;
- external review by learned, professional societies.

Today however, in many countries, the public and other stakeholders such as governments, are expressing increased calls for quality and accountability, which are changing the landscape of higher education (Menges & Reyes, 1997). Harvey and Green (1993) highlight the reasons for the increased profile of *quality* within higher education: changed circumstances, increased levels of participation, widening access, pressure on human and physical resources, appraisal, audit and assessment (see section 1.7.2.2).

The notions of benchmarks, standards and reputation imply that higher education institutions seek to compare the quality of their academic provision with other such institutions on the global stage (Herrington, Herrington, Oliver, Stoney & Willis, 2001). This has resulted in a global need for higher education institutions to review their quality assurance mechanisms and protocols (Hope, 2001).

2.4.3 Quality Assurance in higher education in various countries

Most so-called 'developed' countries have progressed some way in implementing quality assurance initiatives in higher education. It was to these countries that South Africa turned in the mid-1990s, to learn from their experiences (Singh, 2001). A brief overview of the status of quality assurance in higher education in some developed countries is now given.

Europe

In Europe, there is a rich variety of quality assurance arrangements in higher education, with more than a decade of experience in the field (Van Damme, 2000; Westerheijden, 1997). The Bologna Declaration of 1999 aims to attain comprehensible and similar degree structures across all European universities, which is expected to further stimulate the international market in higher education. In the Bologna process, quality assurance is assigned to a network of national quality assurance agencies, whose main aim is to recognise and compare the quality practices of the more than 30 member states (Jeliazkova & Westerheijden, 2002).

A recent web-based survey was carried out in five European languages, with the goal of collecting the views of European training professionals on the current quality of web-supported learning (Massy, 2002). The key findings produced a gloomy picture, with 61% of all respondents rating the overall quality of web-supported learning negatively – all the more reason for pursuing the elusive factors that would enhance the quality of such provision.

United Kingdom

In the United Kingdom, there is a long-standing history of the application of quality assurance principles to education and to higher education in particular (Brennan & Shah, 2000; Harvey & Green, 1993; Geall, Harvey & Moon, 1997). Some researchers have applied the principles of Total Quality Management to schools (Murgatroyd & Morgan, 1993). Others have applied total Quality models such as Deming's 'Plan, Do, Control, Act' model and the 'House of Total Quality' to higher education (Lewis & Smith, 1994).

The UK Quality Assurance Agency (QAA) for higher education is well established (Gosling & D'Andrea, 2001). They publish a comprehensive set of Distance Learning Guidelines on their website (QAA, 1999). It is not only in developing countries that massification and globalisation have had a profound effect on higher education. Randall (2002) reports that these were major factors in shaping the quality assurance system designed by the UK QAA.

United States of America

According to Woodhouse (2000a), "the earliest instance of the phenomenon of external quality assurance (EQA) is provided by the USA, where higher education became a big operation at an early stage" (p. 21).

The Council for Higher Education Accreditation (CHEA) is a non-profit organisation established in 1996, which co-ordinates and promotes quality and public accountability in institutions and programmes through voluntary, non-governmental self-regulation – an interesting way around the Scylla and Charybdis debate.

Most states in the USA also have regional accrediting associations to determine the quality of programmes and curricula (Ratcliff, 1997). Universities and regional associations have developed their own guidelines for best practices in distance education, which are available on the Internet (Cravener Educational Consultants, 2000). The American Federation of Teachers has published Guidelines for Good Practice in Distance Education (American Federation of Teachers, 2000).

Australia and New Zealand

Australia has been undergoing education reform for more than two decades, since the Williams report in 1979 (Candy & Maconachie, 1997). In the early 1990s they established national quality agencies and committees based on similar structures in the United Kingdom, namely the Australian Committee for Quality Assurance in Higher Education (CQAHE) and the Higher Education Council (HEC) (Jegede, 1993; Vidovich, Fourie, Van der Westhuizen, Alt & Holtzhausen, 2000).

Like South Africa, New Zealand has a Qualifications Authority, the New Zealand Qualifications Authority (NZQA), a National Qualifications Framework (NQF) and National Standards Bodies (NSBs), all of which were established in the early 1990's. The New Zealand Universities' Academic Audit Unit (AAU) takes responsibility for institutional quality audits in higher education (Hall, Woodhouse & Jermyn, 1997; Woodhouse & Hall, 1997).

Although all the above-mentioned countries have structures for the regulation or self-regulation of higher education activities in place, "there has traditionally been less regulation across frontiers and there is certainly less still in cyberspace" (Hope, 2001, p. 127).

2.4.4 Quality Assurance in higher education in South Africa

The South African scenario is sketched in this section, with particular reference to recent legislation regarding quality assurance in higher education. Quality assurance practice in South African higher education is emerging and formative. There is a "palpable urgency" (Baijnath et al., 2001, p. v) to contribute meaningfully not only to the debate, but more practically, to the formation of recognised, negotiated and acceptable mechanisms to improve the quality of teaching and learning in higher education.

The cornerstone of higher education policy development is the National Commission on Higher Education (NCHE) of 1995, which laid the foundations for the Higher Education Act of 1997 (Alt & Fourie, 2002). Various acts of parliament were passed in the mid-1990s, which represent part of our nation's attempt to standardise and legitimise our education and training system. The following Acts are relevant to the field of higher education in general and quality assurance in particular (South Africa, 2002):

- South African Qualifications Authority Act (SAQA), No. 58, 1995;
- National Education Policy Act, No 27, 1996;
- Higher Education Act, No 101, 1997;
- Further Education and Training Act, No 98, 1998;
- South African Schools Act, No. 84, 1996.

The purpose of the SAQA Act of 1995 is to provide for the development and implementation of a National Qualifications Framework (NQF) (South Africa, 1995). Two key elements of the NQF are *standards* and *quality*, which are reflected in two of its objectives, namely to create an integrated national framework for learning achievements and to enhance the *quality* of education and training (SAQA, 2001a).

One of the objectives of the Higher Education Act of 1997 is to provide for quality assurance and quality promotion in higher education (South Africa, 1997). Accordingly, it made provision for the establishment of the Council for Higher Education (CHE), a statutory body to advise the Minister of Education on all matters pertaining to higher education.

The Committee for University Principals (CUP) established a Quality Promotion Unit (QPU) in 1995 to perform external quality audits in the university sector (Hay, 2000; Smout, 2002; Vidovich et al., 2000). The QPU was closed down in 1999 as a result of a serious lack of resources, a highly politicised working environment and debate over its mandate (Smout & Stephenson (2002).

"The university sector has thus had limited experience of an external quality assurance regime in addition to manifesting a highly uneven level of internal quality assurance arrangements" (Singh, 2001, p. 142). Van der Westhuizen (2000) also mentions that the university sector had a backlog compared to technikons, in respect of quality assurance processes.

To address the need for direction, responsibility for quality assurance at universities was assigned to the Higher Education Quality Committee (HEQC), which was constituted in March 2001 (Singh, 2001). The HEQC, a permanent committee of the CHE, is concerned with strategic and conceptual issues of quality in higher education, and is responsible for programme accreditation, quality promotion and institutional auditing (Baijnath & Singh, 2001).

The CUP is now known as the South African Vice Chancellors' Association (SAUVCA), to reflect a restructured and transformed association (http://www.sauvca.org.za/about). The primary objective of SAUVCA is to provide constructive and critical perspectives on all key issues affecting higher education (Smout, 2002). SAUVCA recognised the work done by communities of interest in the field of quality assurance and formalised such activities by establishing the SAUVCA National Quality Assurance Forum (SNQAF). The work of SNQAF is intended to complement and contribute to that of the HEQC (Smout, 2002). In 2002 a definitive report was published by SAUVCA in order to assemble current quality assurance knowledge in a comprehensive resource document to assist institutions in developing their quality assurance systems (Smout, 2002).

The consequence of recent policy and legislative developments is that South African education providers are confronted with the need to implement formal quality assurance systems in order to respond effectively to the national calls for accountability (Alt & Fourie, 2002). This study responds to the call by formalising the self evaluation efforts of an e-learning support unit.

The HEQC's approach is one of capacity building and encouraging excellence (http://www.che.org.za/heqc). They make use of the well-known four stage model currently used in Europe and the United States. This model consists of the following stages (Alt & Fourie, 2002; Jeliazkova & Westerheijden, 2002):

- establishment of procedures and methods to be used by the national quality assurance agency;
- regular institutional self-evaluation;
- peer review visit by the national agency;
- published report containing the findings of the peer review visit.

The structure of, and links between, the various legislative bodies in South African higher education are summarised in Figure 2.2 (refer to the List of Acronyms in the front matter of this thesis).

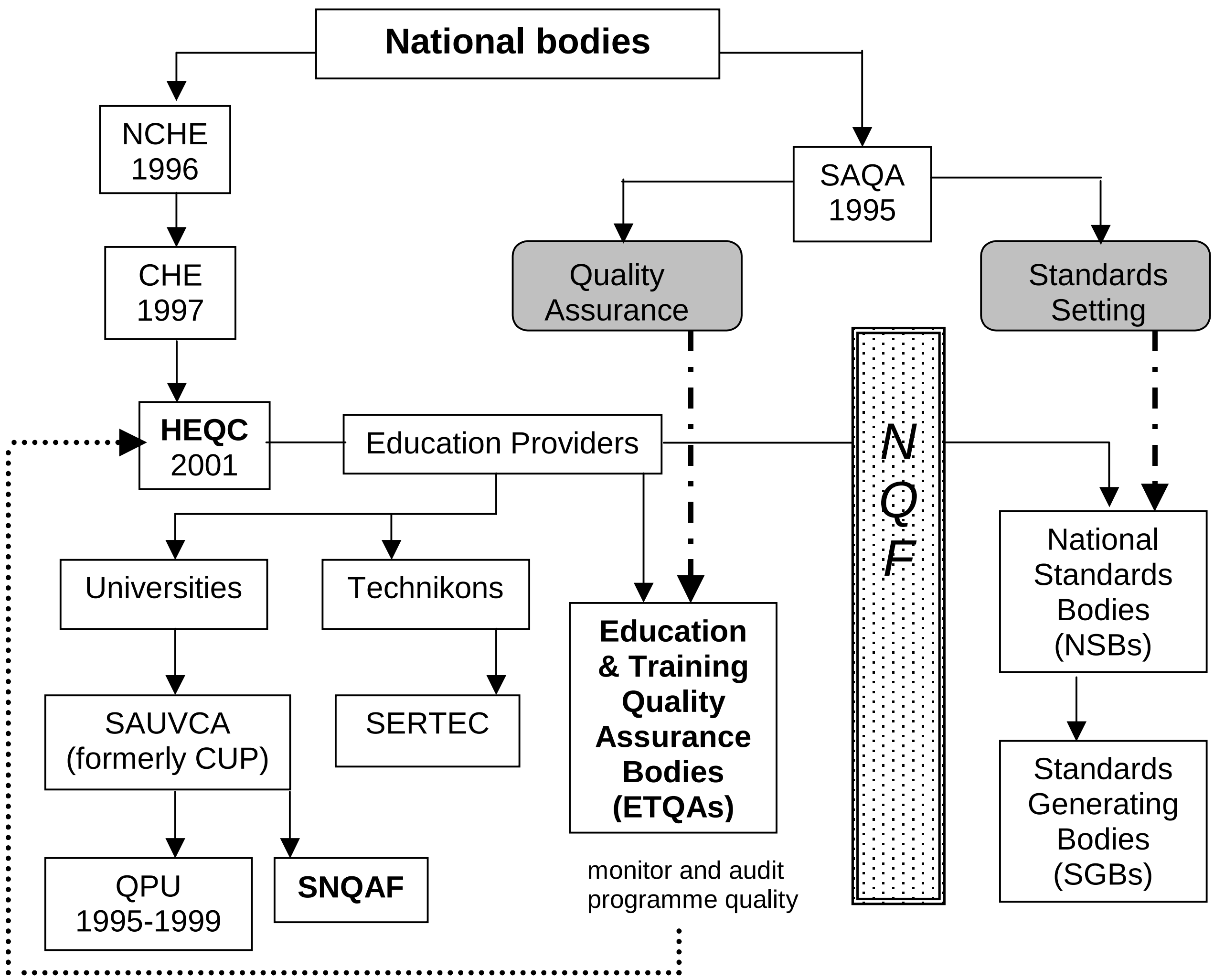


Figure 2.2: Legislative structures within South African higher education

In Figure 2.2 the bodies in **bold type** are primarily responsible for **quality assurance.** Note that the ETQA for the higher education sector is the HEQC (indicated by the dotted arrow).

There are various independent bodies which are also involved in quality assurance in higher education and/or business in South Africa. These are the Foundation of Tertiary Institutions of the Northern Metropolis (FOTIM), the South African Quality Institute (SAQI) and the South African Excellence Foundation (SAEF), which are described in turn below.

FOTIM is a voluntary foundation of member institutions, giving attention to various issues in higher education. FOTIM has a quality assurance project, which promotes improvement of quality in both the academic and administrative sectors of member institutions. Their initial focus has been on developing models for self- and academic programme evaluation and the implementation of quality assurance procedures at member institutions (FOTIM, 2002). The first FOTIM biennial quality assurance conference was held in Johannesburg from 23-25 June 2004 and attracted international keynote speakers and workshop facilitators.

The South African Quality Institute (SAQI) is a non-profit company which offers training courses and materials and is involved in implementing quality systems in both the business and education sectors.

The South African Excellence Foundation (SAEF) assists small businesses and public sector departments to self-assess their organisations in terms of leadership, policy and strategy, customers and markets (http://www.saef.co.za/saef/mc.html). They are the custodians of the South African Excellence Model (SAEM), which was adapted from the model promoted by the European Foundation for Quality Management (EFQM).

Section 2.4 reviewed the literature with respect to quality assurance in higher education, both internationally and nationally. Relevant debates and issues which have contributed to the recent high profile of quality assurance were presented, in order to sketch the background for this study. Against this background, my case study focuses on the quality of *web-supported learning* in higher education, with particular emphasis on the *self-evaluation* initiatives of the e-learning support unit at the University of Pretoria.

The literature pertinent to the three research questions in this study is now reviewed in detail, namely factors to promote the quality of web-supported learning, client satisfaction with web-supported learning and quality management systems for web-supported learning.

2.5 Factors to promote quality web-supported learning

The first research question in this study is: *What factors promote quality web-supported learning?* This section reports on collections of guidelines available on the Internet, as well as published studies which investigate benchmarks, indicators and principles to promote the quality of web-supported (or online) learning.

There are many Internet sites that offer guidelines or best practices for distance learning, which have been developed by individual institutions, consortia of institutions or national quality assurance agencies. Some of the guidelines are for pure distance education and others are for technology-enhanced distance education (web-supported learning). A selection of such sites is listed in Appendix C, Table C1.

Although practical guidelines and standards for technology-enhanced distance education exist and are an important part of documenting best practice, they form only part of attempts to improve the quality of web-supported learning. ected international studies which investigated the quality (and/or effectiveness) of web-supported (online)[2] courses are reviewed here. These particular studies are based on extensive research in Canada, the USA and Australia Their findings are synthesized into a taxonomy of factors contributing to the quality of web-supported learning (section 2.5.3). The studies are categorised as those that are classic studies providing benchmarks, indicators or principles (section 2.5.1), and criteria for judging online courses as promising or exemplary (section 2.5.2). More recent frameworks which corroborate and add to the synthesized taxonomy are analysed in the reflection chapter of this thesis, chapter 7.

[2] The terminology used is in accordance with that used by the respective authors of the reported studies.

2.5.1 Classic benchmarks, indicators and principles

The Institute for Higher Education Policy (IHEP, 2000) in the United States undertook a "first-of-its-kind study to bring reason and research data to this overheated debate" (between proponents and opponents of internet-based distance learning) "to provide more tangible measures of quality in distance learning" (p. vii). The study was commissioned and sponsored by the vendors of the learning management system Blackboard® and the National Education Association in the USA.

A comprehensive literature search was conducted, which identified a total of 45 benchmarks developed by organisations to ensure quality distance education. Six institutions in the United States were then selected and studied to ascertain the degree to which the benchmarks were used, and how important they were to the faculty, administrators and students. After consolidating and streamlining the original list of 45 benchmarks, the outcome was a list of 24 benchmarks, classified into seven categories:

1. Institutional support
2. Course development
3. Teaching and learning
4. Course structure
5. Student support
6. Faculty support
7. Course evaluation.

The 24 benchmarks are considered essential for ensuring excellence in internet-based distance learning. Emphasis is placed on items such as student interaction with faculty and other students, students engaging in higher-order thinking, timely feedback to students and access to technology and library resources. Technical training and support to students and faculty members are also recommended. The 24 benchmarks are given in detail in Appendix C, Table C2.

The report states that "in addition to the internet's profound influence on distance education, it is also important to point out that a growing number of faculty are using the internet to complement traditional classroom-based courses" (Institute for Higher Education Policy, 2000, p. 6). The 24 benchmarks, therefore, can also be applied to what have become known as *hybrid* or *blended* learning scenarios, where the learning model incorporates a mix of delivery media. Such a learning model is in use at the University of Pretoria (see chapter 1).

A second classic and often cited study is Barker (1999), who published the results of a community project commissioned by the Canadian Association for Community Education (CACE), conducted by a consulting company by the name of *FuturEd*.

The project undertook an extensive international literature search for complete sets of guidelines and individual quality indicators for distance learning. The report summarises many resources (mainly online) to inform developers about quality education practices and the use of educational technologies.

The project defines *technology-assisted distance learning* as the learning situation where "the learner is in one location and the 'provider' of the learning is in another and technology is used to make the link" (Barker, 1999, p. 3). According to Barker (1999), a quality educational experience includes the following elements:

> … the quality of learning materials, the availability of materials, support for students through well trained staff, a well managed system, monitoring and feedback mechanisms to improve the system. Stated more succinctly, quality education is education that produces an independent learner. (p. 14)

The outcome of the project is a set of guidelines for quality indicators for technology-enhanced distance learning, which are divided into the following categories:

1. Quality **inputs and resources** for technology-assisted distance learning.
2. Quality **processes and practices** in technology-assisted distance learning.

3. Quality **outputs and outcomes** from technology-assisted distance learning.

An overview of each of these categories is given below. Full details of factors within the categories are given in Appendix C, Table C3.

1. Quality of **inputs and resources** is applicable to the teaching and learning model. It includes guidelines for learning outcomes, curriculum content, learning materials, learning technologies, instructional design and the provision of support personnel.
2. Quality of **processes and practices** includes institutional factors such as the management of students, programmes and human resources, as well as the use of technology to nurture active engagement and communication.
3. Quality of **outputs and outcomes** concentrates on the skills and knowledge of the student emerging from the learning process, as well as recognition and transferability of the qualification. This category also consider return on investment with regard to effectiveness, efficiency and customer satisfaction.

The guidelines are intended to assist consumers in making choices and in ensuring the best return on their investment (by considering categories 2 and 3 above). This consumer orientation to educational products and services is intended to assist providers of technology-assisted distance learning to develop, evaluate and continuously improve their products and services.

In 1987 Chickering and Gamson developed their now well-known *Seven Principles of Effective Instruction*, which emphasize student feedback and communication. They were motivated by the need to improve teaching and learning in higher education, as demonstrated by the quotation below:

> Apathetic students, illiterate graduates, incompetent teaching, impersonal campuses – so rolls the drumfire of criticism of higher education. … States have been quick to respond by holding out carrots and beating with sticks. There are neither enough carrots, nor

> enough sticks to improve undergraduate education without the commitment and action of students and faculty members. They are the precious resources on whom the improvement of undergraduate education depends. (Chickering & Gamson, 1987, online reference)

The seven principles (Chickering & Gamson, 1987) are based on extensive research on teaching and learning and characterise good practice in undergraduate education. Since the seven principles were proposed in 1987, new technologies have changed the face of education. Chickering and Ehrmann (1996) applied the seven principles to online learning environments.

Table 2.1 lists Chickering and Gamson's (1987) seven principles in the left column and Chickering and Ehrmann's (1996) application thereof using educational technologies, in the right column. Table C4 in Appendix C presents the same application in more detail.

Table 2.1

Seven principles of Chickering and Gamson (1987) applied by Chickering and Ehrmann (1996) to online environments

Seven Principles	**Application of technology**
1. Encourage contact between students and faculty	The Internet, e-mail and learning management systems.
2. Develop reciprocity and cooperation among students	Co-operative learning online.
3. Use active learning techniques	Communication tools, online activities, electronic portfolios.
4. Give prompt feedback	E-mail, online discussion fora.
5. Emphasize time on task	Asynchronous access and computer record keeping of time spent.
6. Communicate high expectations	Real life problems and scenarios, public scrutiny of work submitted.
7. Respect diverse talents and ways of learning.	Variety of learning experiences, anywhere, anytime learning.

Chickering and Gamson's (1987) strategies have been enduringly strong and widely accepted as measures for judging the effectiveness of distance learning as well as traditional classroom teaching (Johns Hopkins University, 2002; Herrington et al., 2001). De Bruyn (2003) analysed student feedback on web-supported courses at the University of Pretoria in terms of the seven principles. A summary of Chickering & Ehrmann (1996) is given by Wilkinson, Wilkinson & Nel (2001).

Ehrmann claims that although much has changed since 1996, much has remained the same (Chickering & Ehrmann, 1996). He states that “these same seven principles, and these seven kinds of technology use, seem equally important for all kinds of learners (and faculty) in all kinds of situations” (online reference).

2.5.2 Criteria for exemplary or promising courses

The learning management system WebCT was developed in British Columbia, Canada and hosts an annual user conference at which winning online courses in the WebCT Exemplary Course Project are showcased. Graf and Caines (2001) developed a scoring rubric to evaluate online courses submitted for consideration in this project. They present criteria in two categories: academic rigour (10 items) and content robustness (6 items).

Paloff and Pratt (as cited in Graf & Caines, 2001) describe academic rigour and content robustness as follows:

- academic rigour: “the degree to which a web-enhanced or asynchronous online course causes students to become immersed in the course content through the application of higher level learning objectives” (p. 1);
- content robustness: “the breadth and depth of the content included in or part of a web-enhanced or asynchronous course and the extent to which students are required to interact with that content and with each other” (p. 1).

In particular, *academic rigour* includes items such as course objectives, assignments, student participation, use of technology, course content and ancillary resources. *Content robustness* refers to the degree to which the course content is available online, how it is structured, the use of images and graphics, the degree of interaction among students and with the lecturer and the type and quality of student assessment. The criteria in these two categories are given in full in Appendix C, Table C5.

The WebCT Exemplary Course Project supplies a scoring rubric, which for a particular WebCT course, ranks each of the above criteria in terms of *exemplary*, *accomplished*, *promising*, *incomplete* or *confusing*. Course designers are invited to nominate their own or other WebCT courses for consideration for an award (WebCT®, 2002). Winning courses enjoy international recognition and are showcased at the annual WebCT conference. This project is an international benchmark in the field of online learning, which motivated its inclusion in this literature review.

A second project to develop a framework and a set of criteria for quality in educational technology programmes is Confrey, Sabelli & Sheingold (2002). An expert panel on educational technology was established in 1998 by the US Office of Educational Research and Improvement (OERI). Educational technology was defined as "a variety of electronic tools, media, and environments that can be used to enhance learning, foster creativity, stimulate communication, encourage collaboration, and engage in the continuous development and application of knowledge and skills" (Confrey et al., 2002, p. 8).

The goal of the expert panel was to evaluate educational technology learning programmes by judging them as promising or exemplary. In order to be able to make such judgements, the panel devised a set of six criteria. The programme under review should:

1. address an important educational issue and articulate its goals and design clearly;
2. develop complex learning and thinking skills;
3. contribute to educational excellence for all (equity and diversity);
4. promote coherent organisational change;
5. have rigorous, measurable evidence of its achievements;
6. be adaptable for use in multiple contexts.

Each criterion was measured by using rubrics on five levels, ranging from Level 1 (poor or incomplete) to Level 5 (compelling or convincing). The details of the criteria and their associated rubrics are given in Appendix C, Table C6.

In elaborating the criteria, Confrey et al. (2002) discuss how the criteria need to be integrally linked, in order to strengthen the robustness and focus of the learning programme. Technology-based learning interventions that can deeply affect learning for all require organisational rethinking and renewal, significant investments in professional development of teachers, access to technology, as well as access to complex and significant learning experiences. The panel emphasized the importance of learning as an active process and the need to set high expectations for all students. These latter issues reflect some of Chickering & Ehrmann's (1996) application of the seven principles to educational technology.

Confrey et al. (2002) reported that the expert panel was sensitive to and relied on input from the field of educational technology. Even so, the resulting framework and criteria turned out to be considerably ahead of the field in its practice at that time: only five percent of programmes submitted were judged to be worthy of recognition. The expert panel gave no direct specifications of particular technologies required or how they should be optimally used: "Instead, we have defined the system into which technology is embedded and identified criteria that will signal how effective its use is by the footprints it leaves" (Confrey et al., 2002, p. 15).

In her reflection on the use of the framework, Edwards (2002) remarks that although the criteria are intended to be used to evaluate and recognise noteworthy learning programmes in a summative way, the best use of the instrument may be formative rather than summative. Confrey et al. (2002) also remarked that the framework may be used productively for self evaluation.

The studies summarised in this section approach the notion of quality in online learning from various perspectives (e.g. lecturer, student, institution and evaluation of exemplary programmes). It is clear that the context, the learning model used, the nature of the institution and the target population all play an important role in specifying an appropriate framework for quality web-supported courses.

2.5.3 Meta-analysis: Taxonomy of factors to promote quality web-supported learning

The first research question in this study investigates factors to enhance the quality of web-supported learning. The categories and factors from the studies reviewed in the preceding sub sections are now synthesized into an overall *taxonomy* (Table 2.3), based on the frequency with which the factors were mentioned in the original works. The version of the taxonomy showing the frequencies is given in Appendix C, Table C10.

In order to decide on categories for the taxonomy, the categories used by some existing collections of guidelines or best practices are shown in Table 2.2. Many of the categories shown overlap or are similar in nature (for example: student satisfaction, student services, student support). Some categories could be subsumed by others, for example ‘access’ and ‘facilities and finances’ could both be considered institutional factors.

I therefore synthesized my own categories which are given below Table 2.2.

Table 2.2

Some categories commonly used to classify guidelines or best practices

Categories used	Reference
1. Institutional Support 2. Course Development 3. Teaching and Learning 4. Course Structure 5. Student Support 6. Faculty Support 7. Course Evaluation	Institute for Higher Education Policy (2000)
1. Institutional Context and Commitment 2. Curriculum and Instruction 3. Faculty Support 4. Student Support 5. Evaluation and Assessment	Western Interstate Commission for Higher Education (2001)
1. Curriculum and Instruction 2. Evaluation and Assessment 3. Library and Learning Resources 4. Student Services 5. Facilities and Finances	North Central Association Commission on Institutions of Higher Education (1999)
1. Learning Effectiveness 2. Cost Effectiveness 3. Access 4. Faculty satisfaction 5. Student satisfaction	Sloan-C Consortium's 5 Pillars (Lorenzo & Moore, 2002)

A reasonable combination of the type of categories shown in Table 2.2 seems to be as follows:

1. Institutional Factors
2. Technology Factors
3. Lecturer Factors
4. Student Factors
5. Instructional Design Factors
6. Pedagogical Factors.

The factors for quality web-supported learning are synthesized in Table 2.3 according to the classification given above. In some of the literature studies, an item may have been mentioned in further discussion, not necessarily listed as a main benchmark. All such items *are* listed explicitly in Table 2.3.

Table 2.3 *Taxonomy of factors to promote quality web-supported learning*

Category	Factor
Institutional Factors	Technology plan
	Infrastructure / Adequate resources for online learning
	Student advice and consultation
	Institutional evaluation of programme effectiveness
	Promotes coherent organisational change
Technology Factors	Appropriate use of technology
	Reliability / robustness
	Accessibility / 24/7 availability
	Technological support available for lecturers and students
	System training available for lecturers and students
	Accurate management of student records / data
Lecturer Factors	Interaction with students / facilitation of online learning
	Frequent and constructive feedback to students
	Professional training in education - professional development
	Regular evaluation of lecturer competence
	Academic background / qualifications
Student Factors	Communication with fellow students
	Time management / time on task
	Learner control over time, place, pace of learning
	Expect efficiency and effectiveness
	Employ critical thinking strategies
	Motivation / commitment / self esteem
	Improve students' problem solving abilities
	Return on investment - customer satisfaction - cost/benefit
Instructional Design Factors	Co-operative / group learning / team work / reciprocity / collaboration
	Student engagement in higher cognitive levels / knowledge construction / challenges / complex thinking skills
	Rich learning resources / Sound learning materials
	Interactivity / Active learning / learning activities
	Design standards / guidelines / minimum requirements
	Routine review and evaluation of courses / products
	Enhanced student motivation / responsibility for own learning
	Manageable segments / modular / chunking
	Inclusivity: social, cultural, gender, disabilities
	Purposeful use of learning media
	Appropriate use of images, graphics
	Offer a complete learning package
Pedagogical Factors	Learning outcomes / objectives are clearly stated
	Communicate high expectations
	Respect diverse talents and learning styles / equity for all
	Optimal assessment strategies / authentic tasks
	Clearly stated expectations re: level of participation, assignments etc.
	Provide time for students' self reflection
	Provide a non-threatening, comfortable environment
	Students instructed in proper research methodology
	Relevance and accuracy of content
	Research and continuous improvement
	Educationally significant goals
	Programme is adaptable, sustainable and scaleable

The taxonomy given in Table 2.3 is a holistic synthesis of important factors and practices which together promote the quality of web-supported learning experiences. The taxonomy is extended and refined in chapter 4 (Tables 4.3 and 4.4; Figure 4.3)

In isolation, no category would be sufficient to guarantee quality web-supported teaching and learning. For example, Carrol (as cited by Mayes, 2001) describes the misconception of the 'Nurnberg Funnel': the assumption that the delivery of high quality learning materials is sufficient for learning to occur. The emphasis on 'good' instructional design and 'good' pedagogy confirms Clark's insistence on the benefits of sound course design, rather than the effect of the delivery medium in enhancing learning (Clark, 1994). Ragan (1999) confirms that "good teaching is good teaching" (online reference) and Oliver (2003) asserts that "the quality principles that underpin successful online teaching and learning are exactly the same as those that underpin successful face to face teaching" (p. 8).
Additional relevant studies were reviewed after this literature review was completed. The additional studies corroborate many of the factors in the taxonomy and expand it by a further ten factors that were subsequently identified (see chapter 4 and Appendix C, Table C11). The extended and refined taxonomy is given in Table 4.4.

2.6 Client satisfaction with web-supported learning

The second research question in this study is: *What factors contribute to client satisfaction (or frustration) with web-supported learning?* This section reviews reported studies on *student satisfaction* and *lecturer satisfaction* with various forms of technology-enhanced learning[3].

2.6.1 Student satisfaction

Part of evaluating the effectiveness (quality) of any learning intervention is to obtain ongoing feedback from users and monitor their use (Lowe & Hall,

[3] The terminology used is in accordance with the context of the various sources.

1999). Randall (2002) highlights the growing concerns of students, as paying customers, about the quality of the educational provision offered to them and emphasizes that delivery systems and the quality assurance thereof need to meet the needs and expectations of users. White (2000) also notes that the concept of the learner as a *customer* is becoming more prevalent.

Zhiting, Yi, Qing and Xiaoyong (2003), in a working document aimed at evaluating service quality of e-learning, specify that organisations must ensure adequate understanding of the needs and expectations of the customer and should gather customer feedback, including satisfaction with the services provided as well as with the e-learning product. Leckey and Neill (2001) claim that it is "evident that student evaluation, whether of courses, teaching quality or the overall student experience, is extremely important and has a significant role to play in the quality assurance process" (p. 19).

According to Steyn (2000), "Recent policy developments in higher education in South Africa are likely to lead to increased evaluation of teaching and courses through the use of learner evaluation" (p. 174). This means that national quality agencies (e.g. the HEQC) will require evidence from an institution about its knowledge of the student experience and the ways in which it has taken student views into account in course design, production and facilitation.

Kochtanek and Hein (2000) summarise the importance of researching the student experience with online or asynchronous learning environments:

> Many students are quite accustomed to and comfortable with sitting in a classroom at an assigned time, taking notes and following a sequence of well-developed presentations and activities created ahead of time by the instructor. They may be less comfortable communicating at a distance, using new technologies to support that communication, and actually being a partner in and contributor to the instruction, in addition to being a recipient of that instruction. (p. 284)

Kirkpatrick (1998) proposes a four-level model for evaluation, particularly in corporate training:

1. Reaction (a measure of customer satisfaction);
2. Learning (the degree of change in participants' knowledge, attitudes, skills);
3. Behaviour (the extent to which partcipants' behaviour changes as a result of training);
4. Results (achievement of objectives, impact on the organisation).

Kirkpatrick's evaluation levels should be implemented sequentially and it is a serious mistake to bypass any level (Kirkpatrick, 1998). Although evaluation at the subsequent levels may provide scope for further research, it is not easy to measure levels 3 and 4 in a higher education institution, unless one plans follow-up research involving graduates in the work place.

Clark (2000) identifies two similar levels of evaluation: reaction evaluation (participant reactions) (cf. Kirkpatrick Level 1) and achievement of learning or programme objectives (cf. Kirkpatrick Levels 2 and 4). Clark (2000) describes two advantages of reaction evaluation: it can uncover informal participant impressions and reveal unanticipated benefits and problems with the course. This is clearly useful in the sense of formative evaluation and continuous improvement and is the level of student and lecturer evaluation that is applied in this study (see sections 3.5.3, 3.5.4 and chapter 5).

This study is confined to measuring levels of client satisfaction which are based on client reactions, perceptions and experiences, i.e. Kirkpatrick's Level 1. Where perceived learning is measured, it is described as a 'Perceived Learning Index' (see chapter 5). This study does not purport to measure Kirkpatrick's higher levels, such as the degree of actual learning that took place. These are distant outcomes (see Conceptual Framework: Figure 2.5).

O'Reilly and Newton (2001) report on a joint research project between an academic school and the Teaching and Learning Centre at the Southern Cross University, Australia. They used student surveys to research student perceptions of the importance of online discussions, whether these were mandatory (for assessment purposes) or optional. Their aim was to understand the way students are using the online medium and what processes enhance their learning, so that improvements in interactive online teaching and learning may be initiated and continued. This continuous improvement took the form of fine-tuning the design of course units (formative evaluation), implementing student support mechanisms and enabling teaching staff to improve their pedagogical strategies.

The findings of O'Reilly and Newton (2001) showed that students valued the following aspects on online communication:

- peer-to-peer interaction for social support: forming friendships, offering advice and encouragement, overcoming isolation (cf. Laurillard's (1993) conversational framework);
- peer-to-peer interaction for course-focused learning support;
- mutual help with technical issues and the use of online tools;
- a safe environment for learning through open communication;
- intrinsic motivation for engaging in online discussion;
- benchmarking individual progress within groups;
- enhanced learning due to online discussion in a social context .

The above authors concluded that learners value the human aspects of the online environment and are beginning to exhibit not only increased technical sophistication, but also social skills such as civility, conviviality, harmony and reciprocity.

Carmichael (2001) carried out an educational evaluation of WebCT at the University of Abertay Dundee, Scotland, using Laurillard's (1993) conversational framework. Laurillard's (1993) framework is based on dialogue and reciprocal actions and interactions between the student and the teacher. The case study was a small group of undergraduate students – 15 of approximately 60 students took part in the survey of student experiences using WebCT - a very small sample, compared to the sample in this study (4 650 students – see chapter 5).

Carmichael (2001) formed a one-to-many correspondence between the criteria of Laurillard's (1993) framework and the various tools in WebCT. She then used the student evaluation to investigate which WebCT tools were *used* and which tools were found to be *useful*, from which a usefulness percentage was calculated. This usefulness percentage for each WebCT tool was then matched with the applicable criteria from the conversational framework. This is an interesting study, although it used a very small sample and the original heuristic matching of tools to the framework appears to be rather arbitrary. The results were disappointing in that usefulness percentages for many WebCT tools were rather low, with the result that most of the criteria of the conversational framework were viewed as being not successfully implemented.

De Bruyn (2003) conducted a study at the University of Pretoria, which encompasses pedagogical aspects, as well as student experiences of web-supported learning. She used the 2002 version of the WebCT Experience survey developed by this researcher (Appendix D1 in this study contains the 2003 version of the survey). She matched questions from the survey with the Seven Principles for Good Practice in Undergraduate Education (Chickering & Gamson, 1987). (Although the survey items were not composed according to the seven principles, they fit well into that framework.) She found that WebCT is rapidly changing the way in which students and lecturers approach teaching and learning and that, in general, students perceive the web-supported courses to be efficient and interesting. She recommended that ongoing research is required, especially with respect to the adoption and integration of ICTs by lecturers.

Delport (2003) investigated the use of computer-mediated communication in undergraduate Mathematics courses at the University of Pretoria. She also used the 2002 version of the WebCT Experience and Module surveys. She found that computer-mediated communication, using all available online communication tools (e.g. discussions, e-mail, chat), was dependent on encouragement by the lecturer to interact frequently. She recommended frequent and timely feedback and encouragement to individuals and groups, in order to provide a varied and challenging learning environment, and to promote deep learning.

McKenzie, Bennett, Mims and Davidson (2001) sought student perceptions on the value of online instruction at the University of West Georgia, during 1999 and 2000. Seven courses were evaluated, involving 161 undergraduate and graduate students. Of these students, 150 chose to make use of WebCT.

There were three aims of the McKenzie et al. (2001) study[4]:

1. to identify whether students would choose to access supplemental course materials provided on WebCT;
2. to identify whether their use of WebCT enhanced the course and if so, which tools and activities they found most useful;
3. to determine if WebCT should be continued as a supplemental resource in the future.

The findings of McKenzie et al. (2001) showed that the main reasons students used the online course components were ease of accessibility to course materials, the convenience of communicating with the instructor and other class members on a regular basis, and it saved them time. Students indicated that they liked to participate in a variety of activities on WebCT, using various online tools. The majority of participants indicated that online course support should be continued.

All the studies reviewed above evaluated student perceptions of and satisfaction with web-supported learning. Very few studies were found which surveyed the other clients of an e-learning support unit, namely lecturers, as to their level of satisfaction with web-supported learning (Fresen & Le Roux, 2003).

[4] The study quoted is from the point of view of one instructor making choices about the courses he offers, whereas this study considers the point of view of a support unit serving a whole institution. Therefore, aim 2 above is more applicable than the first or third aims. Aim 2 is also more relevant to the enhancement of quality.

2.6.2 Lecturer satisfaction

Schifter (2000) surveyed faculty members and administrators at Temple University, Pennsylvania to investigate motivating and inhibiting factors for lecturers participating in technology-enhanced distance education. Her findings list the top five motivating factors and the top five inhibiting factors for faculty members, as shown in Table 2.4.

Table 2.4

Motivating and inhibiting factors for faculty members to participate in technology-enhanced distance education (summarised from Schifter, 2000)

Top five motivating factors	Top five inhibiting factors
Personal motivation to use technology	Lack of technical support provided by the institution
Opportunity to develop new ideas	Lack of release time from academic duties
Opportunity to improve my teaching	Concern about faculty workload
Opportunity to diversify program offerings	Lack of grants for materials / expenses
Greater course flexibility for students	Concern about quality of courses

Schifter (2000) concludes that "while teaching at a distance requires new technical skills for the new teaching and learning environment, what becomes very important is how to teach concepts within this environment, i.e. pedagogy" (p. 46). This finding supports the philosophy of pedagogy before technology (see chapter 1).

The SUNY Learning Network (SLN) is the online instructional component for the 64 colleges and nearly 400, 000 students of the State University of New York. Shea, Pelz, Fredericksen and Pikett (2002) surveyed 255 online teachers from 31 of these colleges in order to investigate how the experience of teaching an online course impacts on classroom teaching. In their study, the certificate and degree programmes were offered completely at a distance.

Faculty members participating in SLN come from all academic ranks and from various types of institutions, ranging from small rural community colleges to large urban university centres. Their areas of subject expertise include maths, science, humanities, business, art and social sciences. Faculty members undergo an intensive faculty development process, which enables them to develop and present their own online courses. Substantial incentives are offered, such as stipends and laptop computers. Support is provided, in the form of instructional design partners, trainers, help desk staff and experienced faculty mentors.

The findings of the Shea et al. (2002) study are summarised in Table 2.5.

Table 2.5

Lecturer perceptions of online learning (from Shea et al., 2002)

Outcomes	Findings
General reactions	Faculty members were asked to rate their level of satisfaction in developing and teaching an online course. Approximately 96% expressed general satisfaction and 4% expressed general dissatisfaction.
Student performance	Faculty members were asked to rate student performance in online courses, compared to similar classroom courses. Approximately 33% reported better performance from online students, 41% reported no difference in performance and 14% reported better performance from classroom students.
Interaction	The authors feel that the importance of interaction cannot be understated. Faculty members were asked about their perceptions of the levels of interaction in online courses. Approximately 61% felt that their level of interaction with online students was higher than in the classroom, 28% saw no difference and 26% rated their interaction with students in the classroom as higher than online.
Appropriateness of the online environment	Asked whether the online environment is appropriate for teaching particular course content, approximately 91% of faculty members said “yes”, 7% were undecided and 2% said “no”.

Table 2.5 (continued)

Lecturer perceptions of online learning (from Shea et al., 2002)

Outcomes	Findings
Knowledge of students / isolation	One could hypothesise that the online environment could be cold, sterile and anonymous. Asked how well they got to know their students, approximately 37% felt their knew their online students better than in the classroom, 25% felt there was no difference and 35% felt they did not know their students as well.
Alternative means of instruction and assessment	Approximately 97% of respondents reported that developing and teaching their online course offered them new opportunities to consider alternative means of instruction and assessment.
Faculty support processes	Faculty members reported that the greatest single advantage of teaching online was the emotional and technical support offered by the SLN staff. Some responded that they would not have attempted it without the support provided.

Shea et al. (2002) concluded from their results that although developing an online learning environment is not a trivial endeavour, it can be implemented in such a way that both faculty members and students report high levels of interaction, satisfaction and learning. Furthermore, faculty members found opportunities for reflection on their pedagogical practice, such as alternative means of instruction, assessment and the systematic design of instruction. They also found that teaching and online course allows them to reflect on and improve the way they teach in the classroom.

Although the various studies reviewed in section 2.6.1 acknowledged and investigated student feedback with respect to online learning, few of them specifically emphasized the theme of customer satisfaction in the light of quality assurance. Only two studies were found which investigate lecturer satisfaction with technology-enhanced distance learning (section 2.6.2). Research question 2 in this study is therefore motivated by the need to synthesize a holistic view of quality assurance of web-supported learning from the point of view of client (student and lecturer) satisfaction.

2.7 Quality management systems for web-supported learning

The third research question in this study is: *What are the components of a process-based quality management system (QMS) in a web-supported learning production unit?* This section reports on the few formal QMSs for e-learning that were found in the literature.

From an institutional perspective, many universities have Quality Assurance or Quality Promotion Units which work with national quality assurance agencies putting systems in place to assure the quality of the academic programmes they offer. Such systems are generally referred to as *quality assurance systems* and focus on institutional self-evaluation followed by external audit, based on the four step model described by Jeliazkova and Westerheijden (2002) and Alt and Fourie (2002). Some institutions may go further than this to implement auditable *internal* systems. For example, the Tshwane University of Technology (formerly Technikon Pretoria) has a well-documented formal institutional quality assurance system (not particularly for e-learning), which is easily available to staff members on their intranet (viewed during personal visit, April 2001).

With regard to electronic learning, Lowe and Hall (1999) distinguish between the *process* and the *product* in hypermedia applications. The *process model* in an e-learning support unit can be equated with the instructional design model (for example, the ADDIE model: Analyse – Design – Develop – Implement – Evaluate– see Appendix B2). This section focuses on quality management of the *process* of designing, developing, delivering and implementing web-supported learning.

Using Internet and database searches, only four formal quality management systems (QMSs) have been found which focus on web-supported learning. These four examples are discussed below. Even if the titles of papers are enticing, the depth or emphasis of the research projects is often misleading or focused in a different direction. For example, *Enhancing the quality of online higher education through measurement* (Zhao, 2003) – this paper makes various suggestions as to what may be done, but does not report on any actual research done or systems implemented. Many papers present models, tools, or frameworks to enhance the quality of online learning (the *product*), usually referring to pedagogical effectiveness (see section 2.5).

The Distance Education Centre (DEC) at the University of Southern Queensland is the first distance education facility in the world to receive international quality accreditation to ISO 9001 (University of Southern Queensland, 2002). Their certification includes various institutional and operational aspects, such as organisational management, network design and maintenance, student support systems, multimedia development, telecommunications support, examinations preparation and production, courseware design and development and project management.

The fact that the DEC has IS0 9001 accreditation implies that they must have a formal quality management system in place, since this is an ISO requirement (L.G. Boyd, personal communication, 25 January 2004). On the Design and Development page of the DEC website, reference is made to the team approach, detailed record keeping, quality checks and ongoing evaluation and review of study packages. However, there is no direct mention on their website of a formal QMS[5].

A two-year research project in Wales, based at the University of Bangor, is reported by Sambrook, Geertshuis and Cheseldine (2001). They highlight some “theoretical issues and problems associated with establishing an online *quality assurance system* [italics added] for computer-based learning materials relevant to the needs of business and higher education” (p. 48).

Sambrook et al.’s (2001) quality assurance system consists of evaluation tools, guidance materials and a training package. As such it focuses on evaluating existing computer-based learning materials, or using the guidance in designing new materials. For producers or developers of instructional materials, it can be viewed as an ‘instructional design toolkit’. For consumers (students), it is a mechanism for them to select and evaluate learning

[5] Several email messages to enquire about their research outputs remain unanswered.

materials in a given programme. Sambrook et al. (2001) conclude that their system focuses on pedagogical quality, that is, the quality of learning materials and the potential of ICT resources.

The Sambrook et al. (2001) system does not, in fact, address the internal processes and procedures of an e-learning support unit, in the sense of a formal quality management system.

The Swiss Centre for Innovations in Learning (SCIL) is based at the Universitat St. Gallen in Switzerland. The Stanford Center for Innovations in Learning (also SCIL) collaborates with the Swiss SCIL on various teaching and learning projects.

The Swiss Centre promotes and supports quality improvement of e-learning in higher education, through a variety of activities, such as the development of quality standards, evaluation of e-learning projects and analysis of best practices. They have developed a quality management system and certification process in collaboration with the European Foundation for Management Development (EFMD) in Brussels and as part of the eLearning Quality Improvement Programme (ELIP). The EFMD includes an accreditation institute, for the accreditation of programmes at universities and corporate universities (Seufert, 2004). The same author mentions that self-assessment and external evaluation are part of ELIP and that from a customer perspective, the intention is to promote improved quality of e-learning.

The SCIL appears to use a TQM approach in that they consider the inputs, processes and outputs of quality management. They equate a quality management system with evaluation: formative and summative. In my experience of evaluating the literature in the field, this usually implies evaluation of products and not necessarily quality management of processes.

The Royal Melbourne Institute of Technology (RMIT) in Australia has developed a university-wide quality assurance system with respect to the instructional design of online courses (McNaught, 2002). The vast majority of their courses involve *mixed mode designs*, that is, a combination of face-to-face teaching and online learning offered through a distributed learning system.

The quality assurance policy at RMIT has three primary components: educational (instructional) design, peer review and formal evaluation. All courses with an online component need to supply clear evidence of educational design and planning (which includes curriculum coherence, administrative information, planned activities and assessment opportunities). Formal peer review sessions are held in order to evaluate online courses. This provides feedback to the course designers, as well as academic development for other participants who experience strategies that they may apply in their own courses. Summative evaluation of courses after implementation directs efforts at ongoing quality improvement. This is managed by means of a formal evaluation plan, which includes a student feedback plan.

Four formal quality management (or quality assurance) systems for web-supported learning were reviewed above. Two are at universities in Australia, one at a university in Wales and one at a European corporation with links to a university in the USA. Of those which provided details of their systems, or published papers, the RMIT example appears to be a true process-based quality management system for online learning, in that it documents policy and processes with the intention of continuous improvement.

The next section synthesizes the literature review into a conceptual framework for this study. The conceptual framework links aspects of established theories and applies them to the field of web-supported learning in higher education.

2.8 Conceptual framework

Three established theories have contributed to building the conceptual framework for this study:

- *Quality assurance theory:* the body of knowledge on quality assurance (aspects include Total Quality Management and ISO 9001) that originated in the industrial era and is now being applied increasingly to the field of education (Gabor, 1990; Macdonald, 1998).
- *Instructional systems design theory*: the body of knowledge that promotes the design and development of learning environments (usually electronic) to enhance learning (Reeves & Hedberg, 2003; Smith & Ragan, 1993).
- *Systems theory*: the body of knowledge that analyses complex systems, their constituent parts and how they interact (Checkland, 1999; Senge, 1990).

Each theory, its applicability to this study and the links between the theories are presented briefly in Appendix B. Figure 2.3 shows the relationship between these three theories.

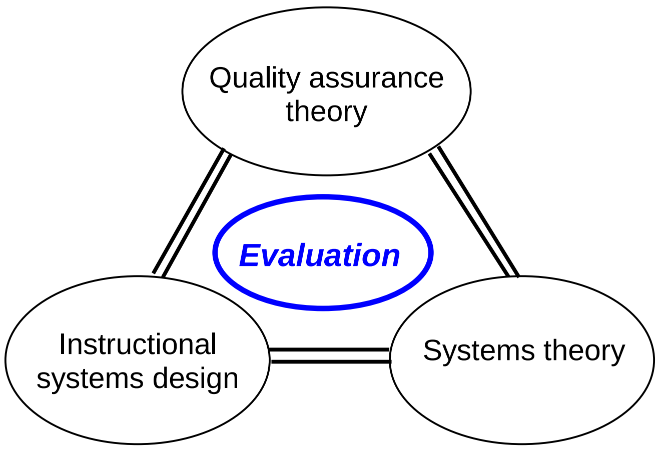


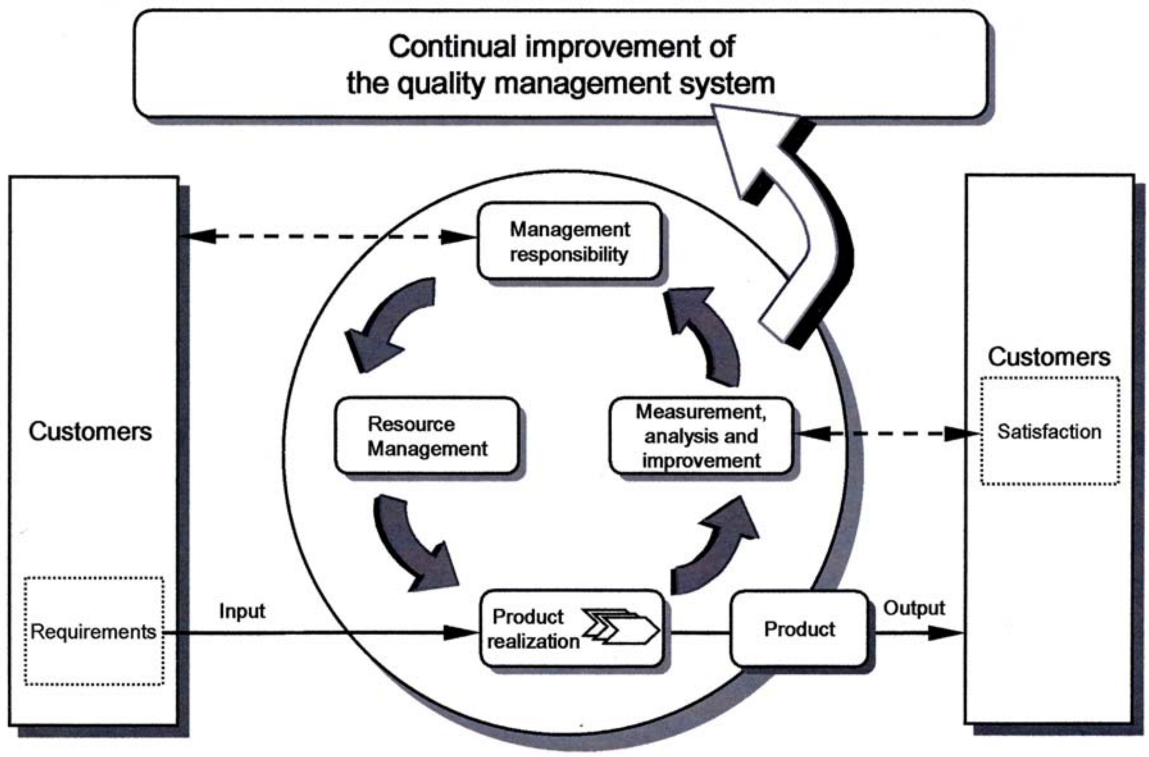
Figure 2.3:

Established theories informing the conceptual framework for this study

The common thread between all three theories is *evaluation*. Formative evaluation research and systems theory investigate human activities dedicated to continual improvement (Bereiter, 2002; Checkland, 1999). In this case study, the term *evaluation* is interpreted in three senses:

- continuously improving processes and procedures (quality assurance);
- formatively and summatively evaluating learning products (instructional design);
- improving the way human and technical systems function and interact (systems thinking).

The ISO 9001 international standard on the requirements for quality management systems promotes a *process approach* (SABS, 2000), in conjunction with the Plan-Do-Control-Act quality improvement cycle first promoted by Deming (Gabor, 1990). The ISO 9001 model (Figure 2.4) was used as a basis for the conceptual framework for this study.



Key: ——► Value-adding activities; - - -► Information flow

Figure 2.4

ISO 9001 model of a process-based quality management system (SABS, 2000)

Figure 2.4 illustrates the combination of a quality improvement cycle (indicated by the circular arrows), with the process-based approach, in which *inputs* (on the left hand side of the diagram) are converted by the *process* (the central cycle) to *outputs* (on the right hand side of the diagram). During this *process*, products are designed and produced (realised). The *products* are outputs of the process: the level of their quality contributes to the level of customer satisfaction.

I adapted the ISO 9001 process-based quality management model to produce a conceptual framework for the quality management of web-supported learning (Figure 2.5).

Figure 2.5 reflects elements of *quality assurance* theory (Plan-Do-Control-Act cycle, feedback loop, inputs, processes and outputs, client satisfaction), *systems theory* (a complex, holistic system, made up of constituent parts), and *evaluation* (user evaluation of web-supported courses). It responds to the plea that "a complete solution must recognise the importance of processes, and for adequate checking of quality, we must take a balanced account of inputs, processes, outputs and outcomes (Woodhouse, 2000b, p. 107).

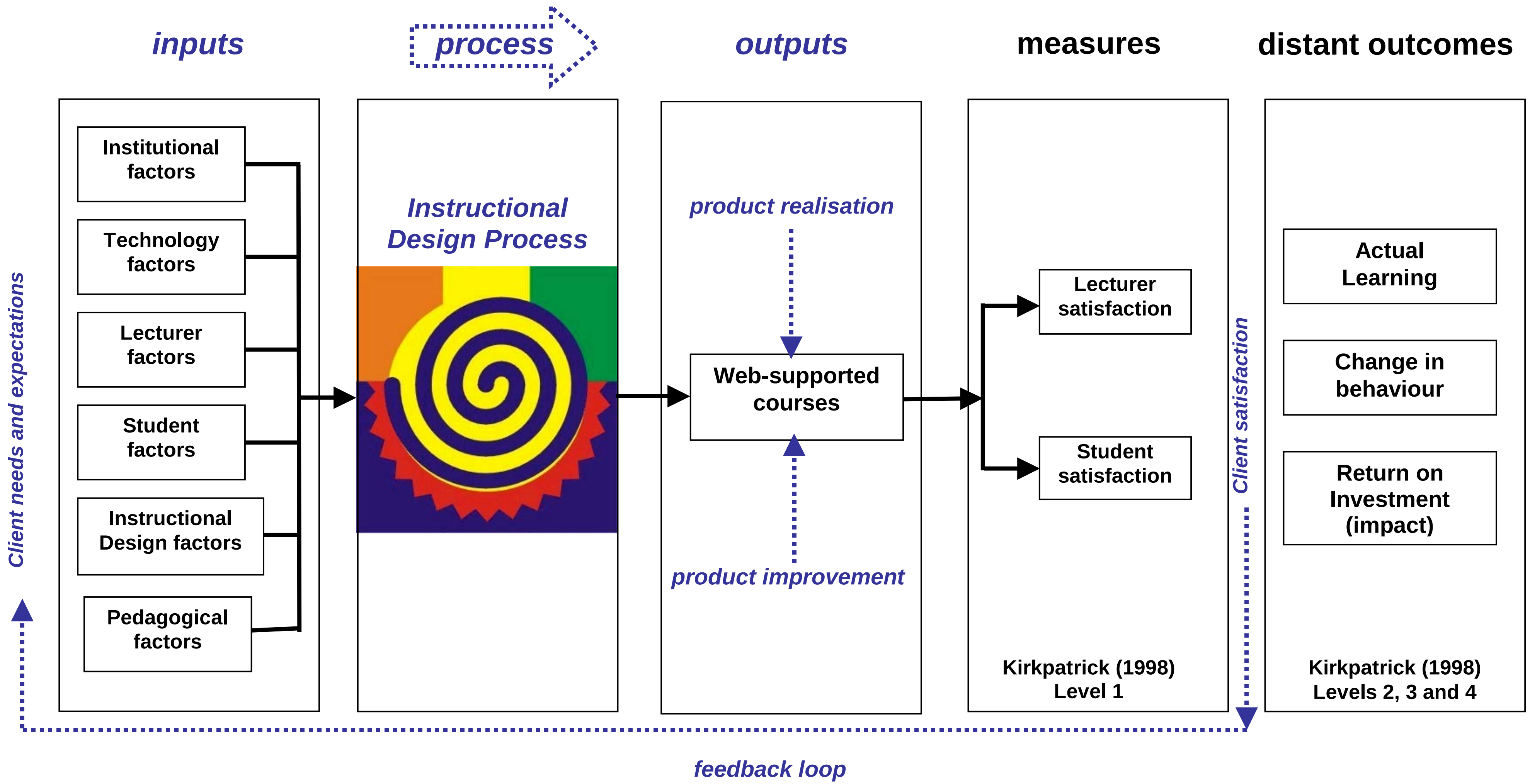


Figure 2.5:

Conceptual framework: A process-based quality management system for web-supported learning

The inputs into the system include factors identified from the literature review, which contribute to the quality of web-supported courses, in the categories institutional, technology, lecturer, student, instructional design and pedagogical factors (see Table 2.2 for details of the factors in each category).

In the context of this case study, certain unique factors within these categories are briefly described here. With respect to institutional factors, TLEI enjoys commitment and funding from top management, including the provision of human resources (TLEI practitioners), computer laboratories on campus and a campus-wide licence for a learning management system. Technology factors which directly influence the quality of web-supported learning and the extent of customer satisfaction include the support received from the campus IT division, the provision and maintenance of technology and human resources in the computer laboratories and the availability of a help service for lecturers and students.

Some of the lecturer and student factors in this case study tend to be universal rather than unique, for example, varied backgrounds, learning styles, levels of commitment and motivation, and differing positions on the adoption curve (Moore, 1999) for web-supported learning. What is unique about the South African learner population is the extent of cultural and language diversity that needs to be catered for in designing any learning opportunity, as well as the fact that only half[6] the student population has access to computers in their homes (see chapter 4). Increasingly, the needs of students with disabilities are now being recognised, both nationally and internationally.

Instructional design and pedagogical factors tend to be universal, i.e. approaches in which promote constructivist learning principles and practices to encourage deep and meaningful learning. What is unique to web-supported learning is the challenge to optimise the use of the medium, without simply converting existing learning materials into electronic format. Complementing this need is the challenge to encourage lecturers to enhance their facilitation of

[6] In the sample in this study, 56.2% of students have computers in their homes.

web-supported learning.

In Figure 2.5, the instructional design *process* is represented by the stylized image. The ISO 9001 quality cycle was adapted to form a spiral, implying continuous improvement, striped ribbons implying excellence, such as an award or medal, and a 'stamp of approval' indicating accountability and accreditation[7]. These interpretations of the meaning of quality were adopted by the E-Education Unit in this case study to generate a *quality policy*.
A quality policy is an ISO 9001 requirement (SABS, 2000). The written policy embraces the philosophies of fitness for purpose, client satisfaction and continuous improvement (see Appendix F10).

In Figure 2.5, the iterative flow (indicated by dashed arrows and italic text) represents the feedback loop, an integral part of the Plan-Do-Control-Act cycle. Customer needs and expectations (the antecedents) are categorised in terms of the taxonomy of factors required (inputs). These inputs are transformed via the instructional design *process*, in order to realise quality web-supported learning *products* (outputs). *Product realisation* refers to the production and formative evaluation of web-supported learning opportunities. *Product improvement* refers to the summative evaluation and improvement of the completed products.

Improvement decisions need to be based on *measurements* which provide management information and inform the quality cycle. Measurements can take many and varied forms. The measurements investigated in this study are participant reactions according to Kirkpatrick's (1998) Level 1, namely levels of student and lecturer satisfaction. These client feedback measures need to be acted upon (for example, via a summative evaluation procedure), with the aim of ongoing process and product improvement.

Other possible measures of quality include actual learning that took place (for example comparing scores on pre- and post tests), changes in behaviour as a

[7] The image was designed by the graphic design section of TLEI.

result of learning, and return on investment (impact on the organisation) after learning has taken place. These additional measures, which are Kirkpatrick's (1998) Levels 2, 3 and 4, provide scope for further research and are included in Figure 2.5 as *distant outcomes*.

In order to measure the distant outcomes, in particular return on investment, financial inputs will need to be quantified and cost effectiveness investigated. The cost issues are not part of the present study, although the provision of infrastructure and adequate resources are included as required institutional factors.

2.9 Summary

This chapter reviewed the literature in terms of quality in general, quality assurance in higher education and quality assurance in higher education in developed countries and in South Africa. It investigated the literature in respect of each of the three research questions in this study: factors to promote quality web-supported learning (section 2.5), client satisfaction with web-supported learning (section 2.6) and quality management systems for web-supported learning (section 2.7).

The construct *quality* includes the perspectives of quality as *exceptional*, quality as *perfection or consistency*, quality as *fitness for purpose*, quality as *value for money* and quality as *transformation*. Quality as *innovation,* with an emphasis on *client satisfaction* (anticipating customer wants and needs) prompted research question 2 in this study.

Two aspects of the quality debate were engaged in this chapter, namely the merits of introducing quality assurance practices into higher education, and the dilemma of internal improvement versus external accountability (the Scylla and Charybdis dilemma). It was concluded that a meaningful approach to self- and continuous improvement in higher education is possible, taking into account the sensitivities and commitment of participants, the dynamic nature of education and basic good management practice. In so doing, it is possible to avoid the threats of Taylorism, cloisterism and conformance to specifications.

An overview of the current international status of quality assurance in higher education was given. Europe, United Kingdom, United States of America, Australia and New Zealand are prominent in the field, with well established national agencies and histories of applying quality assurance principles to education.

National transformation initiatives and the current legislative framework in South Africa were summarised. Quality assurance in South African technikons is further advanced than it is in universities, where there is an uneven level of internal and external quality assurance mechanisms. The HEQC initiated pilot audits of higher education institutions in 2003, which included the University of Pretoria as the first university to contribute to the practice of institutional audits and to the specification of relevant criteria.

In considering the first research question, prominent international studies were reported and analysed. The analysis was presented in two categories: classic benchmarks, indicators or principles and criteria for exemplary or promising technology-enhanced courses. In the former category, classic studies that are often cited in the literature were analysed. In the latter category, studies by recognised agencies such as the vendors of WebCT (Canada) and the Office of Educational Research and Improvement (OERI) in the United States were analysed. Details of the findings of all these studies are given in Appendix C. A taxonomy of factors to promote quality web-supported learning was synthesized: institutional factors, technology factors, lecturer factors, student factors, instructional design factors and pedagogical factors. The critical factors in each category of the taxonomy were given in Table 2.3. The extended and refined taxonomy is given in Tables 4.3 and 4.4, together with a graphic interpretation (Figure 4.3), in answer to the first research question.

With respect to research question 2 (satisfaction of students and lecturers), client satisfaction is a vital component of quality assurance and is reflected in Kirkpatrick's (1998) first level of evaluation: Reaction. The clients of an e-learning support unit in higher education are lecturers and students. Several specific studies were found which collected student feedback information on courses supported by online materials and activities, but not on an institution-wide basis. Only one study was found which investigated motivating and inhibiting factors for faculty members who embark on technology-supported learning.

With respect to research question 3 (applying quality assurance theory to the instructional design process), only two higher education institutions were found (University of Southern Queensland and RMIT, both in Australia), which have implemented formal processes and procedures for distance education supported by technology. Other research projects, although they may refer to 'quality assurance systems', generally tend to concentrate on the pedagogical effectiveness of online learning, or alternatively on institutional quality assurance measures to improve teaching and learning in general.

There is therefore a lack of guidance in the literature for e-learning practitioners or government quality assurance agencies attempting to document critical success factors to standardise and improve the quality of web-supported learning, from both the process and product perspectives.

The theoretical basis for this study embraces the established theories of quality assurance, instructional systems design and systems theory. Instructional design models traditionally include phases of formative and summative evaluation. Systems thinking has been applied to quality management by various authors (Senge, Kleiner, Roberts, Ross & Smith, 1994; Fourie, 2000). It may be applied to complex systems such as instruction systems design and formal systems such as quality management systems.

The chapter ended by presenting the conceptual framework for this study, based on elements of quality assurance theory (for example Plan-Do-Control-

Act cycle, feedback loop, client satisfaction, inputs, processes and outputs), instructional systems design (for example, formative and summative evaluation of web-supported courses) and systems thinking (complex, holistic human activity systems, made up of constituent parts)

The conceptual framework is represented diagrammatically in Figure 2.5, which incorporates all three theories and adapts them to the instructional design process for web-supported learning products.

Chapter 3

Research Design and Methodology

3.1 Overview of this chapter

This chapter presents the research philosophy, design and methodology for this study. The research philosophy is presented first, in order to clarify the researcher's epistemological viewpoint. The research design presents the design choices made and the strategies that were used to answer the research questions. Thereafter the methodology is described in terms of the sampling and participants, instruments, procedures, data collection and data analysis.

3.2 Research Philosophy

The philosophical foundation of this study has grown and evolved from a predominantly positivist epistemology towards a more naturalistic, interpretive epistemology. This viewpoint implies:

- focusing on trying to understand and interpret a particular phenomenon (i.e. *quality in web-supported learning*);
- being directly and personally involved in the research project;
- investigating the 'taken-for-granted' (constructs such as *quality*, *systems* and *evaluation*);
- having a concern for individuals involved (e-learning practitioners and clients) – this is described as *existential phenomenology* (Schutz, as described by Cohen, Manion & Morrison, 2000);
- having a practical interest in the case study, in order to continuously improve real world practice.

The philosophy described above is in line with Creswell's (2003) *pragmatic, mixed methods* approach, in which there is a concern with applications and solutions to problems. This study makes use of *qualitative* methods, such as case analysis meetings (Miles & Huberman, 1994), interviews with lecturers ("guided conversations", Yin (2003a) p. 89) and task teaming (Vinca, 2004). Section 3.4.3: *Procedures* gives details of the procedures involved for these data collection methods. This study also has a *quantitative* component in the form of statistical analysis of closed questions in the student survey (see section 3.4.5: *Data analysis*).

In keeping with the exploratory nature of this study and the mixed methods approach, a combination of etic and emic data was gathered: etic data from the surveys and emic data from the case analysis meetings, interviews and task teams (see Table 3.1: *Research strategies*).

3.3 Research Design

This section presents the research design for this study, followed by the research methodology in section 3.4. The research design describes the nature of this study, including a description of the case and the unit of analysis. Design choices are reported, such as the strategies that were used to answer each research question (section 3.3.1). Issues of validity and reliability are discussed in sections 3.3.2 and 3.3.3 respectively.

3.3.1 Design choices

This investigation is an exploratory study, based on a **case study** of the Department of Telematic Learning and Education Innovation (TLEI) at the University of Pretoria in South Africa. The time period for this particular study was from 2001 to 2003, with scope for further research in an ongoing way, due to the nature of continuous improvement.

The unit of analysis (i.e. what is being analysed within the case) is the instructional design *process*. The embedded units of analysis (Yin, 2003a) are the web-supported learning opportunities that are designed and developed by

TLEI (these may be considered to be *products*, just as an *Apple* computer or a *Xerox* photocopy machine is a product of those respective companies).

According to the delineation of the case and the unit of analysis described above, the design of this study is a *single* case, embedded design (Yin, 2003a). The work done for various departments and faculties could be considered to be multiple cases, in some other research design, where a researcher may want to *compare* the instructional design process in different subject areas. In this particular research design, TLEI is a centralised unit, offering a centralised instructional design process. The various interventions are classified as *projects,* since a project management approach is adopted. No particular *projects* are analysed in this study.

Although conclusions that might arise independently in multiple cases could be more powerful and generalisable than those coming from a single case, the circumstances of this case study imply that I am part of the instructional design team and hence a participant observer. This single case may be considered *representative*[1], or typical of e-learning design and production units in other higher education institutions. The reasons this case may be considered representative of other e-learning units, are that instructional design practice recommends a team approach (Gery, 1987; Smith & Ragan, 1993), the clients served are lecturers and students and the instructional design *process* involves some form of digital mediation and interaction between lecturers, instructional designers and learners (Reeves & Hedberg, 2003).

This case study may also be described as an *instrumental* case study (Stake, 2000). This means that a particular case is examined and scrutinised and its activities are recorded and researched in an attempt to gain insight into an issue *(quality in web-supported learning)* and to inform understanding of the broader scenario.

[1] According to Yin (2003a) a representative case is a rationale for the use of a single case design.

An *evaluation* aspect is present in the case itself as well as in this study:

- in the case: the evaluation aspect is the regular formative and summative evaluation of web-supported learning opportunities (products);
- in this study: the self evaluation aspect is the analysis of the instructional design *process* (see section 2.8: *Conceptual framework*) in the pursuit of continuous improvement and measures to close the feedback loop (see Figure 3.1).

Although the *case* is singular, it has subsections and sub groups (Stake, 2000). In 2003, the instructional design team in TLEI consisted of 5 project managers, 12 instructional designers and 1 programmer. Other members of TLEI provide support in the design, development and implementation of e-learning interventions, for example education consultants, graphic designers, video and photographic experts. The *clients* of TLEI are lecturers who are involved in the design, presentation and facilitation of web-supported courses, and the students who are the end users of the products. Both groups of clients are role players and their feedback is a source of data to inform continuous improvement of the unit of analysis (see Figure 1.2: *Role players*).

The *criteria* by which the exploration will be judged successful (Yin, 2003a) may be viewed as the *programme objectives* of the intervention. In this case study, the intervention is the process-based quality management system for web-supported learning, in the full sense of the word *system* (see Figure 2.5). There is an epistemological tension between the practical objectives achieved by the intervention (the descriptive, the positivist, the concrete artifacts in the workplace) and the intellectual ideals striven for (the interpretivist, the relativist, the intangible understanding sought and distilled from the pragmatic experience, the journey towards growth and understanding). The practical objectives[1] are listed on the home page of the online QMS and are not discussed here (see Figure 6.2 and Appendix F7).

[1] Supplied by L.G. Boyd, personal communication, 9 October 2003.

The intellectual ideals seek understanding and explanation. They are:

1. to understand how standard quality assurance theory may be applied to the instructional design process with respect to web-supported learning;
2. to understand the interplay between quality of processes and quality of products;
3. to interpret client satisfaction in terms of summative evaluation of web-supported products in the quest for continuous improvement.

The achievement of these research ideals are reviewed and reflected upon in the final chapter of this thesis (chapter 7).

Table 3.1 gives an overview of the research strategies with respect to each of the three research questions that were presented in chapter 1. In section 3.4: *Research Methodology*, the sampling, instrumentation, procedures, data collection and data analysis are presented in detail.

Table 3.1

Research strategies with respect to the research questions

Strategy: / Research questions	Literature survey	Case analysis meetings	Student survey	Lecturer interviews	Expert consulta-tion	Task teaming
1. What factors promote quality web-supported learning?	X	X				
2. What factors contribute to client satisfaction (or frustration) with web-supported learning?	X		X	X	X	
3. What lessons were learnt in applying standard quality assurance theory to the instructional design process for web-supported learning?	X				X	X

The literature survey identified various factors to promote quality web-supported learning. These factors were synthesized into a taxonomy

(Table 2.3), which provided the inputs into the conceptual framework (Figure 2.5). Triangulation was provided via two case analysis meetings with critical colleagues whose input “combed” (Miles & Huberman, 1994) and refined the taxonomy. The findings for the first research question are presented in the form of the refined taxonomy together with a list of underlying assumptions and exogenous factors, as well as a graphic mapping of the taxonomy using ideas from the field of information science (chapter 4).

The literature survey also highlighted the importance of obtaining client feedback in order to measure the quality of web-supported learning (section 2.6). Client feedback informs the feedback loop with a view to continuous improvement of web-supported products. Therefore a student survey and lecturer interviews were used in order to answer research question 2. Expert consultation was also sought, with respect to the summative evaluation of products in order to provide measurements to inform the quality improvement cycle (see Figure 3.1). The student survey and the lecturer interviews are described broadly below and in more detail in section 3.4.3: *Procedures*.

I developed and piloted the questionnaire for the online student survey in 2001. Since then, it was refined and is now administered at the end of each semester (July and December) to all students at the University of Pretoria (both undergraduate and postgraduate), who participate in web-supported courses. The findings from July 2003 (4 650 respondents) are analysed and reported in this study (chapter 5). The same instrument was trialled by De Bruyn (2003) and Delport (2003) who used it in other research projects.

A small sample of lecturers (22) at the University of Pretoria who participate in designing and facilitating web-supported courses, were surveyed in February 2004, by means of personal interviews. This was a pilot experiment which enabled in-depth questioning of the participants and provided the opportunity to test and improve the interview schedule. A full-scale campus-wide investigation of client satisfaction with respect to *all* the services of TLEI is planned as part of an impact study in 2005[2].

Research question 3 is answered by the evidence contained in departmental documentation and archival records, the activities of task teams and the artifacts they produced and expert guidance from a quality assurance consultant (chapter 6). This part of the case study is descriptive as well as exploratory. The findings from this part of the study can be described as those resulting after a reflective journey of the participant researcher.

Four criteria are commonly used to establish the quality of research designs in the social sciences: construct validity, internal validity, external validity and reliability (Yin, 2003a). These tests are discussed in the following subsections.

3.3.2 Validity

Construct validity in this study has been demonstrated by the careful analysis of the construct *quality* and of the constituent parts of a quality management system, such as *processes*, *products* and *clients*. These constructs were articulated in section 1.7.1: *Institutional context* and section 2.8: *Conceptual framework*. The construction of *quality assurance in higher education* in this study embraces continuous improvement in the search for excellence, with the emphasis on self-evaluation and a quality culture, rather than a culture of compliance (see sections 1.1: *Introduction* and 2.4.1: *Perspectives on the debate*). *Quality* terminology and *learning* terminology were clarified in chapter 1, as were the three knowledge domains: quality assurance, higher education and web-supported learning.

Construct validity in the student questionnaire was enhanced by basing it on validated categories and instruments from the literature (Hannafin & Peck, 1988 and Ramsden, 1991). The lecturer interview schedule was a newly developed instrument and part of this research effort was to validate and

[2] The impact study does not form part of this research study, but provides scope for further research.

improve it by piloting it. The suggestions for refinement of the instrument (section 4.3.4) enhance its construct validity for further research.

Although Yin (2003a) claims that *internal validity* applies only to explanatory and not to exploratory studies, a brief reflection is given here on the naturalistic equivalent of internal validity, namely *credibility* (Guba & Lincoln, 1981). This study made use of a participant researcher, peer examination of data and mechanical means to record, store and retrieve data. These are techniques used to address internal validity (credibility) (Le Compte & Preissle, as cited by Cohen et al., 2000).

A common threat to credibility is distortions in the data due to the researcher's presence at the research site, in other words, *observer effects*. In this study, being a permanent member of the instructional design team at TLEI, I was not regarded as an external researcher. However, my participation in the QMS Steering Team and the task teams meant that my input and my suggestions clearly influenced the nature and content of the artifacts produced. My contribution cannot be described as causing any distortions or bias however, since peer examination of the artifacts occurred when task team members reflected on their practice and reached consensus on the documentation.

With respect to the student survey, the data was electronically captured, generated and stored in html and Excel format. The fact that the data existed in various formats contributes to credibility, since the alternative formats were used to validate frequency counts. For example, when something appeared strange in the findings, such as the graphical distributions for two variables being identical, I could use the alternate data format to identify and correct the problem. Human error was minimized by using Excel to clean and code the data, except in the case of the open responses, in which human judgment was required in the coding of the responses. It would have been advantageous to repeat the coding exercise using different assistants to hand code different samples of open responses. However, repeating such an exercise several times over would still have been able to tap only a small proportion of the total number of open responses (4 650 respondents x 3 open questions each).

External validity can be thought of as synonymous with generalisability (Cohen et al., 2000; Yin, 2003a), in that it considers the *applicability* of a study's findings in a wider context (Guba & Lincoln, 1981). Yin (2003a) points out that in case study research, the idea is precisely not to attempt to generalise to other case studies, but rather to generalise to *theory*. That is what this case study aims to do: the themes and issues within instructional design practice and the need to merge the discourses of quality assurance and web-supported learning are universal phenomena experienced by many e-learning practitioners (personal communications, S. Celliers, 1 July, 2004; V. Greaves, 16 July, 2004).

Cronbach, as cited by Guba and Lincoln (1981), maintains that generalisations decay and that soon after they are made, they become history rather than science. Particularly in qualitative research, the major concern is often not generalisability; thus moving away from rigorous pressures to generalise is a small loss (Guba & Lincoln, 1981).

Specific aspects of generalisability of this study were described in chapter 1, section 1.9.3: *Generalisability*.

3.3.3 Reliability

Reliability is essentially a synonym for *consistency* and *replicability* over time and/or over groups of respondents (Cohen et al., 2000; Guba & Lincoln, 1981). In this case study, the different strategies used to answer the various research questions exhibit varying degrees of reliability, as discussed in the following paragraphs.

The literature review, which contributed to the taxonomy of factors to promote quality web-supported learning, was extensive, up-to-date and based on reliable sources, wherever possible (see section 2.2: *Literature sources*). The findings are corroborated by studies found after the synthesis of the taxonomy (see chapter 4). Further triangulation was provided by the case analysis meetings, in which critical colleagues helped to confirm and refine the taxonomy.

The student questionnaire was piloted and refined for two years, prior to its administration in July 2003 (see chapter 5). It was also subjected to external evaluation by the South African Institute of Distance Education (SAIDE), which reported that both “the student and lecturer feedback instruments are very well crafted and the presentation of the student feedback findings in terms of satisfaction and frustration indices is illuminating” (T. Welch, personal communication, 22 June 2004).

In analysing the data from the student questionnaire, the goal was to calculate frustration and satisfaction indices. That analysis is based on my decision as to which questionnaire items indicate frustration and which items indicate satisfaction. This was done in consultation with a statistician who advised that a considerable amount of intuition and common sense is required in making such decisions when categorising data. Reid (2000) describes such decision making thus: “As with most real life studies, there were a number of decisions related first to data collection, and then to modeling the observed data, that involved considerable creativity…” (p.1335). Merriam (1998) also refers to the fact that data analysis (especially in qualitative research) is highly intuitive and that a researcher cannot always explain where an insight came from or how relationships among data elements were detected.

Threats to the reliability of the analysis of the open responses in the student questionnaire are the risk of human error and judgement in allocating codes. Furthermore, the coding frame was perhaps not sufficiently discriminatory, since too many responses had to be coded as “Other”. The analysis will lead to improvements in the coding frame for future administrations of the survey.

Due to the nature of the satisfaction and frustration indices calculated from the student feedback data, it is expected that a pattern should emerge over time and over different groups of respondents, rather than precisely replicable findings over subsequent administrations of the instrument.

Indeed, Cohen et al. (2000) point out that "the premises of naturalistic studies include the uniqueness and idiosyncrasy of situations, such that the study cannot be replicated – that is their strength, rather than their weakness" (p. 119). The same can be said of the lecturer interviews in this study – due to the very fact that individual perceptions of benefits and problems experienced were mined, the results are particular to the individuals interviewed at the time and are not necessarily replicable. However, the intention was to tap into clients perceptions, in order to continuously improve practice and services. In that sense the data obtained was valuable and informative.

With respect to the task teams who reflected on and documented their practice, the nature of the field of instructional design and web-supported learning is so dynamic, that it is expected that the resulting procedures will require frequent updating. Nevertheless, valuable lessons were learnt about difficulties in the field and how to overcome them. This is the nature of an exploratory study.

3.4 Research Methodology

3.4.1 Sampling and participants

Samples were drawn in order to survey students and to interview lecturers. These samples are described respectively below.

Participation in the online student survey was voluntary, therefore the sampling technique may be described as a *self-selecting sample* [3] (A. Swanepoel - statistician, personal communication, 1 August 2003). The survey was administered *online* at the end of the first semester in 2003 (see section 3.4.3: *Procedures*). Of a population of approximately 17 000 students with WebCT courses, 4 650 participated in the survey, yielding a response rate of 27%.

[3] See discussion of possible bias in section 3.4.6

A purposeful sample was selected for the lecturer interviews. Lecturers known to be active in the implementation and facilitation of WebCT were specifically targeted, since they could make a valuable contribution to analysing the effectiveness of web-supported learning[4]. Twenty two lecturers were thus identified across the faculties of Education, Humanities, Economic and Management Sciences, Natural Sciences, Engineering / School of IT and Health Sciences (see Table 3.2).

Table 3.2 *Lecturer Experience and Satisfaction interviews conducted*

Faculty	Department	No. of interviews
Humanities	Psychology	1
	Visual Arts	1
Education	School for Teacher Training	1
	Centre for Evaluation and Assessment	1
	Centre for Augmentative and Alternative Communication	2
Economic and Management Sciences	School for Public Management and Administration	1
	Graduate School of Management	2
	Marketing and Communication Management	2
	Taxation	2
	Tourism Management	1
Engineering and the School of IT	Information Science	1
	Industrial Engineering	1
	Technology Management	1
	Mining	1
Health Sciences	Physiotherapy	1
	Anatomy	1
Natural Sciences	Chemistry	1
	Geography, Geoinformatics and Meterology	1
	Total:	**22**

[4] Barriers to web-supported learning are beyond the scope of this study, for example, lecturers who may have initially embraced and then later abandoned the use of web-supported learning for various reasons.

This section now describes the composition of the task teams which designed and developed the online quality management system (QMS) for web-supported learning. ISO practice recommends that one team (the *steering* team) should lead QMS projects, with smaller task teams to analyse, develop and document procedures (Vinca, 2004). In this case study, a QMS Steering Team led the development of the online QMS. This team consisted of all the e-learning practitioners that make up the instructional design team, namely 12 instructional designers and 5 project managers. The group consisted of 2 men and 15 women, ranging in age from early twenties to late forties, as well as the external consultant. Most of the team members are graduates trained in instructional design and the use of web-supported teaching and learning strategies and activities.

The smaller task teams were constituted from the QMS Steering Team, so their members were subsets of the instructional design team (see section 3.4.3: *Procedures: research question 3*).

3.4.2 Instruments

Formal instruments were designed for the student survey and the lecturer interviews:

- the *Student WebCT Experience* questionnaire (Appendix D1);
- the *Lecturer Experience and Satisfaction* interview schedule (Appendix E1).

Each instrument is described in further detail in this section.

Student questionnaire

The student WebCT Experience questionnaire consists of 27 closed items and 3 open items. I designed[5] the first draft instrument in 2001, based on the literature (Hannafin & Peck, 1988; Ramsden,1991) – see section 3.3.2: *construct validity*. Besides personal information, five categories were identified which reflected the issues to be investigated:

[5] This instrument is part of my original contribution to the field.

- personal information (4 items);
- technical adequacy and technical support (11 items);
- educational support (2 items);
- affective domain (feelings and emotions of students) (4 items);
- interactivity (use of the communication tools in WebCT) (2 items);
- instructional adequacy (perceived learning) (4 items).

The questionnaire was piloted during 2001 and 2002, after which the items and scales were refined and improved in consultation with the instructional design team. Since 2003 the questionnaire has remained almost unchanged, in order to enable longitudinal studies comparing results between semesters or from year to year (this provides scope for further research). The data from July 2003 thus provides a basis for monitoring change, improvement and the impact of web-supported learning, although the problems of bias due to the self-selecting sample are acknowledged.

The number of items in the questionnaire was kept to a minimum, so as not to frustrate the respondents with a lengthy questionnaire. For the closed questions, a 5-point Likert scale was used, ranging from *Strongly Agree* to *Strongly Disagree*. Open questions were kept to a minimum (three) and students were asked to give concise answers (in point form) to these three open questions. Issues and themes were identified by analysing a random sample of open responses, until data saturation[6] was observed, at which point analysis of the open responses was terminated (see section 3.4.5: *Data analysis*).

Lecturer interview schedule

The semi-structured interview schedule was designed and developed for lecturers to complete. The instructional design team was invited to comment on the content and structure of the items, thus contributing to its construct validity.

[6] Lincoln and Guba (1985) define data saturation as "continuing data collection produces tiny increments of new information in comparison to the effort expended to get them" (p. 350).

The interview schedule is a four-page document (Appendix E), which poses both closed and open questions. The closed questions are structured on a 5-point Lickert scale in the categories:

- overall effectiveness of the WebCT course (5 items);
- achievement of student learning outcomes (3 items);
- WebCT staff training attended (2 items);
- service provided by TLEI and the Academic Information Service (5 items).

Space is provided on the interview schedule to add further comments on the above items as well as for open questions in four categories:

- problems experienced (2 items);
- benefits experienced (2 items);
- impact of the e-learning product (1 item);
- overall evaluation (3 items).

The interview schedule was available in both English and Afrikaans, so that lecturers could choose their language of preference[7]. Participants were invited to make suggestions to improve the usefulness and relevance of the schedule. Scope for further research is to refine the schedule and administer it regularly to all lecturers at the university who have registered WebCT projects.

3.4.3 Procedures

The procedures followed with respect to each research question are described in this section.

Research question 1: Factors to promote quality web-supported learning

The literature survey investigated international frameworks to promote the quality of web-supported learning. During the early stages of the literature

[7] The student questionnaire was available only in English in 2003, but in both English and Afrikaans from 2004.

review (2002), studies relevant to the topic were informally identified. These studies were of two types: criteria to judge promising or exemplary online courses, or classic collections of benchmarks, indicators or principles that are often referred to in the literature. A comparative analysis of these studies was undertaken. Notes were made to summarise the factors, benchmarks or frameworks presented by the authors. Categories and factors which contribute to the quality of web-supported learning were identified and refined, in order to record frequency counts of the factors mentioned in each study. This resulted in a taxonomy of factors to contribute to quality web-supported learning (see chapter 2: Table 2.2).

During 2004 the ERIC database was searched for the topic *higher education* and *quality assurance* and *web-based instruction* (or relevant synonyms). Not all the search results were applicable to this research question, for example, some studies focused on topics such as assessment in e-learning, or broad distance education. Refinement of the search criteria identified additional pertinent studies published from 2000 onwards. These studies were then analysed for the purposes of corroborating and extending the factors in the taxonomy.

Miles and Huberman (1994) recommend that such a list of factors (or variables), needs to be "combed for redundancies and over differentiation" (p. 157). This means that the list should be reviewed to eliminate redundancy, to group similar factors together in one "box" and to tease out basic underlying assumptions. In order to enhance trustworthiness, the taxonomy was "combed" using the input and reflection of critical colleagues during two "case analysis meetings" (Miles & Huberman, 1994, p. 156). The colleagues are experienced instructional designers within the case study. Exhibit 3.1 shows part of the communication that took place with the critical colleagues.

Exhibit 3.1: Interaction with critical colleagues

```
E-mail message
From:      Jill Fresen
Sent:      30 August 2004 16:30 PM
To:        A,D and G
Subject:   Factors for quality WSL

Dear A, D and G
Thank you very much for your valuable input this morning – I
really appreciate your time and ideas.

I attach the original list of factors that we discussed, plus
the “combed” list.  I would really appreciate it if you are
able to cast an eye over the combed list and see that I have
not left out anything critical or misrepresented anything.  I
did delete quite a few factors, like “continuous improvement”
and put them under “underlying assumptions”.
```

The critical colleagues provided their input verbally during the case analysis meetings and via e-mail. I refined the taxonomy and sent it to them for their further discussion and final consensus. The resulting taxonomy is presented in the findings for the first research question (chapter 4, Tables 4.3 and 4.4).

Research question 2: client satisfaction

The completion of the online student questionnaire was voluntary and anonymous. The respondents were not identified in any way, since the goal was to calculate and compare levels of satisfaction and frustration and not to measure the extent of individual student learning. In the welcome message, students were assured of confidentiality, so that they felt comfortable that it was the course under scrutiny, not themselves.

The questionnaire was programmed by a programmer using phpESP software[8] (http://phpesp.sourceforge.net). It was implemented on *Student Online Services*, the campus-wide portal from where students access their WebCT courses. After the questionnaire had been made available online by the programmer and completed by the students, the programmer e-mailed me the data in Excel and html format.

[8] The WebCT survey tool was not used, since data collected that way has to be exported and re-formatted in Excel, which is time intensive and open to human error, especially if columns need to be manipulated.

Since the lecturer interview schedule was newly developed in late 2003, it was piloted during February 2004 with 22 lecturers who were known to be active in WebCT. Where possible, field notes were taken by the interviewer, when additional information emerged beyond the questions on the schedule. The interviews were guided conversations (Yin, 2003a), in which the questions on the interview schedule were posed by the interviewer, who probed further when issues were identified, or when the respondent volunteered additional information. The respondents were encouraged to be honest in their responses and to report any other impressions or needs not catered for by the semi-structured schedule. Responses were recorded by the interviewer by hand on the interview schedule, using additional space where necessary to record the richness of the open responses. The interviews were not recorded on audio or video tape.

In some departments, personal appointments were not possible for various reasons. These lecturers offered to complete the interview schedule in the form of a survey, which was submitted by e-mail or by post. This data was included in the analysis, but was less rich than that obtained during interviews, since self-completion of the schedule meant that respondents were less inclined to volunteer additional information. The issues that are analysed in the findings (chapter 5) derived primarily from the respondents that were interviewed.

After the interviews, a *thank you* letter was sent to each respondent in the interests of client relationship management and to express sincere appreciation for the time taken and honest opinions expressed.

Research question 3: process-based quality management system

In order to answer the third research question, namely to apply standard quality assurance theory to the instructional design process for web-supported learning, expert consultation was sought from an external quality assurance consultant. The scope of her work from 2001 to 2003 was to guide and facilitate the design, development and implementation of a formal QMS for web-supported learning (Boyd, 2001a). Her role was a consultative one.

She helped to plan and participated in the QMS Steering Team meetings and attended one of the small task team sessions. As the need arose, she produced documentation to prompt commitment from participants and to guide the writing of procedures[9] (see Appendix F). She reviewed and gave written feedback on all the checklists and procedures written by the task teams.

The procedures for this research question are summarised below according to four steps:

Step 1: training in quality assurance theory
Step 2: task team sessions
Step 3: paper-based prototype
Step 4: online version of the QMS

Step 1: Training in quality assurance theory

This step generated no data, but set the climate and prepared participants for their later activities in producing artifacts for the QMS. The consultant prepared and delivered face-to-face training workshops for the potential users of the QMS (Boyd, 2001b). The workshops facilitated the theory of quality assurance in terms of hierarchical ideas of processes, procedures and work instructions, as well as examples of how to document procedures, such as narrative, flow charts, diagrams or tables.

Additional training material (e.g. guiding questions, sanity checks etc.) was produced by the consultant when it became clear that participants had forgotten some aspects of the quality assurance training (see Appendices F7 and F8).

The theoretical framework which is the basis of the design of the QMS is shown in Figure 3.1.

[9] Her documents and ideas have been acknowledged where appropriate.

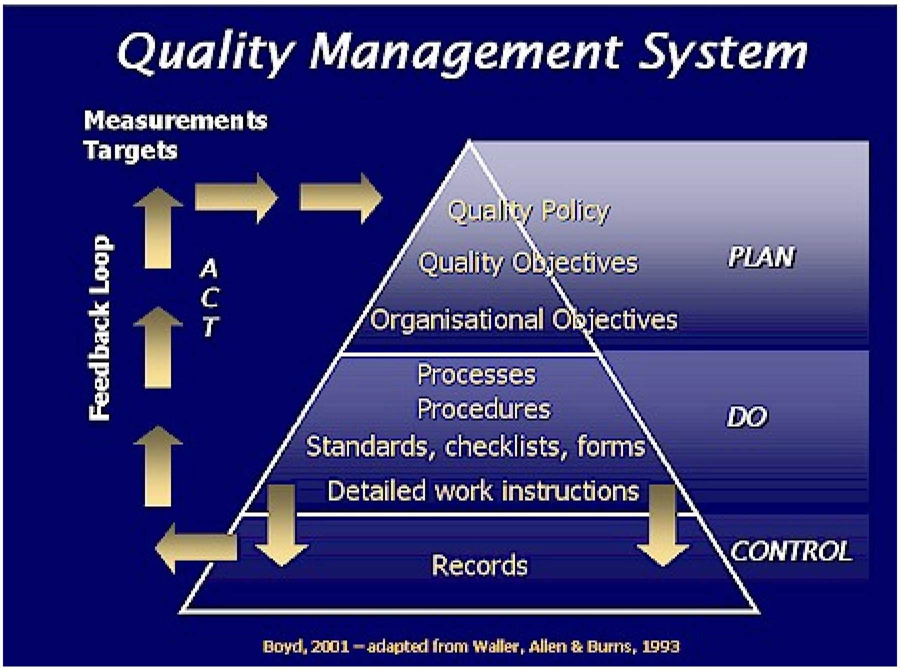


Figure 3.1. Elements of a quality management system
(Boyd, 2001b - adapted from Waller, Allen & Burns, 1993)

The quality management triangle in Figure 3.1 is based on Deming's Plan, Do, Control, Act cycle, a cycle of continuous testing and improvement, developed by W. Edwards Deming in the 1950s (Gabor, 1990). It summarises quality assurance theory and demonstrates visually how the feedback loop provides management information to continually act on and re-inform the cycle of continuous improvement.

Step 2: Task team sessions

Three QMS Steering Team meetings were held from February to July 2003. The responsibilities of the QMS Steering Team (adapted from Vinca, 2004) were to:

- identify team members to document each procedure;
- assign target start and completion dates for each team;
- identify training needs for employees and schedule training sessions (this was done in 2001 and 2002);
- meet on a regular basis to evaluate progress, answer questions and evaluate resource needs;

- review and approve procedures and supporting documentation submitted by the task teams.

The data sources during the Steering Team meetings were the agendas, minutes and additional notes which were recorded by hand by the participant researcher. Further details of these and other data sources are given in section 3.4.4.

At the first QMS Steering Team meeting, the group decided that the graphic version of the Project Timeline (based on the ADDIE model of instructional design – see Appendix F1) should be considered the main *process* for web-supported learning. At that time, the Project Timeline consisted of 17 boxes, each of which was to be documented as a formal *procedure*.

Traditionally, in designing and developing a QMS, one would complete each procedure, with its inputs and outputs, before going on to attempt the following procedure. This is in keeping with the *process chain*, one of the basic elements of Total Quality Management (Macdonald, 1998). In this case, in order to accelerate the development of the system, a rapid prototyping approach (Tessmer, 1993) was adopted. Each of the procedures was assigned to a small task team, consisting of 3 to 5 volunteers from the QMS Steering Team. A team leader was appointed for each task team, with the mandate to arrange and facilitate task team meetings and to submit the resulting documentation to the QMS Steering Team.

The responsibilities of the task teams were to:

- critically analyse their allocated procedure;
- review current supporting documents, such as checklists, forms, policies etc.;
- decide if supporting documents were to be retained, modified or discarded;
- develop new supporting documentation, if necessary;

- document the procedure according to a given example and template;
- circulate the draft procedure among all members for review;
- schedule next meeting.

Step 2 produced the first artifacts, which became components of the formal QMS, namely the allocated procedures documented according to the given template, together with all relevant supporting documents.

Step 3: Paper-based prototype

The next artifact produced was a paper-based prototype of the complete quality management system. Paper-based prototypes are generally underestimated in their usefulness and flexibility (Rettig, as cited in Nieveen, 1999). One way to create a paper-based prototype is to make a pile of papers representing parts of the system or the product and to have potential users 'walk through' them (Nieveen, 1999).

Figure 3.2. Paper-based procedure names according to the project timeline

At the second QMS Steering Team meeting, separate pieces of green paper were prepared, containing the names of each of the 17 procedures in the Project Timeline. These procedure names were laid out in a line on a long table. This provided a practical and visual representation of the structure of the QMS and made it easier for the participants to realise the value of documenting the procedures. Those procedures already documented by the task teams at that stage were reviewed by the QA consultant and proposed changes were discussed and agreed upon by the Steering Team. Task team leaders were asked to implement the agreed changes in the documentation for their allocated procedure/s.

At the final QMS Steering Team meeting (24 July 2003), all the procedures documented by the task teams were put together to create a complete paper-based prototype of the proposed online QMS. The paper-based prototype consisted of a narrative description of each procedure together with all its supporting documents

Step 4: Online version of the QMS

The final artifact produced was the online version of the QMS. This provided no new data, but was instead the culmination of weaving together the artifacts produced in steps 2 and 3. The online system was built using WebCT, the same learning management system used by students to access web-supported courses[10]. User testing of the system was done by a student assistant who concentrated on checking the technical functionality of the online system.

The online version of the QMS was launched and demonstrated to the Department of TLEI at the Quality Week celebration on 31 October 2003. TLEI users were given access after the launch and asked to evaluate the system informally. This involved them making sure that they could sign on to the system and working through it to identify areas for improvement in terms of usability. They sent their written comments to me, and the system was updated accordingly.

3.4.4 Data collection

The data collection methods from each of the data sources are described in this section.

[10] The reason for this choice was so that WebCT tools such as discussions and surveys could be used, as well as the fact that participant use of the system is tracked for later evaluation purposes.

Student questionnaire

Since the student questionnaire was administered online, the data was collected electronically. The data was exported from *Student Online Services* in two formats: html data (see Table 3.3) and raw data in Excel files. The latter was analysed for the purposes of this study.

Table 3.3. *Student WebCT Experience questionnaire: sample of html data*

12. What type of technical difficulties did you experience? (You may mark more than one option)

None	20.5%	(952)
Slow Internet access	54.2%	(2519)
UP network/server being down	31.8%	(1481)
My Internet service provider being down	10.1%	(468)
Logon/registration problems	21.1%	(980)
Too much material to download	15.2%	(705)
Attempted downloads were incomplete/aborted	17.9%	(831)
Lack of technical support	12.3%	(572)
Some links in the course did not work	23.6%	(1099)

13. How often did you experience technical difficulties of any sort?

Less than once per week (e.g. 3 times per semester)	73.0%	(3395)
1 to 5 times per week	23.6%	(1097)
6 to 10 times per week	2.3%	(105)
More than 10 times per week	1.1%	(53)

The html format is easier for interested parties to read and interpret, since it automatically displays frequency counts and bar charts for each item. This data was distributed directly to TLEI management and project leaders in academic departments.

Lecturer interviews

Data was collected during the lecturer interviews by completing the semi-structured interview schedule. Where possible, field notes were taken when additional information emerged beyond the scope of the schedule.

Documentation, archival records and artifacts

Three sources of data were used for the process-based quality management system for web-supported learning, namely documentation, archival records and artifacts (Yin, 2003a):

Documentation:

- communiqués between myself and the consultant (telephone, e-mail and face-to-face) and between members of the task teams;
- agendas, notes and minutes which I recorded on paper at the QMS Steering Team meetings and task team sessions.

Archival records:

- administrative documents and internal records, e.g. Roles and Responsibilities (Fresen, 2000), the Instructional Design Toolkit (Fresen, 2001), the sample project proposal, guidelines for project proposals and the funding policy.

Artifacts:

- procedures and supporting documentation generated by the task teams and the paper-based prototype of the online QMS.

According to Ellis & Bochner (2000), there are a myriad of equivalent terms for such qualitative data collection, for example, autoethnography, personal narrative, first-person account or ethnographic short stories. I did not formally record everything at the time it happened, but later reconstructed the journey from the above data sources. The final artifact which was produced after all the steering team and task team meetings was the online version of the QMS (Figure 3.3).

Figure 3.3 Home page of the quality management system (2002)

3.4.5 Data analysis

Student survey

The data was coded, transformed and categorised as described in Appendix D2. A brief overview of the steps is given here:

Step 1: The Excel data was converted from alphanumeric format to numeric codes using programming statements in Excel.

Step 2: Multiple response items (sometimes up to ten possible response options) were transformed by creating single variables with binary response options (e.g. 0 implies no technical difficulties, 1 implies technical difficulties of some sort).

Step 3: Items were classified as contributing to either student frustration or satisfaction, in order to calculate a Frustration Index (FI) and a Satisfaction Index (SI):

Table 3.3: *Categories classified according to the implication of either frustration or satisfaction*

Frustration categories:	Technical adequacy and technical support (TA)
	Educational support (lack thereof) (ES)
	Affective domain (AD)
Satisfaction categories:	Communication tools (CT)
	Perceived learning (PL)

Step 4: For each respondent, the Frustration Index (FI) was computed in Excel as the sum of intermediate indices in the three *frustration* categories. The Satisfaction Index (SI) was computed in Excel as the sum of intermediate indices in the two *satisfaction* categories.

S-PLUS was used to plot the distributions of all the indices and variables (see distributions of the *indices* in chapter 5 and distributions of each *variable* (questionnaire items) in Appendix D5). Plotting the distribution of a variable yields a full record of its behaviour, rather than estimating its behaviour based on measures of location and spread (means and variances).

During the pilot administrations of the student questionnaire in 2001 and 2002, a coding frame was generated by analysing and categorising the responses to the open questions. The resulting items in the coding frame therefore summarise the themes and issues which emerged from the early analysis of open responses. (see Appendix D3). A subset of the open responses collected in July 2003 were coded by hand, using the coding frame generated during the pilot stage. This can be considered a first level content analysis: it was important to allow salient themes and issues to surface (Stake, 2000), and not to analyse the responses verbatim (examples of such salient issues are technical reliability, interaction with lecturers etc.).

Due to the large number of respondents (4 650 respondents who answered three open questions each), a point of data saturation was reached, after which no new issues or themes were identified. At that point the analysis of any further open responses was terminated. The results of the student survey are reported in chapter 5.

Lecturer interviews

The data collected from the lecturer interviews originated from both closed and open responses. It was summarised by hand and reported anecdotally according to themes and issues identified. The intention was for this qualitative data to inform the practices and improve services offered by TLEI, so it had to be considered and interpreted in rich detail, without any loss of information.

The evidence from the lecturer interviews is presented in chapter 5, after the findings from the student survey. Care was taken to present the evidence separate from any interpretation and to explore alternative interpretations (Yin, 2003a). The semi-structured interview schedule meant that certain themes had previously been identified by the researcher[11], for example, problems and benefits experienced with respect to course development and course facilitation.

The responses to such items were analysed in terms of the issues that were volunteered by the lecturers. The frequency of the issues was tabulated and summarised (an analytic manipulation recommended by Miles and Huberman, 1994). Where relevant a graph was presented, for example, to represent visually the comparison between the levels of service received from different role players in the project team.

Documentation, archival records and artifacts

No formal analytic manipulations by the researcher, such as content analysis, pattern matching or time series were applicable, since peer review and consensus ensured acceptance of the artifacts.

[11] This is an example of *etic* data, as opposed to the *emic* data volunteered by the respondents.

The internal documents and archival records were already in use in practice. The communiqués and notes were recorded on paper or electronically in the case of e-mail messages. The agendas and minutes of the QMS Steering Team and task teams were considered when documenting and improving the procedures and supporting documents. All this data was used in an ongoing way to make decisions throughout the work of the task teams, for example notes taken during the QMS Steering team meetings were used by the team leaders to implement edits to particular procedures. In this way, the data contributed to the development of the artifacts and to the final online QMS.

The artifacts generated by the task teams were in the form of electronic procedures and supporting documents (such as checklists, QA report) for each of the procedures in the Project Timeline. The second draft of each procedure was saved in MS Word and Adobe Acrobat format and the latter, together with applicable supporting documents, was uploaded into the online version of the QMS. All the documentation may be considered to be working documents, since they are not static but always subject to review and improvement.

The findings in the form of lessons learnt on reflection by the participant researcher, and artifacts generated and incorporated into the QMS, are reported in chapter 6.

3.4.6 Justification for and limitations of the research methodology

The sample for the student survey was a self-selecting one. Taylor, Woodman, Sumner and Blake (2000) describe self-selecting samples as follows: "There is always an element of self-selection in the return of questionnaires – this hazard is always present" (online reference). Although such a sample cannot be viewed as representative of the population, the intention in this study was to gather client satisfaction data and not to describe or draw inference about the whole population of WebCT students. Even so, it is acknowledged that only certain types of students, such students with strong opinions, may have responded to the questionnaire.

The student questionnaire was delivered to WebCT students online. Online questionnaires have the advantage of providing extensive coverage of a large population at no additional cost (Taylor et al., 2000). Furthermore, the captured data is already in electronic format. A paper-based questionnaire to be completed in class time would have had the disadvantages of being time consuming and involving several people, such as lecturers or tutors, to administer it. The advantage of a paper-based questionnaire would have been a random instead of a self-selecting sample. Since the questionnaire was about the WebCT experience, it was advisable for students to complete it online rather than via non-electronic media, so that the respondents were physically and intellectually close to their web-supported learning experience.

However, being an electronic survey may also have introduced an element of bias, in that the questionnaire may have been completed by students who

a. were more computer literate, or
b. had ready access to computers, or
c. had the time and energy to complete it online, or
d. had a specific point of view to express (either strongly positive or strongly negative).

A factor which may have favourably influenced the completion rate of the student survey is that it was administered at the end of the semester, but before examinations were written and final results obtained. The intention was to attract a higher response rate as students prepared for examinations, rather than lose many of them when they no longer had a need to access their online courses.

Taylor et al. (2000) caution further that although questionnaires provide data about preferences, trends and patterns of behaviour over time, they usually do not provide deep and meaningful evidence of actual student learning.
It is acknowledged that the measurement of actual student learning (Kirkpatrick's, (1998) Levels 2 and 3) provides scope for further research. Such measurement will provide further evidence to inform the quality cycle

and to substantiate return on investment for University management (Kirkpatrick's (1998) Level 4).

An unexpected benefit of the personal interviews with lecturers was that the interviewer had a chance to renew client relationships, especially with established clients whose WebCT courses had been running for some time. The sample of lecturers was small, but it was a pilot administration of the interview schedule, with the intention of improving the instrument for future administrations.

Although participant observation in a case study provides certain unique opportunities, a major problem is that of possible bias (Yin, 2003a). The participant researcher may be so closely involved in the daily situation that firstly, she may be a biased supporter of the group of participants and secondly, her efforts may be concentrated too intensely on the participant role and not directly on the observer role. In this case study I was a direct member of the instructional design team and therefore of the QMS Steering Team and various task teams. In facilitating the task teams of which I was the team leader, I concentrated on trying to be an outsider and prompted the participants to critically review what they were doing, why they were doing it and how their practice could be improved. Task teams then reached consensus on their allocated procedures, which were later reviewed, edited if necessary and adopted by the QMS Steering Team.

For practical reasons, a researcher is compelled to limit the literature search in terms of quantity and publication dates of studies. The studies analysed in search of factors to promote the quality of web-supported learning are not necessarily the only such studies. Of the studies found on the ERIC database the abstracts were read and assessed for their relevance to the topic. After a refined search, nine studies plus others previously identified, were reviewed with respect to the extent of their corroboration of the synthesized taxonomy.

The taxonomy in Table 2.3 collates, synthesizes and categorises a variety of contributing factors into a practical framework. There are some problems associated with collating and interpreting such qualitative data, for example:

- In re-wording categories and items, the results are dependent on the researcher's interpretation of what the authors intended to imply.
- The similarity of items enabled some to be grouped together, which would not necessarily be done in the same way by any other researcher.
- There may well be many items which are not listed, not because they lack importance, but because they were not thought of in any of the specific studies, or were not relevant to the author's point of departure at the time (e.g. Alley (2000) specifically states that he is considering neither institutional nor uncontrollable factors).

These threats to confirmability (objectivity) and auditability (reliability) should not detract from the value of this exercise, since it is an exploratory attempt to synthesize qualitative data. Such threats do not necessarily detract from qualitative approaches, due to the insights that may emerge (Guba & Lincoln, 1981).

3.5 Summary

This chapter presented the research philosophy, design and methodology for this exploratory study. During the course of this study, my epistemological viewpoint evolved into an interpretivist, phenomenological approach, as a result of trying to understand the phenomenon of quality of web-supported learning in higher education.

This study is a case study of TLEI, which is the centralised e-learning support and production unit at the University of Pretoria, South Africa. The unit of analysis is the instructional design process. The embedded units of analysis are the web-supported learning products produced. The clients of the e-learning unit, namely lecturers and students, provided a source of data which contributed to answering some aspects of the research questions.

The research design was summarised in Table 3.1. It included the following strategies:

- a literature survey to investigate factors to promote the quality of web-supported learning;
- an online student WebCT Experience survey administered in July 2003 (4 650 respondents);
- lecturer interviews conducted in February 2004 (22 respondents);
- task teams and expert consultation for the design and development of the process-based quality management system for web-supported learning.

Two formal instruments were used to measure client satisfaction (or frustration) with web-supported learning (research question 2), namely the student *WebCT Experience* questionnaire (Appendix D1) and the lecturer *Experience and Satisfaction* interview schedule (Appendix E1). The sampling techniques were self-selecting and purposeful samples respectively.

The data from the student survey was automatically generated by the software package, in html and Excel formats. The graphic html data was distributed to TLEI management and project leaders in academic departments. The Excel data was coded and transformed using programming statements in Excel. SPLUS was used to produce full statistical distributions in graphic format for all the indices and variables which contributed to client satisfaction. Satisfaction and frustration indices were calculated by accumulating contributing variables and calculating the extent of satisfaction or frustration respectively.

The qualitative data from the lecturer interviews was analysed by hand by identifying issues which were summarised and tabulated. The findings from the student and lecturer surveys are presented in chapter 5.

Task team participants consisted of the entire instructional design team of TLEI, namely 2 men and 15 women, mostly with postgraduate qualifications in instructional design. Three QMS Steering Team meetings were held from February to July 2003, in which the instructional design process was analysed into its constituent procedures, all of which were analysed and documented in detail by smaller task teams, thus producing artifacts which became components of the online QMS.

Documentation, archival records and artifacts were the main data sources from which both the paper-based prototype and online version of the QMS were developed. The online version was implemented in October 2003 and will be evaluated in practice as part of further research initiatives.

Possible bias is acknowledged in that the participant researcher was an integral part of the case study. However, the value of participant observation and learning from the particular cannot be underestimated: “Qualitative case study is characterised by researchers spending extended time, on site, personally in contact with activities and operations of the case, reflecting, revising meanings of what is going on” (Stake, 2000, p. 445).

Chapter 4

Findings:
Factors to promote quality web-supported learning

4.1 Overview of this chapter

This chapter presents the findings for the first research question of this study:

What factors[1] promote quality web-supported learning?

The method and procedures for this research question were presented in chapter 3, section 3.4.3. The primary strategy was the literature review which identified and analysed studies of two types: those which present classic benchmarks, indicators and principles for quality web-supported learning (section 2.5.1), and those that identify criteria for exemplary or promising courses (section 2.5.2). That comparative analysis produced a taxonomy of factors which contribute to the quality of web-supported learning (Table 2.3). Details of the studies reviewed in chapter 2 are given in Appendix C (Tables C2 to C6).

Since the taxonomy was synthesized, additional studies[2] on quality issues relating to instructional technologies emerged, both from database searches and from the bibliographies of other papers. In this chapter, these additional studies are reported in as far as their findings corroborate or extend the taxonomy. Some of the more applicable studies are reported in detail (section 4.2), but since this chapter is not a literature review, most are listed in Appendix C (Table C11), together with the factors that they identified.

[1] The word ‘factor’ is used throughout in the ordinary everyday sense of the word, such as ‘characteristic’ or ‘aspect’. No statistical *factor analysis* is implied or intended.
[2] The dates were confined to those published since 2000.

The updated and extended taxonomy is presented in section 4.3 (Table 4.2). Critical colleagues within the case study were asked to reflect on and refine the taxonomy for purposes of triangulation and verification. The refined taxonomy, which answers this research question, is given in Tables 4.3 and 4.4. In order to provide a visual synthesis and interpretation of the taxonomy, it is mapped onto Ingwersen's (1996) cognitive model of information retrieval (IR) interaction (Figure 4.3).

4.2 Corroboration by recent publications

After the initial literature review was completed, new studies emerged from database searches, as well as from other sources. These are analysed in this section to corroborate and extend the findings of the taxonomy of factors to promote quality web-supported learning[3].

4.2.1 The Sloan-C framework

The Sloan Consortium (Sloan-C) is a consortium of accredited higher education providers that "encourages collaboration, sharing of knowledge and effective practice to improve online education in the areas of learning effectiveness, access, affordability for learners and providers and student and faculty satisfaction" (Lorenzo & Moore, 2002, online reference).

At a workshop held in Lake George, New York in September 2002, editors led discussion sessions on the Five Pillars for Quality Online Education:

- learning effectiveness;
- cost effectiveness;
- access;
- faculty satisfaction;
- student satisfaction.

[3] The terminology used (e.g. "online learning", "web-based learning") reflects that used by the respective authors.

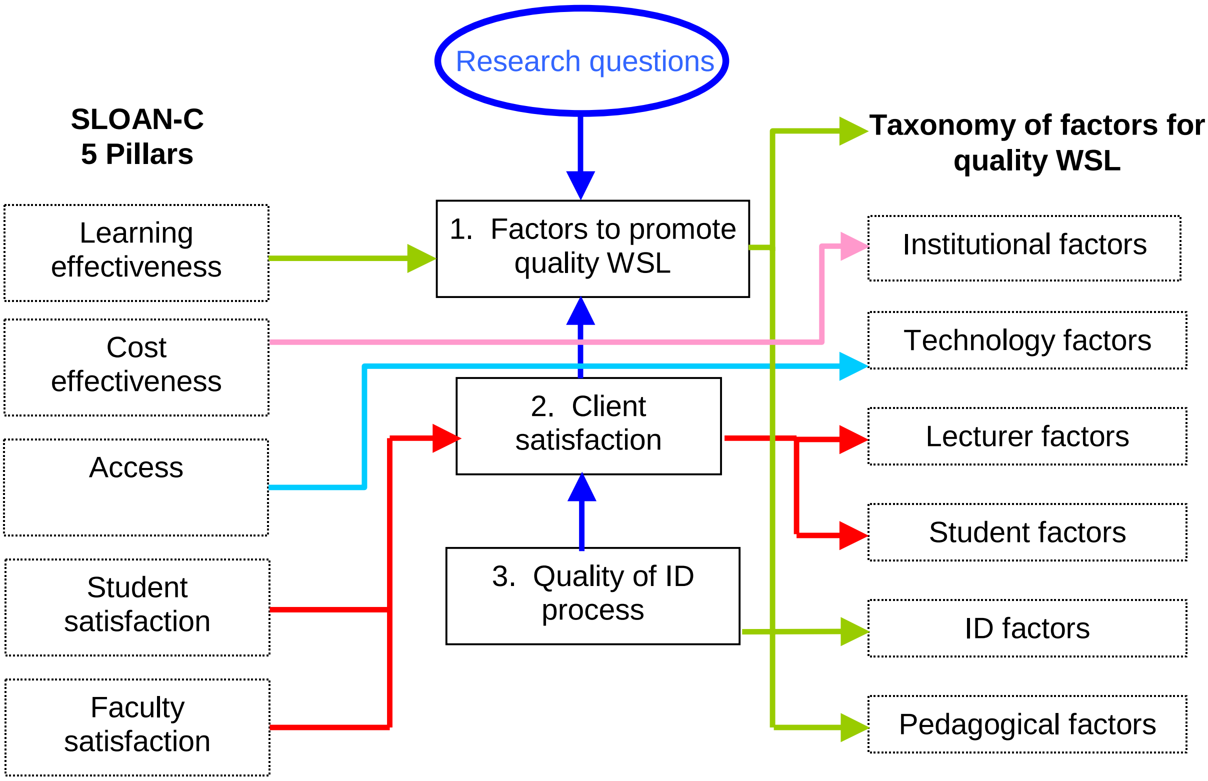
More details of the elements within the five pillars are given in Appendix C, Table C9.

The Sloan-C report to the nation (Lorenzo & Moore, 2002) highlights the following factors that contribute to the *learning effectiveness* pillar in the online environment:

- interaction with classmates, instructors and content;
- online learning environments that generate meaningful discourse and encourage deep reflection;
- significant opportunities for collaboration between student and faculty and student and student.

> Sloan-C's five pillars are a framework for measuring and improving an online program within any institution. Quality in online education is often thought to mean 'learning effectiveness', and that is certainly one element, and is one of the pillars. However, learning effectiveness has greater meaning when it is combined within a framework that encompasses all five pillars. (Lorenzo & Moore, 2002, p.3)

Two of the Sloan-C pillars (*student and lecturer satisfaction*) directly reflect research question 2 in this study (client satisfaction). The pillar of *learning effectiveness* is reflected particularly in the categories of instructional design and pedagogical factors in the taxonomy of factors for quality web-supported learning synthesized in this study (Table 2.3). The pillar of *access* and related issues corresponds to the category of technology factors in the taxonomy. Figure 4.1 shows the links between the Sloan-C framework and the taxonomy.



Key: ID = “instructional design”; WSL = “web-supported learning”

Figure 4.1: Mapping between Sloan-C framework, the research questions and the taxonomy of factors for quality web-supported learning

Parallels can be seen between four of the Sloan-C pillars and the taxonomy of factors for quality web-supported learning synthesized in this study:

- Learning effectiveness is reflected by the whole taxonomy, in particular *instructional design* and *pedagogical* factors.
- Access is directly addressed by several items in the category: *technology* factors.
- Student and lecturer satisfaction, both addressing the question of client satisfaction with web-supported learning, are the essence of research question 2 in this study. The same clients are reflected in the categories of *student* and *lecturer* factors respectively.

One of the Sloan-C pillars, *cost effectiveness*, maps onto institutional factors, but is not analysed further in the taxonomy. The reason is that the unit of analysis and the research questions in this study focus on process and product issues, rather than cost issues. Furthermore, this case study is built on an existing infrastructure, in which a campus-wide learning management system and human and technology resources are already in place, so no cost estimates for establishing such facilities and services had to be compared. Scope for further research is to investigate the extent of the University's return on investment, in the sense of the impact of TLEI as a support unit serving the University.

4.2.2 Methodological framework for online teaching and learning

Zhao (2003) alludes to enticing issues in his abstract:

> Drawing on the current principal literature, this study explores a range of issues affecting the quality of online higher education; examines a variety of perspectives on criteria for quality online teaching and learning; and proposes a methodological framework for the measurement of both the process and outcomes of online teaching and learning. (p. 214)

He advocates a holistic approach to evaluating the quality of online learning (as does this study). He identifies three categories for investigation: information technology, pedagogy and administration, which are congruent with the categories technology issues, pedagogical principles and institutional factors in the taxonomy in this study.

Zhao (2003) refers to the literature and identifies additional criteria in terms of the quality of online courses:

- extent of platform and browser compatibility;
- extent of synchronous communication;
- extent of asynchronous communication;
- ease of creation and maintenance of course material;
- extent of online help including how-to-use tutorials;
- extent of online assessment activities;
- fostering collaborative work;

- extent of customisation;
- effectiveness of results management and flexibility of report generation;
- interaction, which increases student satisfaction ;
- a responsive instructor.

Zhao's (2003) paper makes several suggestions of what *might* be done, for example, using the standard *Servqual* service quality instrument to measure academic (lecturer) satisfaction. The methodological framework is a theoretical discussion of the following "four crucial building blocks" (p. 218):

1. **Course effectiveness**: this includes the curricula and learning resources which should be up to date, relevant, comprehensive and culturally sensitive.
2. **Adequacy of access** in terms of technology infrastructure: technology needs to be accessible, reliable, fast and easy to use. This includes technical support services for students and instructors and student training.
3. **Student satisfaction**: asynchronous and synchronous interactions between instructors and students, timely feedback and mentor support.
4. **Academic (lecturer) satisfaction**: opportunities for quality interaction with students, for leadership, research and professional development. This includes ongoing staff training and development in ICTs.

As can be seen from the list above, Zhao's (2003) work leans heavily on the five pillars of the Sloan-C consortium, which he references. Both Sloan-C and Zhao state that their work is based on extensive literature reviews, and some recommendations are clearly from Chickering & Gamson (1987), such as the importance of student-student and student-faculty interaction.

4.2.3 Pedagogical framework

Herrington, Herrington, Oliver, Stoney and Willis (2001) developed a framework summarizing what they consider to be critical elements of effective online learning environments. Their intention was to "describe a workable set of guidelines for academic and support staff in the development and benchmarking of online course quality" (Herrington et al, 2001, p. 263). They express the hope that their guidelines will be useful in assessing the quality of existing online courses as well as online courses in development.

These authors organised their framework according to the following categories:

- Quality of Pedagogy;
- Quality of Resources;
- Quality of Delivery Strategies.

The Pedagogy category emphasizes meaningful assessment, engagement of learners and opportunities for collaboration. The Resources category recommends guidelines for high quality learning materials and resources, such as accessibility, currency, richness and inclusivity. The Delivery Strategies category concentrates on the reliability of the interface, bandwidth and download demands, as well as communication between students and lecturers. The full framework is summarised in Appendix C (Table C7).

This framework is currently being implemented with instructional designers and faculty at Edith Cowan University. The iterative process will result in modifications and improvements to the instrument which can be thought of as summative evaluation of the framework.

4.2.4 Importance of the Institute for Higher Education Policy study (2000)

One of the primary source documents that contributed to the taxonomy is the *Quality on the Line* study, which presented 24 benchmarks for quality online teaching and learning (Institute for Higher Education Policy (IHEP), 2000 - see Appendix C, Table C2).

The third Pew symposium on preserving quality in distributed learning environments analysed the IHEP study in detail (Twigg, 2001). The symposium preferred the term *distributed learning* to *distance learning*, since it dispels myths about specific preconceptions about distance learning and emphasizes the combination of both on- and off-campus online teaching and learning.

Twigg (2001) confirms that the IHEP study is particularly useful because:

> … it appears to encompass all of the previous efforts and because knowledgeable, experienced practitioners – those with concrete experience as to what works well and what does not in distributed learning environments – have vetted the benchmarks. Moreover, as part of the preparation for the symposium, we asked the participants to make their own list of key quality indicators. Practically all of their responses duplicate the IHEP benchmark list. (Twigg, 2001, p. 7)

The above comment is a powerful corroboration of the extent and reliability of the IHEP study, which contributed substantially to the taxonomy.

Yeung (2002) investigated critical success factors to contribute to quality assurance of web-based learning in Hong Kong. His paper is also based on the IHEP study mentioned above (Institute for Higher Education Policy, 2000). Yeung (2002) used a questionnaire to measure the perception of academic staff as to a) whether the IHEP benchmarks are important to ensure quality and b) whether they were present at the time in the University of Hong Kong. A final item asked the academic staff to list important quality benchmarks that are not present in the IHEP study. The findings from the latter item yielded the factors listed in Table 4.1.

Table 4.1:

Additional quality indicators listed by academic staff (from Yeung, 2002)

attractiveness	accuracy	capacity
consistency	creativeness	flexibility
feasibility	fun	informative
interesting	interaction	innovation
motivation	popularity	reliability
rich content	stability	technical support
user friendliness		

Most of the above factors are in the taxonomy (e.g. *interaction*, *motivation*, *reliability*, *technical support*). Others such as *user friendliness* are an intrinsic part of sound instructional design practice (see Table 4.2 and its antecedent assumptions).

In South Africa, Herman (2001) and Bezuidenhout (2004) conducted studies also based on the IHEP study, at the University of Stellenbosch and the Central University of Technology (formerly Free State Technikon) respectively.

4.2.5 Brief overview of the findings of other studies

Many studies since 2000 have focused on the issue of quality in web-supported teaching and learning, because of its prevalence and topicality. Additional relevant studies are reviewed in Appendix C (Table C11) in as far as they support or extend the factors in the taxonomy.

There are undoubtedly many more studies that engage with various aspects of assessing and improving the quality of web-supported courses. Some of the studies reviewed in Table C11 focus only on student feedback, others focus only on one particular (small) course, while others focus only on pedagogical aspects of online learning. The taxonomy in this study is an attempt to present a holistic view of categories and factors to be considered in promoting the quality of web-supported courses.

The next section takes the taxonomy which emerged from the comparative analysis in chapter 2 (Table 2.3), extends it by incorporating findings from other studies reviewed in Appendix C (Table C11), and re-organises the layout and phrasing, so as to make it easier to apply in practice.

4.3 Extension and re-organisation of the taxonomy

The categories on which the taxonomy is based are institutional, technology, lecturer, student, instructional design and pedagogical factors. This categorisation is maintained in this chapter.

Miles and Huberman (1994) promote the use of data displays such as matrices, charts and networks, as a major avenue to valid analysis of textual data. They claim that “valid analysis requires, and is driven by, displays that are focused enough to permit a viewing of a full data set in the same location, and are arranged systematically to answer the research questions at hand” (p. 91). Data displays in the form of tables and graphics are used in this chapter in order to assemble organised information into an immediately accessible, compact form, making the data more accessible to the researcher and reader alike.

According to Miles & Huberman (1994), the first step in data analysis is data reduction. The original taxonomy used synonymous words or phrases to clarify the nuances in various factors, so as to be able to classify items from the source studies. Table 4.2 is a reduction of the wording of items in the taxonomy, focusing on single words or phrases to list the factors in each category[4].

Additional relevant studies published since 2000 were identified and reviewed in Appendix C (Table C11). Most of these studies corroborated factors

[4] If not stated, adjectives such as ‘effective’, ‘appropriate’, ‘optimal’ are implied in the reduced list.

already in the taxonomy. Ten additional factors that were not already in the taxonomy were identified from Table C11:

- community and empathy (Waddel & Byrne, 2003) *[lecturer]*;
- layout and presentation (Herrington et al., 2001) *[instructional design]*;
- appropriate bandwidth and download demands (Herrington et al., 2001) *[technology]*;
- learner-centered environment (Herrington et al., 2001) *[pedagogical]*;
- currency of learning resources and content (Applebee, Dearn, Donnan, & Kiley, 2003; Herrington et al., 2001) *[pedagogical]*;
- usability (Alley, 2000; Foreman, Nyatanga & Rich, 2002) *[instructional design]*;
- multiple learning paths (Alley, 2000) *[pedagogical]*;
- reusable learning objects (Oliver, 2001) *[instructional design]*;
- reusable learning designs (Oliver, 2001) *[instructional design]*;
- student selection and entry into courses (Oliver, 2003) *[institutional].*

The suggested categories for inclusion in the taxonomy are given in brackets. The above factors are now added into the reduced taxonomy (Table 4.2). The ten additional factors are indicated in (blue) italic text. In Table 4.2 the categories are represented two-by-two in adjacent columns. This assists in reducing and synthesizing the factors.

Table 4.2: *Expanded taxonomy*

Institutional factors	Technology factors
Technology plan	Appropriate use
Infrastructure	Reliability
Student consultation	Accessibility
Institutional programme evaluation	IT support and training for lecturers
Organisational change	IT support and training for students
Student selection and entry into courses	*Appropriate bandwidth and download demands*
	Management of student data
Lecturer factors	**Student factors**
Interaction with students	Communication
Feedback to students	Time management
Professional training	Self directed learning
Evaluation of teaching competence	Client expectations
Academic background	Critical thinking
Community and empathy	Motivation
	Problem solving
	Client satisfaction
Instructional design factors	**Pedagogical factors**
Group learning	Learning outcomes
Engagement	High expectations
Higher cognitive levels	Assessment strategies
Learning resources	Diversity
Learning materials	Clearly stated expectations
Interactivity	Self reflection
Standards	Non-threatening environment
Course evaluation	Research methodology
Inclusivity	Relevance of content
Student motivation	Accuracy of content
Modular chunks	*Currency of content and learning resources*
Use of media	Continuous improvement
Use of images, graphics, animation	Educationally significant goals
Complete learning package	Adaptable, sustainable, scaleable
Layout and presentation	*Learner-centered environment*
Usability	*Multiple learning pathways*
Reusable learning objects	
Reusable learning designs	

Table 4.2 reflects the first attempt to answer research question 1, by listing factors in six categories, to promote the quality of web-supported learning. The taxonomy was refined and corroborated by critical colleagues in two case

analysis meetings, as described below.

The critical colleagues confirmed the importance of all the factors listed in Table 4.2. Various suggestions were made in terms of rewording, merging and adding to the list of factors, based on the experience of the critical colleagues in this case study. These modifications are discussed below the resulting "combed" taxonomy (Table 4.4).

In synthesizing such a taxonomy, it is impossible to list *all* critical success factors for quality web-supported learning. It is inevitable that other researchers will suggest additional factors. In attempting to be as comprehensive yet as succinct as possible, earlier research resulted in listing two types of basic factors separately (Fresen & Boyd, 2003):

- basic *assumptions* which must be in place before quality web-supported learning can even be contemplated;
- *exogenous* (external) factors, which are important for quality web-supported learning, yet are beyond the control of e-learning practitioners.

The critical colleagues agreed with listing underlying assumptions and exogenous factors separately. These factors are listed in Table 4.3, reflecting the suggestions and consensus of the critical colleagues. The resulting refined taxonomy of critical success factors for quality web-supported learning is presented in Table 4.4.

Table 4.3

Underlying assumptions and exogenous factors forming the foundation of the taxonomy

Underlying assumptions	Exogenous factors
• ICT infrastructure; • information literacy of clients; • basic computer literacy of clients; • positive attitude of lecturers; • commitment and motivation of clients; • sound advice, support and consultation to lecturers with respect to instructional design and educational practice; • sound instructional design practice; • sound teaching and learning practice; • commitment to continuous improvement.	• quality of the institutional learning management system[5]; • stability of national telecommunications infrastructure; • class size; • work load of clients; • recognition and incentives for lecturers.

The refined taxonomy presented in Table 4.4 should be read with the understanding that the underlying assumptions listed above are taken as given and that the exogenous factors are acknowledged.

[5] See section 1.9.1: *Constraints of this study*.

Table 4.4

Resulting taxonomy of factors to promote quality web-supported learning[6]

Institutional factors	Technology factors
Technology plan	Appropriate use of technology
Student selection and entry into courses	Reliability
Student consultation	Availability
Institutional programme evaluation	System training for clients
Change management	IT support for clients
Standardisation of information design and dissemination	Appropriate bandwidth and download demands
	Management of student data
Lecturer factors	**Student factors**
Interaction / facilitation	Communication
Frequent feedback	Time management
Academic background	Self directed learning
Evaluation of teaching competence	Critical thinking
Community and empathy	Problem solving
Instructional design factors	**Pedagogical factors**
Usability: • Modular chunks • Use of media • Use of images, graphics, animation • Layout and presentation • Standards • Accessibility **Learning principles:** • Collaborative learning • Interactivity • Engagement • High expectations • Higher cognitive levels	Learning outcomes, goals, expectations Flexible learning package Assessment strategies Learning styles Learner-centered learning environment Content and learning resources: relevance, accuracy, currency Adaptable, sustainable, scaleable, reusable Self reflection

Various new factors were suggested by the critical colleagues, for example the importance of standardised dissemination of information, on an institution-wide basis. This factor refers to the importance of standardising the *information design* of all applications that influence web-supported learning, for example the user interface of campus portals, access to library reference pages etc. Another suggestion was to subdivide the instructional design factors into two subsections, *usability* and *learning principles*.

[6] (to be read in conjunction with Table 4.3)

Further modifications agreed upon were that the term *inclusivity* should be re-worded as *accessibility* and moved to *technology* factors. The current connotation of the word *accessibility* is access to technology for persons with disabilities, both learning and physical disabilities (Brown, 2004). Similarly *diversity* was reworded as *learning styles*, which is intended to include equity issues as well as social, cultural and gender sensitivity. The term *organisational change* was replaced with *change management*, a term more widely used in the field of education innovation.

4.4 Answer to research question 1

One of the critical colleagues suggested that the taxonomy in Table 4.4 could be meaningfully mapped onto Ingwersen's (1996) cognitive model of information retrieval (IR) interaction. The benefit of such a mapping is that it provides a practical and holistic interpretation of the complex issues involved in synthesizing factors to promote quality web-supported learning.

Ingwersen's model is presented in a simplified form in Figure 4.2 and discussed below the figure. The graphic version of the mapping of the categories in the taxonomy (Table 4.4) onto Ingwersen's model is given in Figure 4.3.

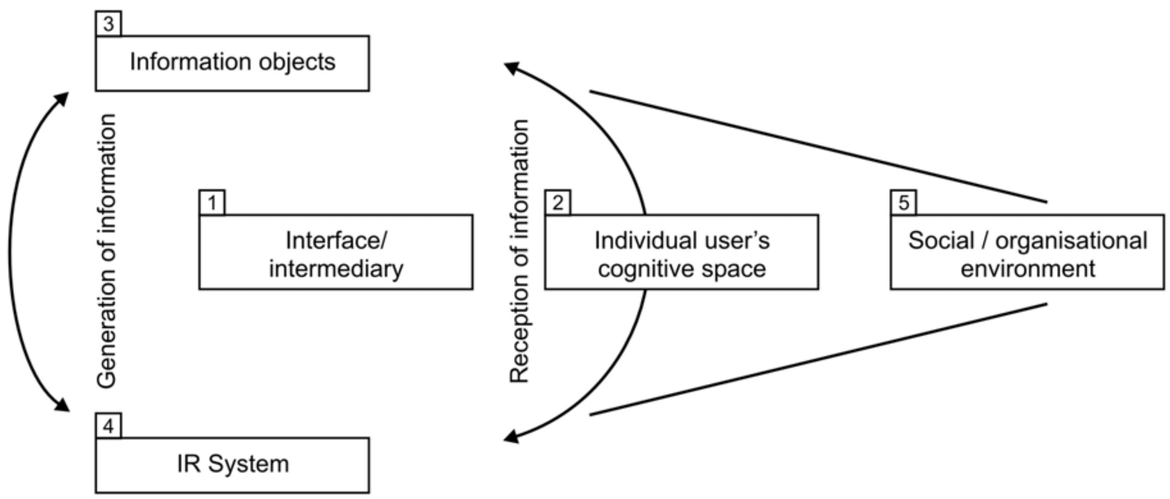


Figure 4.2: Simplification of Ingwersen's (1996) cognitive model of IR interaction.

The details of Ingwersen's model, such as particular items in each section and the flow of transformation, influence, interaction and communication between items are excluded from Figure 4.2, in order to simplify the concepts and to enable a mapping with the taxonomy.

The following discussion takes Ingwersen's model as a point of departure and interprets it in respect of the taxonomy of factors for quality web-supported learning presented in this chapter.

In Figure 4.2, the interface, or intermediary (1) may be human or a computer. In the context of this study, it would be the computer providing access to web-supported courses (this maps onto *technology factors* in the taxonomy). The individual user (2) is the client, namely the student or lecturer participating in web-supported teaching and learning situations (this maps onto the *lecturer* and *student factors*). The information objects (3) are the web-supported learning products that the student is engaging with, including content, resources, learning activities etc. These learning opportunities are based on the *instructional design and pedagogical factors* that need to be considered in designing and developing quality web-supported learning products. The information retrieval system (4) is the *institutional infrastructure* to enable either information retrieval or in this case, web-supported-learning. The social or organizational environment (5) includes institutional and exogenous factors, as well as the underlying assumptions that are required for quality web-supported learning. For example, underlying assumptions such as positive attitudes, motivation, class size and incentives for lecturers are part of the social and organisational environment.

Figure 4.3 presents the taxonomy for quality web-supported learning mapped onto Ingwersen's (1996) cognitive model for IR, as interpreted in the foregoing discussion.

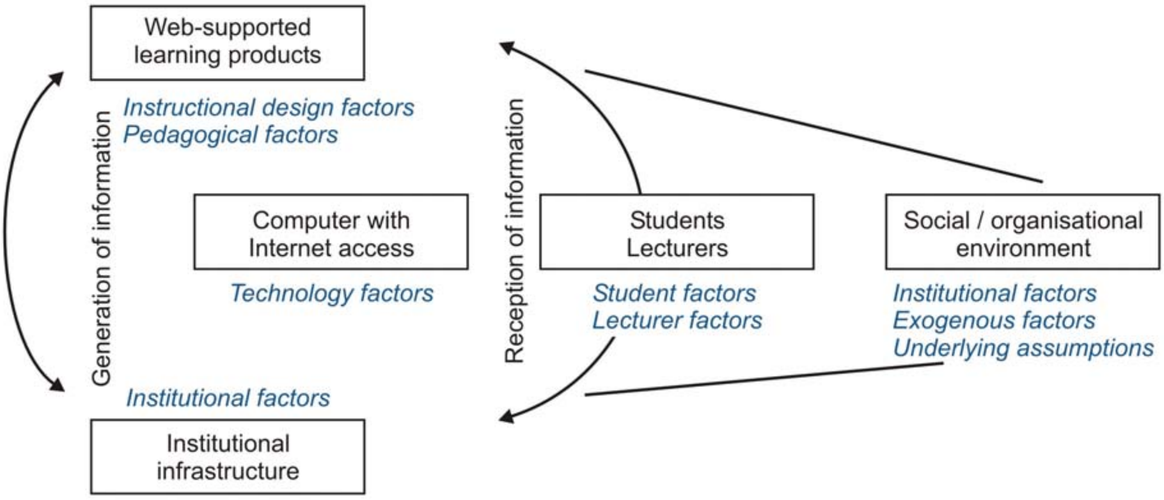


Figure 4.3

Graphic interpretation of the taxonomy for quality web-supported learning, mapped onto Ingwersen's (1996) cognitive model of IR

In Figure 4.3, the categories of the taxonomy are indicated in (blue) italic text. *Institutional factors* appear twice, since they appear to map naturally onto both the *institutional infrastructure* and onto the *organisational environment*.

The graphic interpretation of the taxonomy (Figure 4.3) can be considered compatible with other cognitive, graphic representations relevant to this study. Examples of such compatible representations are:

- the conceptual framework in this study (Figures 2.5 and 7.1);
- the *rich pictures* of Checkland (1999) which attempt to represent complex systems and interactions;
- the TLEI relationship diagram used in the quality assurance training workshops in this case study (Boyd, 2001b).

The latter diagram is not included in this thesis, but it interprets the position of TLEI as a support department within a complex system of interactions and interrelationships with academic departments.

The answer to the first research question is therefore given by the ***taxonomy of factors for quality web-supported learning***, which has three components:

- underlying assumptions and exogenous factors (Table 4.3);
- refined taxonomy of factors, in six categories (Table 4.4);
- graphic interpretation providing a cognitive summary (Figure 4.3).

4.5 Summary

This chapter presents the findings for the first research question, which searched for factors to promote quality web-supported learning.

The literature review in chapter 2 produced a taxonomy of factors to promote quality web-supported learning, in six categories: institutional, technology, lecturer, student, instructional design and pedagogical factors (Table 2.3). Subsequent to that analysis, additional studies (limited to those published from 2000 onwards) were identified from data base searches and other sources. Undoubtedly there are more such studies, but few appear to present a holistic approach to quality in web-supported learning, by applying standard quality assurance practice to products, process and client satisfaction measures.

The additional studies reviewed (see Appendix C, Table C11) corroborated many of the factors in the taxonomy and yielded ten additional factors including amongst others, usability, currency of content and resources, re-usability of learning objects and technical issues such as appropriate bandwidth and download demands. The taxonomy was combed and refined with the assistance of critical colleagues within the case study (Table 4.4).

It emerged from earlier research (Fresen & Boyd, 2003) that there are certain fundamental underlying assumptions that need to be in place before quality web-supported learning may be realised at all. There are also exogenous (external) factors, such as class size and remuneration for lecturers, that are important in enhancing the quality of web-supported learning, yet are beyond the control of e-learning practitioners. These underlying assumptions and exogenous factors (Table 4.3) are part of the answer to this research question and should be read in conjunction with the refined taxonomy (Table 4.4).

In order to present a practical, holistic graphic interpretation of the taxonomy of factors, the categories in the taxonomy were mapped onto Ingwersen's (1996) cognitive model of IR interaction (Figure 4.3). Thus the answer to research question 1 is in three parts: the underlying assumptions and exogenous factors to be considered (Table 4.3), the taxonomy of factors in six categories (Table 4.4), and the graphic interpretation of the taxonomy (Figure 4.2).

The web medium offers increased convenience and alternative methods of communication and assessment. There are changing roles for both lecturers and students in learning how to make optimum use of electronic media. Issues such as change management, accessibility, learner-centered environments and technology access and reliability have an impact on the quality of web-supported learning products. The taxonomy presented in this chapter is an attempt to provide a holistic theoretical basis from which to pursue excellence in web-supported learning.

An opportunity for further research is to test the taxonomy of factors for quality web-supported learning empirically. Instructional designers and project managers need to modify the categories and factors proposed to assure quality in the learning experiences they design and implement in their own particular situations.

Chapter 5

Findings:

Student Survey and Lecturer Interviews

5.1 Overview of this chapter

This chapter presents the findings for research question 2:

What factors[1] contribute to client satisfaction (or frustration) with web-supported learning?

The primary *raison d'être* for an e-learning production unit at a higher education institution is to support academic staff wishing to implement e-learning. This means that lecturers are the direct clients of such a support unit and students are the ultimate clients (end users) of e-learning products (see Figure 1.2: *Role players*). User evaluation of web-supported learning has a significant role to play in the quality assurance process (see chapter 2, sections 2.6.1 and 2.6.2).

Furthermore, in the national and institutional scenario, user surveys are included in the HEQC recommendations after the 2003 pilot audit of the University of Pretoria (Personal communication, D. Malaza, 28 July 2004).

The research methodology for this research question was presented in chapter 3, sections 3.4.3 and 3.4.4 and is revisited briefly here:

- The survey method was used to elicit student feedback on web-supported courses during the first semester in 2003 (January to June). The instrument is the WebCT Experience Questionnaire (Appendix D1).

[1] The word 'factor' is used in the everyday sense of the word, such as 'characteristic' or 'aspect'. No statistical *factor analysis* is implied or intended.

- The interview method was used to elicit qualitative lecturer feedback on the use of web-supported learning and the services rendered by the support team. The interview schedule is the Lecturer Experience and Satisfaction Questionnaire (Appendix E1).

Student survey

At the end of the first semester 2003, a total of 4 650 out of approximately 17 000 WebCT students completed the WebCT Experience questionnaire, a response rate of 27%. Appendix D2 presents the data format, coding and transformation, which formed part of the analysis. In order to put the findings in context, the general findings are presented first (section 5.2.1), followed by those which contribute directly to answering this research question. Some responses to the open questions are reported anecdotally and by giving frequencies of responses from a subset of respondents.

Lecturer interviews

The responses to the closed questions were analysed in tables in Excel. The data from the open questions is reported, organised and summarized, noting patterns, categories and themes (Cohen, Manion & Morrison, 2000).

Samples of the qualitative responses to the open questions are given in Appendix E2. Sections 4.3.1 and 4.3.2 present the findings from the interviews, in respect of closed and open questions respectively. A summary of factors which influence lecturer satisfaction with web-supported learning is given in section 5.3.3. Since this was a pilot application of a newly developed instrument, refinements to the instrument are suggested to enhance its future validity (section 5.3.4).

5.2 Student survey

The findings of the student survey are given in this section, beginning with general findings (demographic and usage statistics), followed by the findings contributing to research question 2, namely the Frustration Index, the

Satisfaction Index and factors contributing to these two indices. The indices are then investigated for age and gender differences (section 5.2.7).

5.2.1 Demographic and usage results

Some items on the questionnaires contributed general information useful to TLEI and the University. Examples of such information are:

- demographic data
- the type of Internet browser most commonly used
- the frequency of usage of WebCT communication tools.

Of the 4 650 students who completed the Experience questionnaire, 52.5% were male and 47.5% were female. The age distribution is shown in Table 5.1.

Table 5.1: *Age distribution of respondents*

Younger than 21	60.9%
21-25	28.2%
26-39	8.9%
40+	1.9%

The majority of respondents (89%) are younger than 26 years. Most of them are undergraduate students, although postgraduate students with WebCT modules are included in the sample.

Usage patterns were measured by the items which asked “Approximately how many times per week did you log on to your web-supported course?” and “What was the approximate duration of your online sessions?” It was found that the majority of students (58.5%) log on 1 to 5 times per week, which appears to be an acceptable level of usage. Most (62.7%) of the sessions were of short duration (up to half an hour).

TLEI was interested to find out to whom students go with technical difficulties.

The intention is that lecturers should not be bothered by technical enquiries and that the appropriate channels should be followed. The findings are presented in Table 5.2.

Table 5.2: *Sources of student support*[2]

My lecturer	23.4%
The Telematic Learning and Education Innovation personnel	12.6%
Support at Student Online Services	22.1%
My fellow students	53.2%
Client Service Centre	14.7%

Students rely fairly heavily on obtaining technical support from their peers, rather than their lecturers. They need to be encouraged to use the help facilities available through Student Online Services and the Client Services Centre, which are designed to provide such support.

Instructional Designers need to know which Internet browsers are most commonly used by students, so that they can ensure compatibility of web-supported courses with the most popular browsers. Figure 5.1 shows the distribution of browsers most commonly used.

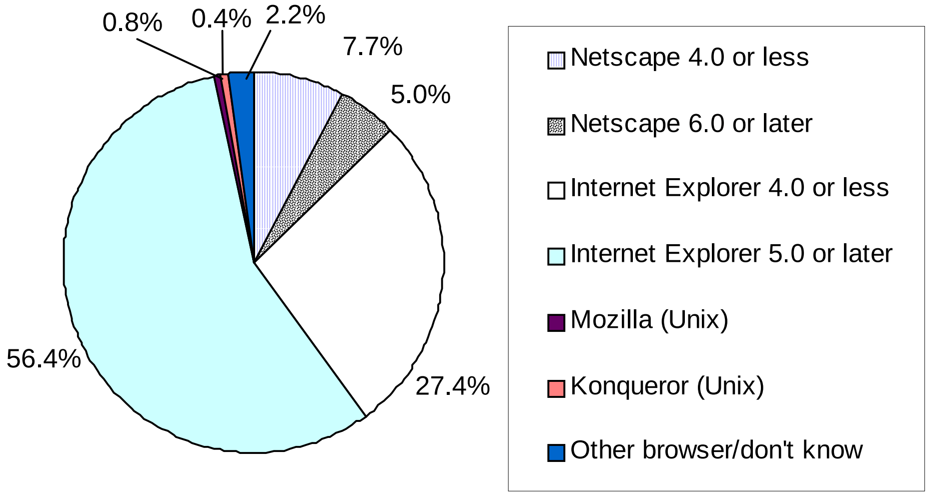


Figure 5.1: Distribution of Internet browsers used by students

[2] This is a multiple response item, so the percentages are not expected to total 100.

Internet Explorer (later versions) is clearly the most commonly used browser. It is the one recommended by the e-learning team to student users of the virtual campus and WebCT.

An item which indicates the extent of lecturer facilitation and the encouragement of deep learning stated:

Question 15:

'To do well in this course, all you really needed was a good memory'.

This item is from Ramsden's Course Experience Questionnaire (CEQ) (Ramsden, 1991). Since it does not necessarily contribute to a student's conscious level of frustration or satisfaction, the results of this item are omitted from those indices and given separately in Table 5.3.

Table 5.3: *Response to 'good memory' requirement*

S. Disagree	Disagree	Uncertain	Agree	S. Agree
19%	33.3%	9%	27.9%	10.8%

It is encouraging to see that 52.3% of students disagreed to some extent with the statement, thereby indicating that more than just a good memory was required to do well in their online courses.

5.2.2 Frustration Index

The Frustration Index was computed for each of the 4 650 respondents as described in chapter 3, section 3.4.5 and Appendix D2. The distribution of the Frustration Index is given in Figure 5.2.

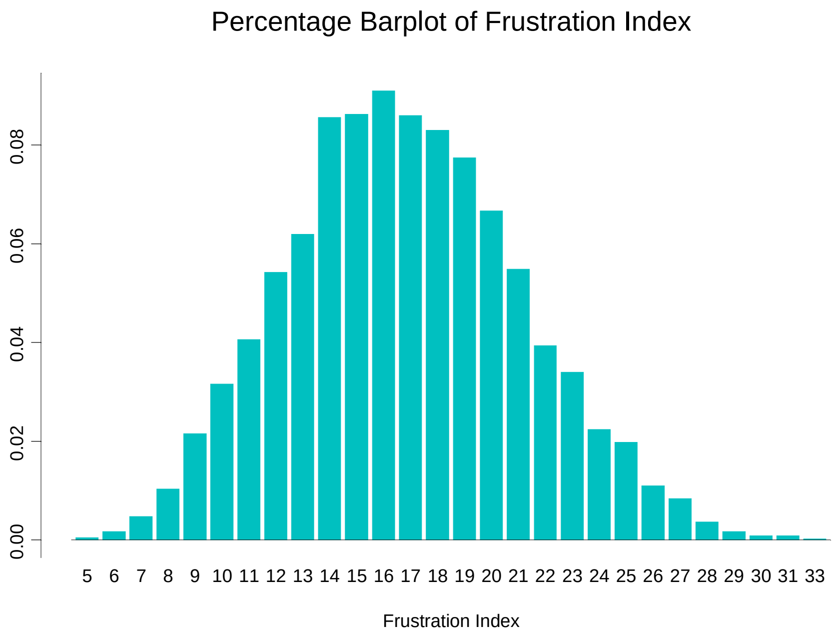


Figure 5.2: Distribution of the Frustration Index

In Figure 5.2 the percentage of respondents is shown on the vertical axis. The range of possible FI scores is shown on the horizontal axis. A low FI score implies a low level of frustration; a high FI score implies a high level of frustration. Although the distribution displays a normal bell-shaped curve, it appears that too many students are experiencing moderate levels of frustration. To summarise the distribution, the frustration levels were clustered according to the categories Low (scores 5 to 12), Moderate (scores 13 to 22) and High (scores 23 to 33). The results are shown in Figure 5.3.

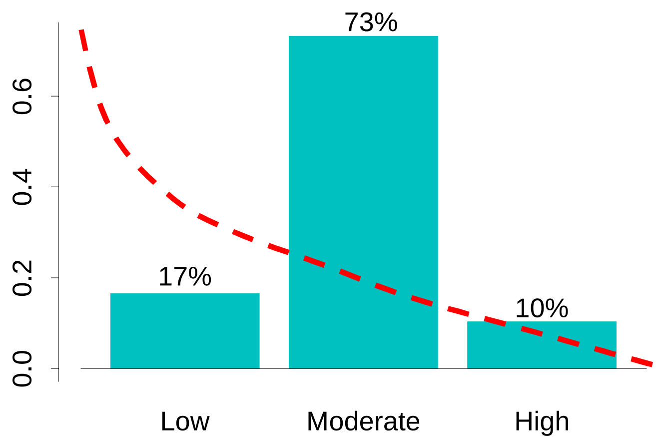


Figure 5.3: Categories for the Frustration Index

It can be seen from Figure 5.3 that 83% of students experience moderate to high levels of frustration. This is clearly unacceptable. According to intuition, the desirable trend would be an inversely proportional outline to the graph, a reverse 'J' shape, as shown in Figure 5.4.

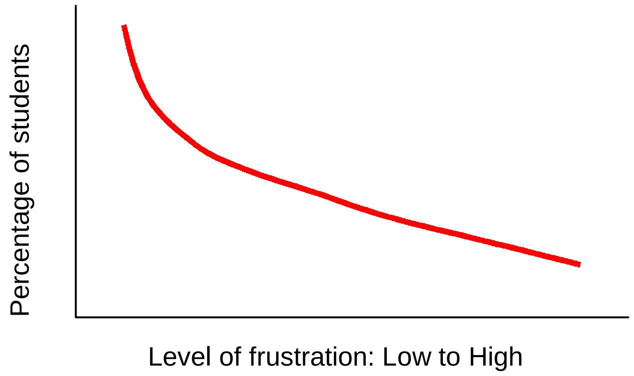


Figure 5.4: Ideal shape of an inversely proportional graph[3]

The ideal shape shown in Figure 5.4 reflects that large numbers of students should experience low levels of frustration and small numbers of students should experience high levels of frustration.

Each of the terms contributing to the Frustration Index (FI) was investigated further to identify predominant sources of frustration. Three categories contributed to FI, namely:

- technical adequacy and technical support;
- educational support;
- affective domain.

Separate indices were computed for each of these contributing factors, namely the TA (Technical Adequacy), ES (Educational Support) and AD (Affective Domain) indices. The findings for each of the contributing indices are given in section 5.2.3.

[3] This 'J' shape is not calculated according to any function, but is simply a free curve to indicate an ideal overall trend.

5.2.3 Factors contributing to student frustration with web-supported learning

Technical Adequacy (TA) Index

The distribution of the Technical Adequacy Index was categorised according to Low, Moderate and High levels of frustration. The graphical representation is given in Figure 5.5.

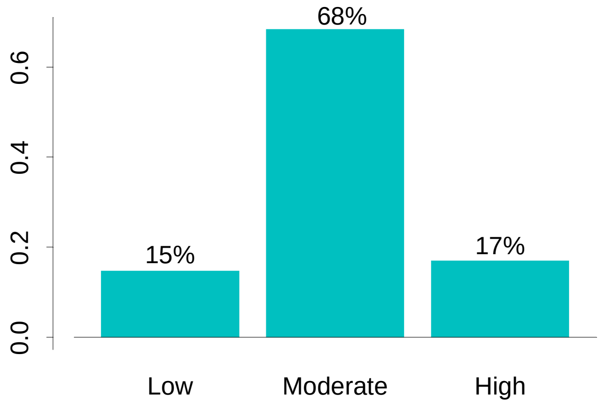
Evidence	Interpretation
	This graph does not exhibit an ideal reverse 'J' shape. It reflects that 85% of students experienced moderate to high levels of frustration with respect to technical issues.

Figure 5.5: Categories for the Technical Adequacy Index

The TA Index is composed of six items from the questionnaire (variables OC, 7, 16, TD, 32, 33). Each of these variables was investigated further. The findings are summarized here and the supporting graphs are presented in Appendix D5 (Figures D1 to D6).

It was encouraging to find that 65% of students have access to a computer of their "own", at least at one location (home, in the residence or at work). Even though many students still do not have access to their own computers, we expect the distribution to improve in the coming years with advances in satellite and mobile technologies.

Although the University cannot influence the access of students to their own computers, the provision of computer technology *on campus* must be adequate. More than three quarters of students who responded (76%) experience a sincere need for printing facilities on campus. The issue of access to printers is becoming more and more of a problem as the drive to provide web support intensifies. Many academic departments seek to reduce their printing costs by placing greater amounts of information in WebCT, which implies that the printing function devolves to students. Approximately half the students (47%) experience moderate to high frustration due to difficulties in accessing computers on campus. This is an ever-present need, which receives attention from the relevant committees on which TLEI serves.

The nature and extent of technical difficulties experienced by students were investigated. Although 80% of students experience technical difficulties of some sort, 73% reported that the *frequency* of such difficulties is low (less than once per week). Technical support services are generally efficient in solving technical problems, since 75% of difficulties are solved within 24 hours.

For all the respondents, the mean frequency of technical difficulties and mean waiting time for solution were calculated from Appendix D5 (Figures D5 and D6 respectively). In the following calculations, the frequencies (or time)[4] on the horizontal axis provide the values of f_i (or t_i respectively) and the probabilities on the vertical axis provide the values of p_i.

The estimated expected frequency of technical difficulties (from Figure D5) is:

$\sum f_i.p_i$ = (0.5)(0.73) + 3(0.24) + 8(0.02) + 14(0.01) = 1.4 times per week.

The estimated expected waiting time for technical difficulties to be solved (from Figure D6) is:

$\sum t_i.p_i$ = (0.5)(0.5) + 1(0.25) + 4(0.11) + 8(0.04) = 1.26 days.

The contributing factors to the Technical Adequacy Index are insufficient computers and printers on campus and the high proportion of respondents who experience technical difficulties of some sort. These factors influenced the high central bar in Figure 5.5.

[4] For example, "less than once per week" and "half a day" translated into f_1=0.5 and t_1=0.5 respectively

Educational Support (ES) Index

The distribution of the Educational Support (ES) Index was categorised according to Low, Moderate and High levels of frustration. The graphical representation is given in Figure 5.6.

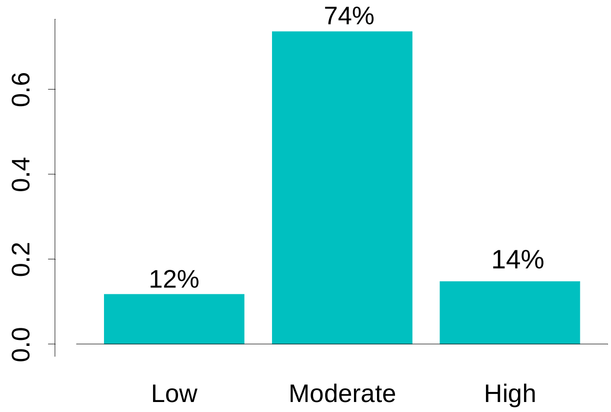
Evidence	Interpretation
	This graph does not exhibit an ideal reverse 'J' shape: 88% of respondents experience moderate to high levels of frustration with educational support, which is not acceptable.

Figure 5.6: Categories for the Educational Support Index

The ES Index is composed of two items from the questionnaire (variables 39 and TS: student support CD-Rom and student training in WebCT). Each of these variables was investigated further. The findings are summarized here and the supporting graphs are presented in Appendix D6 (Figures D7 and D8).

Only 49% of students who received the student support CD-Rom are of the opinion that it is "great". The support CD-Rom was substantially re-designed and improved in the latter half of 2003, in order to improve this statistic.

Student hands-on system training should equip students sufficiently to participate in their web-supported courses. Since 2003, the computer literacy course that is compulsory for undergraduate students now includes training in WebCT, so we expect that the upcoming generations of students will be better equipped to use the platform.

A cross tabulation (Table 5.4) of the two variables contributing to the ES Index showed evidence of a strong correlation between them:

Table 5.4: *Cross tabulation of Student CD-Rom and Student Training*

V39	TS: Training Session		RowTotl
Student Support CD	0: equipped me	1: did not equip me	
0: not received	544 0.2212 0.3261 0.1170	1915 0.7788 0.6422 0.4118	2459 0.529
1: it's great	662 0.6118 0.3969 0.1424	420 0.3882 0.1408 0.0903	1082 0.233
2: it's reasonable	424 0.4482 0.2542 0.0912	522 0.5518 0.1751 0.1123	946 0,203
3: it's poor	38 0.2331 0.0228 0.0082	125 0.7669 0.0419 0.0269	163 0.035
ColTotl	1668 0.36	2982 0.64	4650

```
Test for independence of all factors
Chi^2 = 547.515 d.f.= 3 (p=0)
```

The large Chi squared value and small *p*-value are evidence of a strong relationship between these two variables. To understand this relationship, we need to consider the conditional distributions, both row-wise and column-wise, as shown by the arrows in the Table 5.4.

Consider the row where V39=1: given student opinion that the Student Support CD-Rom was great, 61% of respondents felt the training equipped them and 39% felt the training did not equip them. By contrast, consider the row where V39=3: given student opinion that the CD-Rom was poor, only 23% of respondents felt the training equipped them and 77% felt the training did not equip them. This shows that students who were positive about the CD-Rom tended to be positive about the student training, whereas students who were negative about the CD-Rom tended to be negative about the student training.

Consider now the column where the variable ‘Training Session’ (TS) =1: given student opinion that the training session did **not** equip them, 64% of these respondents did not receive the student support CD-Rom. This gives rise to two areas of lack of support for these students.

The contributing factors to the ES Index are the inadequacy of both the student support CD-Rom and the student training in WebCT. Negotiations are in progress with respect to funding so that all WebCT students will receive the CD-Rom in future. The student training will also be re-considered, giving emphasis to practical hands-on application rather than the theory of the virtual classroom.

Affective Domain (AD) Index

The distribution of the Affective Domain (AD) Index was categorised according to Low, Moderate and High levels of frustration. The graphical representation is given in Figure 5.7.

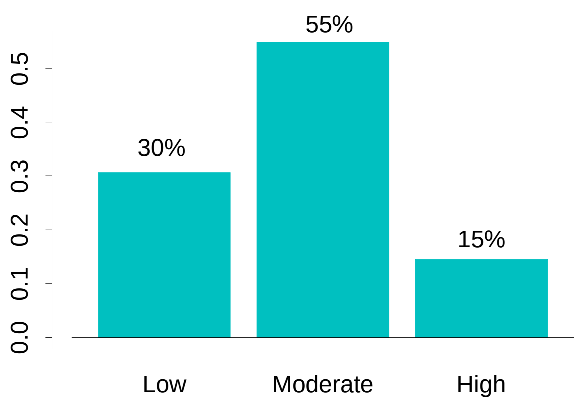
Evidence	Interpretation
	This graph does not exhibit an ideal reverse ‘J’ shape: 70% of respondents experience moderate to high levels of frustration with respect to emotions and feelings involved in the web-supported learning experience.

Figure 5.7: Categories for the Affective Domain Index

The AD Index is composed of four items from the questionnaire (variables 49, 50, 55 and 56). Each of these was investigated further.

These variables were measured on a 5-point Likert scale. The ‘Uncertain‘ option was moved to the centre of the distribution; the ‘Strongly Disagree’ and

'Disagree' categories were merged, as were the 'Agree' and 'Strongly Agree' categories. Given negatively phrased statements, the ideal shape is still a reverse 'J' shape, which would reflect higher numbers of students who disagree and lower numbers of students who agree with the statement.

The findings are summarized here and the supporting graphs are presented in Appendix D7 (Figures D9 to D12).

Forty percent (40%) of students experienced web-supported learning to be impersonal and 24% reported that their classmates were slow to respond to them online. Although these statistics are not unduly high, they could be improved by better mentoring, encouragement and guidance from course facilitators (lecturers).

Only 31% of students directly experienced feelings of annoyance and/or stress during their web-supported learning experience. Sixty six percent (66%) of students reported that they find web support provides the convenience of anywhere, anytime learning. These are encouraging findings.

From the foregoing analysis of the TA, ES and AD Indices, it emerged that the factors which contribute to the Frustration Index (Figure 5.3) are:

- insufficient computers available on campus
- insufficient printing facilities available on campus
- extent of technical difficulties experienced
- insufficient support from the student CD-Rom
- inadequate student training in WebCT
- a somewhat impersonal learning experience
- slow response from classmates
- some feelings of annoyance and/or stress.

All these factors require attention in order to reduce current levels of student frustration with their web-supported learning experience.

5.2.4 Satisfaction Index

The Satisfaction Index was computed for each of the 4 650 respondents as described in chapter 3, section 3.4.5 and Appendix D2. The distribution of the Satisfaction Index is given in Figure 5.8.

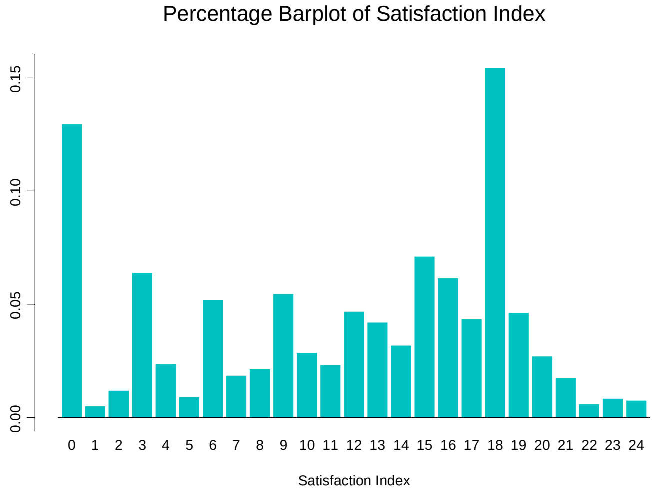


Figure 5.8: Distribution of the Satisfaction Index

In Figure 5.8 the percentage of respondents is shown on the vertical axis. The range of possible SI scores is shown on the horizontal axis. A low SI score implies a low level of satisfaction; a high SI score implies a high level of satisfaction. Since this skewed distribution is not easy to interpret, the satisfaction levels were clustered according to the categories Low (scores 0 to 5), Moderate (scores 6 to 15) and High (scores 16 to 24) (Figure 5.9).

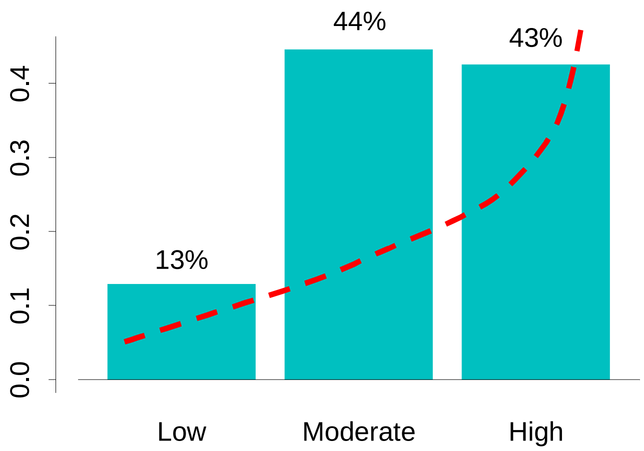


Figure 5.9: Categories for the Satisfaction Index

It can be seen from Figure 5.9 that only 43% of respondents experience high levels of satisfaction. This figure should preferably be higher. According to intuition, the desirable trend would be a directly proportional outline to the graph, a 'J' shape, as shown in Figure 5.10.

Figure 5.10: Ideal shape of a directly proportional graph

The ideal directly proportional shape implies that small numbers of students should experience low levels of satisfaction and large numbers of students should experience high levels of satisfaction.

Each of the terms contributing to the Satisfaction Index (SI) was investigated further to identify predominant sources of satisfaction. Two categories contributed to SI, namely:

- use of the communication tools;
- perceived learning.

Separate indices were computed for each of these contributing factors, namely the CT (Communication Tools) Index and PL (Perceived Learning) Index. The findings for each of these contributing indices are given in section 5.2.5.

5.2.5 Factors contributing to student satisfaction with web-supported learning

Communication Tools (CT) Index

The distribution of the Communication Tools (CT) Index was categorised according to Low, Moderate and High levels of satisfaction. The graphical representation is given in Figure 5.11.

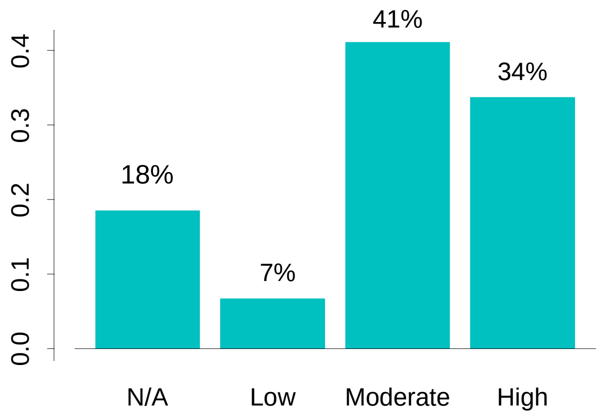
Evidence	Interpretation
	This graph does not exhibit an ideal 'J' shape: too many respondents (41%) are experiencing moderate levels of satisfaction and not enough are experiencing high levels of satisfaction (34%).

Figure 5.11: Categories for the Communication Tools Index

The CT Index is composed of two items from the questionnaire (variables 47and 48). Each of these was investigated further. The findings are summarised here and the supporting graphs are presented in Appendix D8 (Figures D13 and D14).

The findings in respect of the CT Index are encouraging. Sixty two percent (62%) of students felt comfortable communicating online. Thirty nine percent (39%) felt that they were able to express themselves more than they would have in the traditional classroom, although 38% were uncertain on this item. Removing the 'Uncertain' option may be considered in future administrations of the survey, in order to force students to make a decision, where applicable.

Perceived Learning (PL) Index

The distribution of the Perceived Learning (PL) Index was categorised according to Low, Moderate and High levels of satisfaction. The graphical representation is given in Figure 5.12.

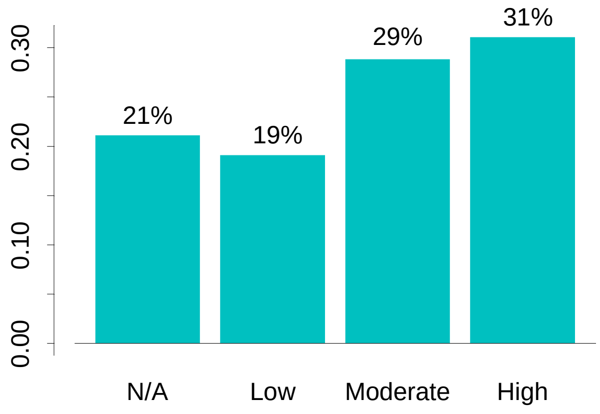
Evidence	Interpretation
	This graph exhibits the beginnings of a 'J' shape, with the exception that too many respondents (21%) selected the 'Not applicable' option and insufficient respondents selected the 'High' option (only 31%).

Figure 5.12: Categories for Perceived Learning Index

The PL Index is composed of four items from the Experience questionnaire (variables 51, 52, 53 and 54). Each of these was investigated further. The findings are summarized here and the supporting graphs are presented in Appendix D9, Figures D15 to D18.

The findings for the PL Index are encouraging. Almost half the respondents (49%) agreed that they learnt from the online contributions of other students, which reflects the value of cooperative and group learning. Thirty nine percent (39%) of students felt that web-supported learning helped to develop their ability to work as a team or group member, although this item again had a fairly high proportion (38%) of responses in the 'Uncertain' category.

Fifty four percent (54%) of students felt that web-supported learning developed their ability to plan their own work, an important factor identified in the literature review (Time on task – Chickering & Ehrman, 1996). It is encouraging to see that 58% of students found web-supported learning to be an enriching learning experience.

It is acknowledged that the responses in the Perceived Learning category measure students' perceptions of benefits, at the level of Kirkpatrick (1998), Level 1. Scope for further research is to probe actual learning and resulting changes in behaviour.

The analysis of the Satisfaction Index is more positive and encouraging than it was for the Frustration Index. From the foregoing analysis of the CT and PL Indices, it emerged that the factors which contribute to the levels of satisfaction reflected in the Satisfaction Index (Figure 5.9) are:

- feeling comfortable communicating via online tools
- feeling more freedom to express oneself than in a traditional classroom
- learning from the contributions of other students
- promoting one's ability to work as a team or group member
- promoting one's ability to plan one's own work
- experiencing an enriching learning environment.

A factor which should, but currently does not, contribute sufficiently to the level of satisfaction, is more interaction and collaboration which could be encouraged by the lecturer in order to make the web-supported learning experience less impersonal.

The Frustration and Satisfaction indices have been computed and their contributing factors summarized. Since 83% of students experience moderate to high levels of frustration (Figure 5.6) and 87% of students experience moderate to high levels of satisfaction (Figure 5.24), it is natural to ask whether there is any correlation between levels of frustration and levels of satisfaction. The two indices were plotted against each other and the resulting box plot is given in Figure 5.34.

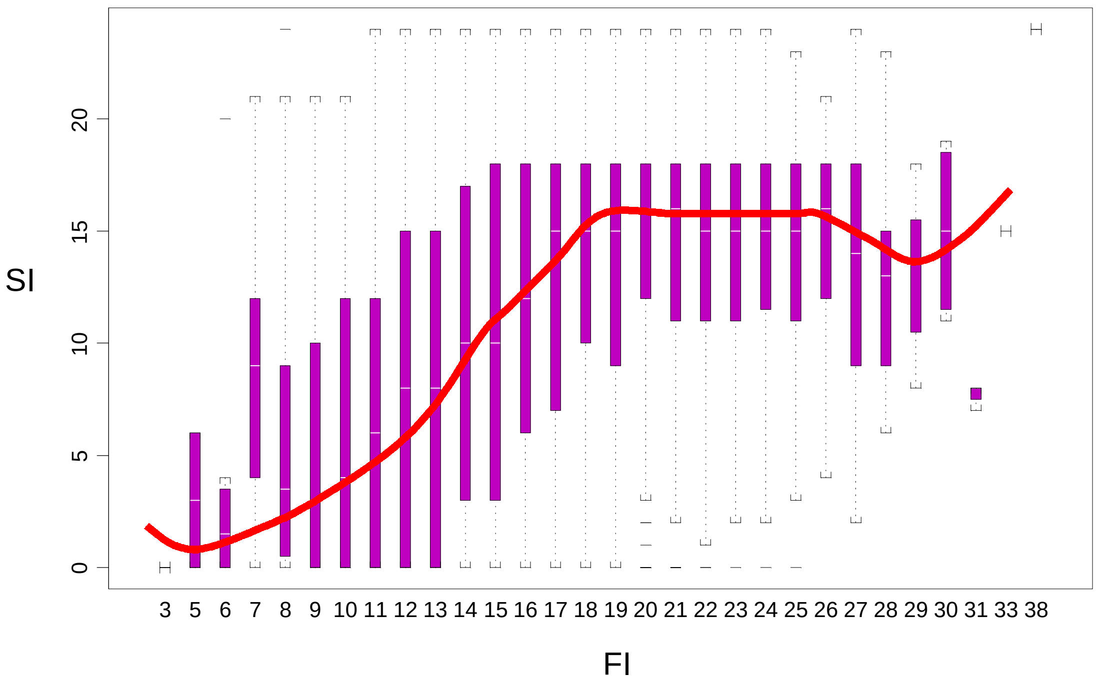


Figure 5.13: Box plots of the conditional distribution of the Satisfaction Index (SI) for each given value of the Frustration Index (FI)

A box plot is a five-number summary of a distribution showing the minimum value, lower quartile, median, upper quartile and maximum value. It is a useful graphical representation of the distribution. In Figure 5.13, each conditional distribution of SI for a given FI is depicted by the vertical box plots. For our purposes, the important information is gleaned from the behaviour of the median SI values, as indicated by the central "dashes", as FI increases. The medians form an approximate S-shaped curve, representing the regression[5] of SI on FI (see the approximate regression line superimposed on the graph). There is some variation around the top end of the S curve, which can be attributed to sampling variation and the lower frequencies of SI. The regression relationship illustrates that students with a low value of FI tend to exhibit also a low value of SI and those with higher values of FI tend to exhibit higher values of SI.

[5] For this data, the regression relationship is S-shaped and not linear.

5.2.6 Analysis of open questions

The WebCT Experience survey (4 650 respondents) contains three open items:

- *Question 28: positive aspects experienced;*
- *Question 29: negative aspects experienced ;*
- *Question 30: suggestions to improve the web-supported course.*

A sample of typical open responses is given in Exhibit 5.1, in which the comments are presented as given by the respondents, without correction. The left hand column indicates the frequency of the response, which is mainly "1" due to the open nature of the items.

Exhibit 5.1: *Sample of open responses in html format*

1	I could learn where I want, when I want.
1	It was great, now I know how to use the internet.
1	I enjoyed working in groups * The learning experience was enriching. * I learned a lot from my group members
1	I got to see my results. * I got access to solutions. * I got to give my views & questions. I got to learn alot.
1	I had my computer skills developed * I had a new learning experience * I had my typing speed skills enriched

1	More computer facilities, printing facilities please!!! Attention to technical problems
1	more computer labs like the maroon one
1	More computer labs should be made available on campus Access to computer facilities should be easy

6	more computers
1	more computers more help
1	More computers More technicians
1	More computers and easier acsess to labs
1	More computers and more printing faciliates.
	continued…

1	lecturers shoiuld be as up to date as we are
1	Lecturers must learn how to work with computers
1	Lecturers should make more effort on WebCT and respond to students\' questions and enquiries. All results should be made available on WebCT, not via email.
1	lecturers should keep it up to date and make sure that everyone has access to a pc if all the info is on there!
1	lectures should be forced to use it more

The open responses for a subset of the data[6] were coded by a student assistant, using the coding frame developed in earlier pilot administrations of the survey (Appendix D3). A sample of the coded data is given in Appendix D4.

The frequencies[7] for each of the open items are given in descending order in Tables 5.5, 5.6 and 5.7. The numbers of the options refer to the respective numbers of the responses on the coding frame.

Table 5.5: *Frequencies for Positive comments*

	Option	Percentage
1:	Convenience / ease of access / flexibility / anywhere, anytime / user friendly	41 %
2:	Information clear and accessible / can review, repeat	15%
13:	Challenging, exciting, enriching, new learning experience	9%
14:	Other	7%
10:	Improved self esteem / self confidence / independence / self discipline	6%
11:	Improved technical skills / computer literacy / searching information	6%

A fairly high proportion (41%) of the sample experienced web-supported learning to be convenient, flexible and user friendly. Fifteen percent of the sample found it helpful to be able to access learning material frequently and to review it before examinations.

[6] After coding 100 open responses (of the 4 650 respondents x 3 open questions each), a point of data saturation was reached, after which no new themes or issues were identified. The full set of open responses has been perused and used anecdotally in reports and presentations.
[7] Only frequencies of 5% or higher are reflected in these tables.

Table 5.6: *Frequencies for Negative comments*

	Option	Percentage
16:	Other	32%
1:	Technical problems / slow internet / slow download / problems uploading or downloading	17%
15:	Lack of access to computers and/or printers on campus	11%
5:	Slow updates to course, e.g. marks, calendar, deadlines	9%
2:	Malfunctions / errors / illegible acrobat files / links not working / difficulties with attachments	7.5%
9:	Inadequate / incomplete course material / class notes not available / not on time / confusing / vague	6%

Technical problems reflect the highest percentage in the distribution on negative comments. It is noteworthy that 11% of the sample reported problems with lack of access to computers and/or printers on campus, even though this item had been covered in the closed questions.

Table 5.7: *Frequencies for Suggestions*

	Option	Percentage
11:	Other	50%
2:	More courses / lecturers should use WebCT	10%
3:	Get lecturers to use it better / motivate lecturers / more interaction, feedback from lecturers / buy-in from lecturers	6%
6:	Better technology skills for lecturers / students / more training in WebCT	8%
9:	More frequent updating of marks / content / dates / groups	6.5%
1:	More powerful server / faster network	5%
8:	After hours support / IT support / prompt solution of problems	5%

Half the respondents in the sample made suggestions that were not covered in the coding frame. The coding frame should be modified in future to include some of the other suggestions made. Such ongoing refinement is part of gaining a deeper understanding of and being able to make more comprehensive interpretations of qualitative data.

It is noteworthy in Table 5.7 that students are applying pressure for more lecturers to put their courses on WebCT and to facilitate them in a more interactive way. The difficulty in obtaining buy-in and commitment from lecturers was also mentioned by lecturers in the lecturer interviews (see section 5.3.2).

5.3 Lecturer interviews

The findings for the closed questions are presented first (section 5.3.1), followed by the findings from the open questions (section 5.3.2).

5.3.1 Findings from closed questions

The findings for the closed questions are analysed in the following categories:

- value of the e-learning component (Table 5.8)
- use of the online communication tools (Table 5.9)
- WebCT training attended (Table 5.10)
- level of satisfaction with services received (Table 5.11).

Seven items about the value of the e-learning component were assessed using a 5-point Lickert scale. An eighth item rated the overall worth of the e-learning component on a scale from Excellent to Unacceptable. The findings for these eight items are summarised in Table 5.8.

Table 5.8: *Lecturers' assessment of the value of the e-learning component*

	Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	**Total**
1. In my opinion, the e-learning component adds value to the learning experience for students.				12	10	**22**
2. The e-learning component promotes active learning / problem-based learning / learner-centered activities.		1	5	10	6	**22**
3. I used the e-learning component to support me in my administrative tasks.	1	1	4	7	8	**21**
4. I found that the e-learning component supported me in the facilitation of learning.			3	10	9	**22**
5. The e-learning component contributed to the achievement of subject specific learning outcomes.		2	2	13	5	**22**
6. The e-learning component provided meaningful assessment opportunities.		1	7	6	6	**20**
7. The e-learning component enhanced the learning experience due to instructional design features, e.g. activities, chunking, resources, interaction.		2	4	11	3	**20**
	A Excellent	**B Very Good**	**C Good**	**D Poor**	**E Unaccept-able**	**Total**
8. My overall evaluation of the **worth** of this e-learning component in enhancing the teaching and learning experience:	8	11	3			**22**

In all the above seven positively phrased items, at least half of the respondents reacted positively by selecting 'Agree' or 'Strongly agree'. All respondents to the eighth item rated the overall worth of the e-learning component as 'Good' or better.

One of the individuals who selected 'Disagree' for some items explained that the students in her course did not use the WebCT component very much, as they are lacking in computer skills. Even after the WebCT training, they needed a refresher course. She plans to promote the use of WebCT much more actively in 2004, especially the online submission of assignments.

A second respondent who selected 'Disagree' in some of the above items explained that WebCT is currently used largely to provide information to students. Lecturers on the programme are generally guest lecturers from the business world. They are not necessarily committed to using WebCT fully. The individual who selected ‘Strongly disagree’ with respect to administrative support simply does not make use of the administrative aspects of WebCT in his research-based postgraduate course.

Some of the respondents qualified their responses with remarks such as those shown in Exhibit 5.2.

Exhibit 5.2: *Qualifying remarks made by respondents*

- It depends on the way it is handled by lecturers.
- If it is used properly, it should really add value.
- In theory, yes...
- These statements may be applicable, but not necessarily.
- At this stage, I only use WebCT on the level of a post box.
- The administrative support I use is the student tracking and mark schedules.
- The students are learning a great deal related to information searches and computer navigation – not directly related to module.
- Hopefully it will in the future.

The qualifying remarks illustrate the fact that even if lecturers are not currently using WebCT for deeper levels of interaction and facilitation, they are aware of its potential for these purposes. Lecturers’ use of the online communication tools is reflected in Table 5.9 and discussed thereafter.

Table 5.9: *Lecturers’ use of the communication tools in WebCT*

Rank these online tools according to:	**Discussions**	**e-mail**	**Chat**	**Calendar**
Frequency of your use of the tool:				
0=never	3	3	19	13
1=seldom	3	2	2	2
2=monthly	3	1	1	2
3=weekly	7	8		3
4=daily	6	8		2
Your opinion of the tool’s usefulness:				
0=useless	1	3	17	8
1=supportive	8	8	3	8
2=indispensible	12	11	1	5

Table 5.9 shows that the discussions and e-mail tools (both asynchronous) are the most frequently used – their frequency of use ranges from low scores on ‘never’ to high scores on ‘weekly’ and ‘daily’. The chat tool is the opposite, with the majority of respondents not making use of it. This is because the synchronous nature of the tool is appropriate in some courses and not in others. One respondent makes efficient use of the chat room on the evening prior to the examination, for students to pose last minute queries.

The Calendar, when used, was found to be “useful for lecturers and students in a flexible learning programme”. One respondent derives great benefit from the fact that the Calendar is totally under her control, without needing the assistance of an instructional designer to make changes or bookings.

A shortcoming of the data collection instrument is that it does not offer the option “not applicable” on the second part of this item (see Table 5.9). For example, if tools such as the Chat and Calendar are never used in a particular course, respondents were obliged to select “0” in respect of their usefulness. Clearly “not applicable” would have been more accurate in such cases.

A further shortcoming of the instrument is that the e-mail tool is not qualified as to whether it is the internal WebCT e-mail tool, personal e-mail or a listserv that is being referred to. All such versions of e-mail clearly contribute to promoting electronic communication between lecturers and students. Some respondents indicated that they never use the e-mail tool in WebCT, but that they do make extensive use of other forms of e-mail.

TLEI offers staff training courses in WebCT at various levels of complexity. All lecturers embarking on WebCT are required to complete at least the one-day WebCT High Impact course. The more advanced courses are optional, depending on how involved the lecturer wishes to become in the creation and maintenance of WebCT courses. Table 5.10 shows the number of respondents who attended the various training courses.

Table 5.10: *WebCT staff training courses attended*

	High Impact	Inter-mediate	Web Page Design	WebCT Designer
Which WebCT training course/s did you attend?	19	5	3	5
Did you attend each training course before, during or after you presented your module?				
b=before	9	2	1	3
d=during	6	2	2	2
a=after	1	1		

Almost all the respondents have attended the required WebCT High Impact course. Some attended it four years ago and indicated a desire to repeat it, due to new functionality in later versions of the software. Few lecturers go on to complete the more advanced training courses. This implies that the majority of academic staff still rely on the support of the instructional design team at TLEI.

The second item in Table 5.10 shows that respondents generally choose to attend the training either before or during the presentation of their web-supported modules. The findings from this item in future administrations of the Lecturer Experience Questionnaire will investigate the impact of training offered by TLEI.

One item in the survey asked directly about client satisfaction with the service levels of various sections of the support team. The data is presented in Table 5.11 and plotted in Figure 5.14.

Table 5.11: *Level of satisfaction with services rendered*

	A Excellent	B Good	C Satis-factory	D Poor	E Not applicable	F Unaware of service	Total
Project Management	12	4			5		21
Education Consultancy	6	3	1		9	2	21
Instructional Design	13	6			2		21
Graphics	6	4	2		8	1	21
Information Service (AIS)	10	6	2	2	1		21

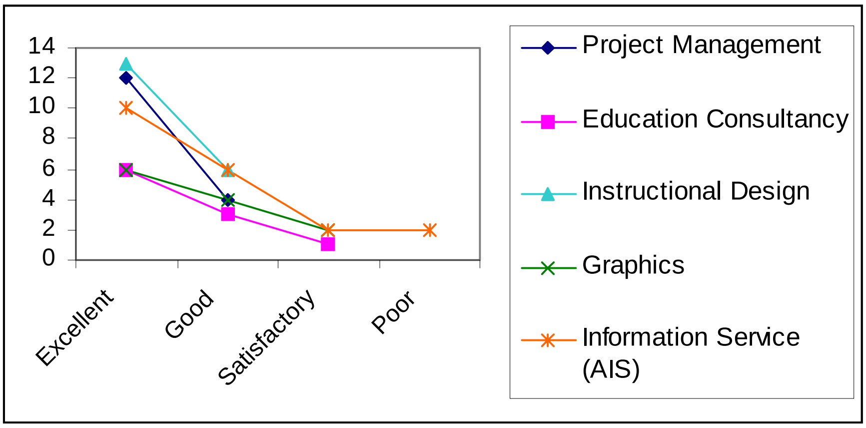


Figure 5.14: Lecturer satisfaction with service levels of TLEI and AIS

Figure 5.14 exhibits the desired trend, in that there are higher numbers of ‘Excellent’ responses and lower numbers of ‘Poor’ responses. The immediate services offered by the e-learning unit are project management and instructional design. These services both enjoyed high numbers of responses in the ‘Excellent’ and ‘Good’ categories. The only service which attracted responses in the ‘Poor’ category was the Academic Information Service, and then only from two respondents. Some problems with this service were also mentioned in response to one of the open questions (see Exhibit 5.1).

Many respondents indicated that some of the services are not applicable or not required. This may be due to various possibilities:

- the lecturer is a WebCT expert and can carry out the functions him or herself;
- a WebCT assistant in the academic department carries out the functions;

- a template is used, thus obviating the need for graphic services;
- the WebCT course is a long-standing one, requiring maintenance only.

Many positive comments were elicited by this item. Some such comments are shown in Exhibit 5.3.

Exhibit 5.3: *Positive comments on services rendered*

- I really enjoyed working with the team. You people make ME look good!
- Polite, knowledgeable, quick turnaround time, bends over backwards for clients.
- I am amazed every day by the outstanding, enthusiastic and helpful manner in which TLEI encourages, supports and leads us.
- Organised, involved, quick feedback provided.
- The Instructional Designer really helps us tremendously – she is a valued team member.
- I believe that the instructional designers do not receive adequate recognition for their hard work!
- You were always a phone call away – thanks for that.
- The dedication and outstanding support of staff members are highly appreciated.
- I have always had excellent service. The Instructional Designer is always willing to help and always extremely positive.

The responses to the closed questions can be summarised as being overwhelmingly positive, particularly with regard to the support provided by TLEI. Where there were reservations or qualifications to statements, these could be explained by the type and level of WebCT usage in a particular department. Some respondents indicated that they would like to refresh their knowledge of WebCT and engage in the use of web-supported learning at deeper levels.

5.3.2 Findings from open questions

The flood of verbal responses from a qualitative instrument necessitates data reduction, selection and careful display (Miles & Huberman, 1994).

I analysed each category of open responses by using coloured highlighters to code remarks on similar themes. The findings are presented here according to the following broad categories:

- problems experienced
- benefits gained
- lessons learnt.

Problems experienced

By perusing Tables E1 and E2 (Appendix E2), five themes were identified. These are listed together with the number (n) of responses per theme in Table 5.12.

Table 5.12: *Summary of problems experienced*

Theme	Number of responses (n)
No (or few) problems	8
1. Technical problems	15
2. Getting students to participate (academically and technically)	9
3. Getting lecturers on board	7
4. Time required (in planning and development)	6
5. Library / copyright problems	5

Technical problems with respect to new software versions and the integration of campus IT infrastructure were mentioned frequently. Other problems are the human issues of commitment and buy-in from lecturers, getting students to participate actively and meaningfully, timely preparation and planning of learning materials, and scanning and copyright of reference materials.

Benefits gained

By perusing Tables E3 and E4 (Appendix E2), nine themes were identified. These are listed together with the number (n) of responses per theme in Table 5.13.

Table 5.13: *Summary of benefits gained*

Theme	Number of responses (n)
1. Organisational / administrative benefits	13
2. Communication and interaction with students	8
3. Savings in terms of time, money, queries	7
4. Good support from TLEI	6
5. Re-thinking / re-planning / re-structuring	4
6. E-learning added value	3
7. Personal and professional development	3
8. Lecturers coming on board	2
9. Students gaining new experiences, skills	2

The comments show that lecturers who use web-supported learning at deeper levels have experienced its benefits. Most notable are organisational benefits, communication and interaction with students, and savings in terms of resources and personal energy. The support of the e-learning team, from the point of view of educational input, structuring and improvement of presentation was mentioned. The need for lecturers to plan, organise, reflect on and re-design their learning materials was seen as benefiting the eventual learning experience of students.

Lessons learnt

By perusing Table E5 (Appendix E2), six themes were identified. These are listed together with the number (n) of responses per theme in Table 5.14.

Table 5.14: *Summary of lessons learnt*

Theme	Number of responses (n)
1. Change management (lecturers and students)	6
2. Training (lecturers and students)	5
3. Distance learning / larger numbers of students	4
4. Human element	4
5. Discussions / growth	2
6. Internationalisation	2

Change management, which was mentioned by six participants, refers to the need to keep lecturers and students informed and committed, especially in the light of proposed system changes. It is noteworthy that training for lecturers and students was mentioned with a fairly high frequency.

The human element refers to the perspectives and focus of lecturers and students in order to make e-learning a success. Internationalisation has been enabled in various postgraduate programmes, due to the global nature of e-learning.

5.3.3 Factors contributing to lecturer satisfaction with web-supported learning

Noteworthy factors synthesized from the above findings are the following:

1. Lecturers don't like surprises with respect to technology upgrades. Keep them well informed and well supported. Maximise technical reliability and don't expect lecturers to solve technical problems themselves or to wait too long for solutions.
2. Organisational and administrative benefits are practical, quick to realise and appreciated by lecturers.
3. Communication and interaction with students and evidence of their increased growth and development are valued by lecturers who facilitate these aspects online.
4. Staff and student training are critical for the success of e-learning.
5. The contributions of support services are invaluable, for example e-learning design and development units and academic information services. Such services need to be attuned to the needs of lecturers and to be creative, prompt and efficient.
6. Even though there is an initial increased time commitment in designing and developing an online course, subsequent savings in terms of time, money and physical queries are appreciated by lecturers.
7. Human issues and change management take time to exhibit positive effects.

Amongst the problems experienced by lecturers, the one which caused the most inconvenience and frustration was the extent of system changes and upgrades which were implemented in early 2004 and the perceived lack of advance warning. When lecturers are comfortable with the technology and experience the benefits of e-learning, they not only adopt it, but feel the need for advancement in the levels of web-supported learning they implement.

5.3.4 Suggestions for refinement of the instrument

Various shortcomings of the questionnaire were identified during the pilot application in early 2004. The questionnaire is currently four pages long and could usefully be shortened to three pages by implementing the following suggestions.

Page 1:

1. Insert this introductory question:

   Identify your particular use/s of the e-learning component:

Information sharing (‘Post box’)	Communication	Assessment	Student tracking

   Responses to this item will contextualise the particular level of usage of e-learning, without respondents having to explain it.
2. Online tools: Include an additional tool: ‘External email / Listserv’.
3. In the second part of the ranking question, include a ‘Not applicable’ option so that a tool’s ‘usefulness’ is not prejudiced by having to select ‘useless’.
4. Remove the question about the interpretation of the **worth** or **value** of the e-learning component. More than one respondent indicated that their answer to the ‘Benefits’ covers the same information as that under the ‘worth’ or ‘value’ of the product.

Pages 2 and 3

Do not separate the type of problems or the type of benefits experienced. This complicates the thought processes required from respondents. Simply have ‘Problems experienced’ and ‘Benefits experienced’. This will also simplify the data analysis.

The above suggestions for improvement of the instrument should be implemented in future applications of the Lecturer Experience and Satisfaction Survey. It is recommended that the survey should be completed by lecturers in the annual review and planning project meeting.

5.4 Summary

An integral component of quality assurance theory and practice is client feedback in order to measure client satisfaction. The direct *clients* of an e-learning production unit are lecturers making use of these services. The ultimate clients are students who are the end users of e-learning products. This chapter investigated the levels of frustration and satisfaction of students taking web-supported courses, as well as that of lecturers making use of the support services offered. The student feedback survey was piloted from 2001 to 2002. The data from July 2003 was analysed and reported in this chapter. There were 4 650 responses to the student WebCT Experience Questionnaire.

The questionnaire items were written according to the following categories:

- technical adequacy and technical support (**TA**);
- educational support (supportive resources and training) (**ES**);
- affective domain (feelings and emotions of students) (**AD**);
- use of the communication tools in WebCT (interactivity) (**CT**);
- perceived learning (**PL**).

The first three categories were used to generate a Frustration Index (FI) and the last two categories were used to generate a Satisfaction Index (SI). The

Frustration Index indicated that 83% of respondents experience moderate to high levels of frustration in their web-supported courses. The Satisfaction Index indicated that only 43% of respondents experience high levels of satisfaction. Both these indices are disappointing in the high level of frustration and low level of satisfaction exhibited.

Each index was investigated in further detail to ascertain the contributing factors. The contributing factors to the Frustration Index are:

- insufficient computers available on campus;
- insufficient printing facilities available on campus;
- extent of technical difficulties experienced;
- insufficient support from the student CD-Rom;
- inadequate student training in WebCT;
- an impersonal learning experience;
- slow response from classmates;
- feelings of annoyance and/or stress.

The contributing factors to the Satisfaction Index are:

- feeling comfortable communicating via online tools;
- feeling more freedom to express oneself than in a traditional classroom;
- learning from the contributions of other students;
- promoting one’s ability to work as a team or group member;
- promoting one’s ability to plan one’s own work;
- experiencing an enriching learning environment.

The interview schedule for the lecturer interviews was the Lecturer Experience and Satisfaction Questionnaire (Appendix E1). It emerged as a newly created instrument from the quality management system (see chapter 5), to contribute to comprehensive summative evaluation of web-supported courses. In the past, the only form of summative evaluation was student feedback.

The instrument was piloted with a small sample of 22 lecturers known to be active in WebCT. The data were analysed separately with respect to closed and open questions. The closed questions yielded very positive findings. There is strong agreement that the e-learning component adds value to the learning experience for students and that the excellent service from the Department of TLEI is valued by the respondents.

In the spirit of collecting rich and valid qualitative data, as much information as possible was recorded in response to open questions. These questions probed problems and benefits experienced with respect to the design and development of web-supported courses, as well as in facilitating and presenting online modules. Many of the respondents use web-supported learning on the level of information sharing, but they are aware of the benefits of facilitating learning in deeper and more interactive ways.

A source of frustration for lecturers was the extent of the upgrades to the IT infrastructure which occurred at the beginning of 2004. This led to a sense of insecurity with regard to technical reliability and technical support.

Staff and student training were mentioned as vital to ensuring the quality and success of web-supported learning. Online communication and interaction are recognised as providing benefits in the teaching and learning situation, but organisational and administrative advantages are more practical and quicker to achieve. Several responses reflected the difficulties with respect to the human element – getting the commitment of lecturers and motivating and encouraging students to participate in web-supported learning.

Suggestions were made in this chapter to refine the Lecturer Experience and Satisfaction Questionnaire for future administrations thereof. It will be reduced to three instead of four pages and the questions regarding the use of electronic tools will be clarified. It is recommended that the survey should be implemented in the interests of summative evaluation with all lecturers in annual project review and planning meetings.

To solve a problem, the first step is to identify where it lies. This analysis has identified a number of problems in the web-supported service provision to students and lecturers at the University of Pretoria. In order for the University to realise its claim of internationally recognised and top quality education provision, the client voice in respect of web-supported courses must be heard and acted upon. Besides improving service to clients, this would contribute to a future impact study to provide evidence of return on investment.

Chapter 6

Findings:

Process-based Quality Management System

6.1 Introduction

The research target stated in chapter 1 highlights the need to diminish the divide between the discourses of quality assurance and web-supported learning. This problem led directly to research question 3:

> **What lessons were learnt in applying standard quality assurance theory to the instructional design process for web-supported learning?**

The conceptual framework for this study (chapter 2, Figure 2.5) indicates that a process-based quality management system (QMS) is a holistic and complex *system*[1], incorporating at least inputs, processes, outputs, measures and distant outcomes. In this case study, the major *process* under analysis is the *instructional design process*. The *products* that result from this process are web-supported courses (learning opportunities). These products are subjected to formative and summative evaluation *procedures* in the course of usual instructional design practice. The evaluation *procedures* are documented formally in the process-based QMS, as are all the procedures in the Project Timeline (Appendix F1).

The process-based QMS in this study was designed and developed according to a conscious decision to concentrate on self-evaluation and improvement, rather than accountability requirements placed on practitioners by an external

[1] The term *system* is used in the broad sense of the word, namely “a powerful bundle of ideas” (Checkland, 1999, p. A4); or the “discipline of seeing wholes” (Senge, 1990, p. 68).

quality assurance agency (see perspectives on the debate presented in section 2.4.1). Jeliazkova and Westerheijden (2002) describe the dangers of a culture of compliance as "routinisation, bureaucratisation and window dressing" (p. 434). Fourie (2000) confirms the need for practitioners to develop their own meaningful efforts at continuous improvement "at various levels of the institution and in various areas" (p. 51) (for example: web-supported learning).

For the above reasons, it was decided not to seek ISO 9000[2] certification for the QMS in web-supported learning. Rather, the approach adopted was a commitment to the human aspects of quality assurance, which emphasized training in quality assurance theory and sought the involvement and support of all participants.

The uniqueness of the intervention lies in the fact that it is a documented, online system for managing the quality of instructional design processes and procedures for web-supported learning. The literature review did not reveal a fully documented online QMS in the field of web-supported learning in higher education (see chapter 2, section 2.7).

The findings are presented in this chapter in the form of eight lessons learnt, each of which contributed to understanding the application of quality assurance theory to the instructional design process. Being an exploratory study of a particular case, the eight lessons are reported as outcomes of the journey of reflection and development on which the instructional design team embarked. The list of eight lessons learnt is not intended to be unique or exhaustive – instead they offer advice for application in similar web-supported learning scenarios.

[2] ISO 9000 requirements were taken into account, so that the system may be adapted for certification, should this be desired at a later stage (Boyd, 2001a).

6.2 Overview of methodology

The methodology for research question 3 was presented in chapter 3, sections 3.4.3 and 3.4.4, and is revisited briefly here. The data sources were documentation, archival records and artifacts (Yin, 2003a):

- documentation: communiqués, agendas, notes and minutes taken by hand during the task team sessions;
- archival records: administrative documents such as policy documents, guidelines and other internal records;
- artifacts: procedures and supporting documentation generated by the task teams and the paper-based prototype of the online QMS[3].

The data sources provided guidance which contributed to the design and development of artifacts in the QMS. Some of the data sources *became* artifacts in the system, for example administrative documents and guidelines that were already in existence. In this sense, the data was not *analysed* according to any formal data analysis techniques, but rather was collected, updated and incorporated into the system where applicable.

Expert consultation and task teaming were used to gather, organise and generate data and artifacts. The research procedures included four steps: training the participants in quality assurance theory, conducting QMS Steering Team and task team sessions, producing a complete paper-based prototype of the QMS and developing the online version of the QMS in WebCT (see chapter 3, section 3.4.3). The online QMS is an internal departmental tool, designed for the use of e-learning[4] practitioners in a support department at a higher education institution.

[3] The final online QMS itself became an artifact to be used in practice.
[4] The term *e-learning* is used here, rather than web-*supported learning*, since the practice may include other electronic media as well as online media.

6.3 Findings

The findings from the data sources and the reflective journey are presented in this section in the form of eight lessons learnt. The following reporting structure is used for each lesson:

Table 6.1

Reporting structure for findings: research question 3

Lesson:	The finding, or the lesson learnt as a result of the research activities.
Evidence:	Evidence and records to support the lesson.
Resulting artifacts in the formal QMS:	Artifacts which contributed to building the formal QMS. The artifacts are described here and included in detail in Appendix F.

In the conceptual framework for this study (Figure 2.5), two of the input categories are *instructional design factors* and *lecturer factors*. Lecturers are role players in the instructional design process, since being subject experts, they provide the content for web-supported courses. A summary is given in section 6.4.1 of all the artifacts produced as a result of the lessons learnt.

6.3.1 Lesson 1: Instructional design model

Lesson:

Adopt a fundamental instructional design model to serve as the main process in the quality management system. Subdivide it into its constituent procedures to be analysed and documented in detail.

Human nature is such that hindsight often reveals what should have been done at the beginning of a project or how a web-supported learning production unit should operate. Informal practices that might have worked with a small group of practitioners in the early days of such a unit soon need to be formalised, documented and streamlined.

Exhibits 6.1 and 6.2 show that in 2000, a formalised instructional design model had not yet been adopted by the E-Education Unit[5] at the University of Pretoria.

Exhibit 6.1: Tabular timeline

Note in my Minutes file, October 2000. As a project manager[6], I feel rather insecure without having a clear instructional design model to follow. I asked the deputy director and an instructional designer what instructional design model was in use by the team. They produced a timeline in tabular format (Lazenby & Drysdale, 1999). Although it mentioned analysis, design, development, evaluation and people responsible for each step, it only implicitly implied an instructional design model.

Exhibit 6.2: Lack of an instructional design model in the E-Education Unit

Extract from Minutes of a brainstorming session held with the instructional designers on 28 November 2000. **Present: Six instructional designers; one Project Manager** 1. Discussion revealed that there was no formal instructional design model in place, although most of the team members have studied instructional design at postgraduate level and are knowledgeable about the process. 2. Estelle produced a triangular diagram, showing the activities involved in creating a web-based course. However, the group agreed that the apex at the top allows the misconception of finally 'arriving' at a solution or 'perfect' product. 3. Existing ID models were considered, e.g. Hodgkinson's Daisy model and Willis & Wright's R2D2 spiral model. The idea of the spiral was popular, since it implies continuous improvement and ongoing quality assurance. 4. It was finally agreed to adopt the standard ADDIE model. Jill offered to design a one page visual representation thereof, so that project managers could easily discuss the process with lecturers during planning meetings.

Resulting artifact in the QMS: Project Timeline (Appendix F1)

Standard instructional systems design (ISD) recommends that practice should be based on an instructional design model (Gery, 1987). In response to the evidence above, the instructional design team decided to adopt the traditional "ADDIE" Instruction Design Model: **A**nalysis, **D**esign, **D**evelopment, **I**mplementation, **E**valuation (Gustafson & Branch, 2002; Hall, 1997).

[5] The term *E-Education* is used, since it was the name of the unit within TLEI at that time.
[6] A project management methodology is followed in the E-Education unit. Therefore any reference to *project* implies an e-learning project.

The ADDIE instructional design process was operationalised as a customised **Project Timeline**, a one-page visual representation of steps involved in the instructional design of web-supported and multimedia learning products.

Quality assurance theory dictates that processes are subdivided into procedures, which may be further subdivided into detailed work instructions (Boyd, 2001b). The Project Timeline is the main *process* of the QMS. It consists of various 'boxes'. Each 'box' or step is a *procedure*, with inputs and outputs, roles and responsibilities and supporting documents (see Appendix F4 for an example of a fully documented procedure).

6.3.2 Lesson 2: Analysis and Evaluation phases

Lesson:

Focus attention on the Analysis and Evaluation phases in instructional design in order to avoid expensive re-work[7], wasted work or development whose instructional effectiveness is not measured.

It is well known in the field of instructional design that the Time – Cost – Quality tension often necessitates tradeoffs in one or more of these aspects (Lee & Mamone, 1995; Lowe & Hall, 1999). In this case study, the time factor and demands of clients (see Lesson 7) often dictate that design, development and production take precedence over analysis and evaluation.

Supporting evidence of the *lack of analysis* is illustrated by Exhibits 6.3 to 6.5 and the *lack of evaluation* by Exhibits 6.6 and 6.7 below. The lack of attention to needs analysis led to significant resources being allocated to projects which were later abandoned due to insufficient student numbers, or insufficient access to computers. The lack of attention to summative evaluation of web-supported courses means that practitioners are unable to measure whether the learning intervention contributes to student learning.

[7] Historically, quality *assurance* assumed preference over quality *control*. The latter rectified errors at the end of the production line, whereas the former is intended to minimise errors during the course of usual practice (Boyd, 2001b).

The inference in both cases is that attention should be paid to needs analysis and summative evaluation in order to avoid the problems mentioned.

Analysis phase

Exhibit 6.3 shows that in 2000, it was assumed that academic departments were expected to conduct their own needs analysis with respect to web-supported learning.

Exhibit 6.3: The analysis phase was not done by instructional designers

> **Personal notes taken at an e-management meeting on 16 February 2001:**
>
> The researcher asked about the Analysis phase. The answer given by the deputy director and the other project manager was that the academic department is expected to do the analysis, in terms of the need for web-supported learning and the size and nature of the target population.

In reality, academic departments are ill equipped to do any sort of needs analysis. Very often they do not know until after their students register for a particular course, details of student numbers, the nature of the target population, or the extent of their access to technology. Even then, their information is incomplete or inaccurate. In two particular departments, many hours went into designing and developing web-supported courses, only to find out afterwards that students either had no access to computers at all, or otherwise had to drive long distances to find a computer with access to the Internet (see Exhibit 6.4).

Exhibit 6.4: Lack of student access to technology

> **Extract from Minutes of a Project Meeting with the Department of XXX[8], held on 11 November 2002.**
> **Present: Project Leader, Project Manager, Instructional Designer, Library specialist, Lecturers**
>
> The project leader explained that only 5 students registered for this programme. Two of them live in the Kruger National Park and have to travel for over two hours to reach a computer with Internet access, located at Skukuza.
>
> continued…

[8] Names of clients and departments are withheld for reasons of confidentiality.

```
Decision: Further development of the WebCT modules is to be put
on hold. The learning materials will in future be provided to
the students on paper.  They may submit their assignments by
post or by fax.
```

Besides the possible lack of student access to computers, the small number of students in some courses renders it neither feasible nor cost effective to design and develop web-supported materials. Exhibit 6.5 shows that an entire undergraduate programme had to be put on hold due to small student numbers.

Exhibit 6.5: Low student numbers

```
E-mail message
From:      Project Leader in the Department of ZZZ
Sent:      04 February 2004 09:34AM
To:        Jill Fresen and cc's
Subject:   Discontinuation of programme

Colleagues
I just received instructions from Professor X stating that we
will not take in new first year students for 2004.  The idea is
to market the programme during 2004 to see if we can't get 10
or more students enrolled – the minimum allowed to continue
with this programme in the future.

Thank you for your support.
```

As a result of problems of access to computers or small student numbers, the development of web-supported courses had to put on hold, very often after several modules had already been developed. The wasted time and effort could have been avoided if a thorough needs analysis had been done before the start of the web-supported learning project.

Evaluation phase

The growing demand for the production of modules in WebCT meant that little attention was given to evaluation of the resulting products. Some formative evaluation took place in the form of "shredding sessions" (later renamed "peer evaluation sessions") attended by peer instructional designers.

No formal summative evaluation was in place until the QMS was implemented in 2004. The *summative evaluation procedure* was analysed and documented by one of the task teams. The objectives of a formal summative evaluation procedure are to enable regular feedback from clients in the interests of continuous improvement, to provide management information in terms of the impact of e-learning, and to evaluate the contribution of the learning intervention to teaching and learning.

Exhibit 6.6:
The summative evaluation phase was not done by instructional designers

E-mail message
From: Lesley Boyd
Sent: 3 November 2002 23:10PM
To: Jill Fresen
Subject: Learning outcomes

These issues have been circulating around in my mind for some time and as you know I frequently refer to the way we have scoped the project. It came particularly to the fore on our long Friday afternoon discussion when you observed that E-education is not directly concerned about the subject-specific learning outcomes of the course. I would argue that you cannot do any meaningful summative evaluation without being concerned about the learning outcomes and how well the instruction contributed towards them.

-----oooOooo-----

E-mail message
From: Lesley Boyd
Sent: 8 November 2002 09:58AM
To: Jill Fresen
Subject: Summative Evaluation

My original question remains … should you concern yourselves in e-education about the learning outcomes of the course and if not, what happens during your summative evaluation? Is summative evaluation in fact something that should be done after 'Student Feedback', not before, to assess the overall worth of the telematic product? What do you actually do during summative evaluation at the moment?

The answer to the latter question at the time was that no summative evaluation was being done in practice. Vigorous discussion took place in some task teams about the extent to which instructional designers might be expected to promote the accomplishment of specific learning outcomes. Most designers felt that this is the domain of the subject expert. One instructional designer suggested that Bloom's taxonomy might be used to generate generic learning outcomes[9] by which the effectiveness of a web-supported learning product may be evaluated (Exhibit 6.7).

Exhibit 6.7:

Should web-supported learning products be evaluated according to the achievement of student learning outcomes?

```
E-mail message
From:      instructional designer D.S.
Sent:      12 November 2002 11:28AM
To:        tlodesign@kendy.up.ac.za
Subject:   Generic learning outcomes

Hallo all
I have been thinking (Yes, it does happen sometimes ;0)…
We cannot really assess the specific learning outcomes of the
lecturer.  Should we not have a look in the beginning of a
project at their specific outcomes, then formulate our own
GENERIC outcomes that will be pertinent to TLEI and the way we
structure everything to enhance the outcomes of the lecturer?
```

The above comment reflects not only the need for summative evaluation after implementation of the web-supported course, but also the need for proper analysis and planning at the beginning of a project. The comment succinctly reflects the essence of instructional design – how to take the learning materials and design an effective learning experience for the student.

Resulting artifacts of the QMS:

Needs Analysis and Summative Evaluation Checklists

(Appendices F2 and E1 respectively)

As a result of the fact that the analysis and summative evaluation phases of the instructional design process were not carried out by the instructional design team, two artifacts were designed and incorporated into the QMS:

- **Needs Analysis Checklist** (Appendix F2): this was designed according to the standard items: goal analysis, target population analysis, media analysis and performance analysis. The instrument should be used in the exploratory stage of a web-supported learning

[9] Subject-specific learning outcomes and/or generic web-supported learning outcomes are referred to, not the cross critical outcomes prescribed by SAQA.

project, with the education consultants assisting lecturers to provide the required information.

- **Summative Evaluation Checklist**: this was later adapted and renamed the 'Lecturer Experience and Satisfaction Survey' (Appendix E1), to be congruent with the terminology used in the student feedback survey.

Both the client experience surveys (for students and lecturers) are supporting documents in the summative evaluation *procedure* in the QMS.

6.3.3 Lesson 3: Quality assurance training

Lesson: **Train e-learning practitioners in the basics of quality assurance practice. Do not allow too much time to lapse between workshops and procedure writing.**

It was difficult to prioritise the development of the QMS during peak web-supported learning development times, when the instructional design team had to focus on their core functions. The training workshops were held in November 2001 and May 2002, yet the QMS Steering Team and task team sessions were only held in 2003. As a result, many months had passed after the training workshops before procedure writing began. This meant that e-learning practitioners had retained little of what they had learnt and additional support materials and guidance had to be produced.

Exhibit 6.8 shows evidence of both these issues, namely the heavy load of the instructional design team which led to the delay in the start of procedure writing, as well as the resulting need for refresher training materials. Exhibit 6.9 shows the planning for the first QMS Steering Team meeting, which incorporated a review of some of the concepts previously dealt with in the training sessions.

Exhibit 6.8: Booking the first QMS Steering Team meeting, February 2003

E-mail message

From: **Jill Fresen**
To: **Instructional Design Team**
Sent: **Wednesday, January 29, 2003 3:15 PM**
Subject: **Jigsaw and pizzas**

Hello everyone
I have booked a QMS 'Jigsaw Puzzle' session (Steering Team meeting) at 09:30 on Tuesday 25 February. We plan to make it a practical, interactive worksession / brainstorming / **refresher session on procedure writing.**

We are sensitive to everyone's heavy workload and yet it is becoming critical that we put something on the table and show some progress very soon. I have chosen the last week in Feb, because I think a lot of the initial crisis management will have passed, and we can fit it in before all the March activities.

Exhibit 6.9: Preparation for QMS Steering Team meeting

Telephone conversation between QA consultant and the researcher on 27 February 2003
QA consultant: I think it will be necessary to provide a copy of the QMS triangle from the training workshop, to put it all in context again.
Researcher: Yes, and we should explain again about processes and procedures. We can provide an example of one of the procedures we have already documented. I'll print out the Project Proposals procedure.
QA consultant: Good, that one is in the format that we agreed last week with the education consultant. Actually, it will be a good idea to provide a template, with the required structure and the document control data. I will work on that.

The QA consultant developed a template in MS Word, so that task teams could create their procedures according to the required structure and layout.

Resulting artifacts of the QMS:

Template for and example of a procedure

(Appendices F6 and F9 respectively)

As a result of this lesson, two artifacts (supporting documents) were provided to task teams to assist with procedure writing:

- a template of a procedure;
- an example of a completed procedure.

Task teams then documented all the procedures in the Project Timeline according to the template. All these procedures and their supporting documents are artifacts in the online QMS. They form the evidence of the self-evaluation exercise that the task teams undertook and document the decisions made by the task teams.

The format of each procedure is as follows:

- the title of the procedure;
- an overview of the procedure;
- the objectives of the procedure;
- list of numbered procedure steps;
- responsibilities of role players in TLEI and in the academic department;
- list of supporting documents and outputs;
- footer showing document control data to control version numbers and date of issue.

Each procedure is a maximum of two to three A4 pages (Arial, size 11). The team agreed on a system of icons in keeping with the building metaphor, to indicate which supporting documents are mandatory and which are optional. Optional documents may be used at the discretion of either the project manager or the instructional designer:

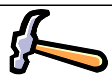
mandatory:	
optional:	

Figure 6.1: Icons indicating mandatory or optional supporting documents

The dynamic nature of instructional design implies that the procedures will need to be frequently updated in order to remain an accurate reflection of instructional design practice in this case study.

6.3.4 Lesson 4: Doubts about usefulness of the QMS

Lesson:

Participants (in this case, e-learning practitioners) and managers sometimes doubt the need for a formalised quality management system or fail to realise its usefulness.

A great deal of time and energy was required from the task teams to brainstorm and document details of each web-supported learning procedure. Efforts were made to place the work in context, yet none of the Steering Team sessions was attended by the full instructional design team. Members of the team were reminded why they were being asked to contribute their time and energy and why procedures were being documented in detail. Ultimately the instructional designers responded well and committed themselves to the task.

Exhibit 6.10: Confidential discussion

Confidential discussion with a senior member of the team (June 2003):

"I am a bit worried about what is going into the QMS. It is taking a lot of time from the instructional designers and it appears to be nothing more than a document management system. How will it ensure that the quality of our web-supported courses is enhanced?"

Replying convincingly to this challenging question was a lesson in itself for me as the researcher. As a result of ongoing discussions with the QA consultant and developing my own understanding, I have been able to formulate what I think is a convincing response, which follows below:

The *online* QMS is but one tool to streamline and formalise processes and procedures in the interests of consistency and continuous improvement of instructional design practice. By implication, improved practice should contribute to improved products, e.g. instructional designers are now expected to follow agreed guidelines such as screen design guidelines and conversion conventions when creating *.pdf versions of lecturers' electronic slideshows. Further than that, the QMS does not *per se* guarantee improved quality of the resulting web-supported learning products. The reason is the complex nature of instructional *systems* design (cf. Checkland's (1999) "rich pictures") and the many role players involved in contributing to the quality of web-supported learning products[10].

In order to dispel doubts about the usefulness of the QMS, attempts were made to organise refresher training in quality assurance, with particular emphasis on the implementation of the online version of the QMS. The QA consultant composed a motivating letter summarising the benefits of the QMS for the TLEI management team. Although there was money available in the budget, implementation training was not viewed as a priority, as shown by Exhibit 6.11.

Exhibit 6.11: No time for implementation training

Discussion with a senior member of the team (November 2003) "I discussed the suggestion for implementation workshops with the management team. Although there is still money in the budget for this year, there is no available time for group training sessions. Furthermore, everyone is exhausted at this time of year and will not be able to focus on the implementation of the QMS."

Resulting artifacts of the QMS:

Sanity checks (Appendix F5)

As a result of this lesson, the QA consultant developed 'sanity checks' for procedures and checklists - Why are we doing this? (Boyd, 2003, Appendix F5). These are practical reminders of the reasons for and benefits of formally documenting procedures and creating checklists. They are a common sense check to promote the commitment of team members and to ensure that value is being added and unnecessary documentation is avoided. The sanity check for procedures was ultimately used on the home page of the online QMS (see Figure 6.2).

[10] The quality of the resulting learning products is investigated further in the first research question of this study: What factors promote quality web-supported learning?

Figure 6.2: Home page of the final online QMS

(The details of the bulleted list are clearly readable in Appendix F5.)

6.3.5 Lesson 5: Reflection on own practice

Lesson:
Instructional designers and project managers in a busy production department need to make time to reflect on their own practice.

It became clear that requests to task teams to submit their draft procedures had to be handled sensitively and timed according to the pressures on instructional designers in the course of their normal duties. The beginning of each semester is a peak development time for instructional designers and focus group / task team sessions had to wait until production was quieter.

Responses from some of the team members are shown in Exhibit 6.12.

Exhibit 6.12: Pressure of development takes precedence

E-mail message
From: Instructional designer H.W.
Sent: 11 August 2003 0005:06 AM
To: Jill Fresen
Subject: QMS procedures still on Draft1

Jill
I'm working on the PNI project. The deadline is the 18th of August. From the 19th of August, I must work on the Mmed, Family Medicine and MSc Sports Medicine projects. I will schedule the task team meeting in September.

I'm sorry, but my projects are priority now.

-----oooOooo-----

E-mail message
From: Instructional designer E.D.
Sent: 07 October 2003 08:58 AM
To: Jill Fresen
Subject: Re: Sorry, lost my brain somewhere…

Hi Jill
Will you please excuse me from the Task Team meeting on 31 October, I already have another appointment. I also still need to send you the updated Maintenance procedure.

-----oooOooo-----

E-mail message
From: **Education consultant R.D.**
Sent: **05 December 2003 03:51 PM**
To: **Jill Fresen**
Subject: **QMS**

Dear Jill
The consultants wish to spend more time on the issues in the QMS that relate to education and consultation – this time of the year is a bit difficult for all of us. Please expect our feedback in February or early March.

The exhibit above is evidence of the pressure on e-learning practitioners to deliver according to the needs of clients. As a result, there is little time to reflect on how instructional design and educational consultation are practised or how procedures may be standardised or improved. Yet, in the interests of continuous improvement of practice, products and services rendered, a great deal of benefit was ultimately gained from critically analysing and documenting every aspect of the instructional design practice in the unit.

Resulting artifact of the QMS:

Guiding questions (Appendix F6)

The QA consultant assisted task teams in reflecting on their practice, since as a novice in the field of instructional design, she was able to pose pertinent questions which stimulated discussion and caused team members to ponder what they do, how they do it and why they do it. She compiled a list of guiding (self-evaluation) questions for task teams to consider when reflecting on and documenting their practice.

6.3.6 Lesson 6: Guidance for lecturers

Lesson:

Lecturers need guidelines in order to prepare learning materials for electronic delivery. They also need guidance on the roles and responsibilities of all role players in the design and development team, including their own.

Lecturers who attended the WebCT staff training courses expressed the need to know where to start and what materials they should supply to the instructional design team, as shown by Exhibit 6.13.

Exhibit 6.13: Basic requirements for a web-supported course

Notes taken during the WebCT High Impact staff training course on 19 February 2001:

Participant A.v.Z.: "That's all very well – I like the look of WebCT and I can now use some of its communication tools. But what do you guys expect me to bring to you for the development of my module and in what format? I am not very competent in the layout of MS Word documents, such as tables, bullets, fonts etc."

The team approach to instructional design (Gustafson & Branch, 2002) means that various role players, from lecturers to graphic artists and information specialists, have different roles and responsibilities, which need to be defined. Lecturers need to understand that they have certain responsibilities in the project team, such as committing themselves to providing well-planned content, ensuring the accuracy of the content and applying for copyright permission.

Exhibit 6.14: What about scanning and copyright?

Notes taken during the WebCT High Impact staff training course on 28 August 2001:

Participant B.v.V.: "I would like to prescribe one chapter from an Anatomy text book, but I don't want my students to buy the whole book, which is very expensive. May I have the chapter scanned in to put on WebCT? Who does that and what about obtaining copyright permission?"

The above exhibit shows the need for lecturers to understand the role of the information specialist at the Academic Information Service (Library) and to have clarity on whose responsibility it is to obtain copyright permission.

Exhibit 6.15: Clarity on roles and responsibilities

E-mail message
From: **Lesley Boyd**
Sent: **28 October 2002 4:04 PM**
To: **Jill Fresen**
Subject: **Responsibilities**
In answer to your question, I do not feel that it is necessary to have a line of responsibilities per paragraph in the procedure. However, where it is not self explanatory, it should be very clear about who is responsible for doing what.

Resulting artifacts of the QMS:

Minimum Requirements and Roles and Responsibilities

(Appendices F7 and F8 respectively)

As a result of this lesson, two instruments were incorporated into the instructional design toolkit, which is one of the artifacts accessible from the online QMS:

- **Minimum requirements**
  The need to specify basic requirements for the development of WebCT courses had been addressed in 1998, when one of the lecturers active in the roll-out of WebCT designed the *Minimum Requirements for Web-based Support* (Visser, 1998). The study guide is the basic building block on which the development of a web-supported course is based.

The minimum requirements were extended and enhanced by the instructional design team, in consultation with the education consultants, to reflect the suggested structure for the study guide.

- **Roles and responsibilities**
  A clear statement of an organisation's roles and responsibilities is generally required by international standards bodies, such as ISO 9000. Besides a brief sentence in the tabular version of the Timeline (Lazenby & Drysdale, 1999), guidelines about various role players and their functions had not been documented prior to 2001. Therefore a *Roles and Responsibilities* document was developed (Fresen, 2000) and later enhanced with inputs from the team.

6.3.7 Lesson 7: Unrealistic expectations

Lesson: **Lecturers often expect immediate completed web-supported learning products, even if they are submitted at extreme short notice.**

Even with clarity on the roles and responsibilities of team members, including their own, lecturers tend to produce their study guides and other learning materials only a short time before students are required to access them in WebCT at the beginning of a semester (Exhibit 6.16).

Exhibit 6.16: Immediate service expected by some lecturers

Notes from a project meeting held on 2/2/04.
Present: Lecturer: C. R., project manager, education consultant, instructional designer.

The lecturer produced his study guide, which was still incomplete and confusing. He required it to be on WebCT immediately and for us to provide student training the very next day. He apologized and explained what had prevented him providing the study guide before the end of last semester. However, this does not change the fact that the instructional design team cannot promise to complete this project at such short notice.

-----oooOooo-----

E-mail message
From: **Jill Fresen**
Sent: **6 February 2004 10:12 AM**
To: **Project Manager D.J.**
Subject: **Please take this one over**

Hi D.
Lecturer H.L. popped in today without an appointment. Last year he delivered his two study guides on diskettes with the request for them to be put on WebCT. We did so and notified him to come to the QA session. He did not respond.

He does not read his e-mails (admitted to me today that he has over 200 unread); he has been away for two weeks and does not have voice mail on his phone. Sounds like our other “friend” who pops in at peak times, yet never delivers ;-). I asked him to make an appointment with you, since you are now the project manager for that faculty.
(I know you have nothing to do and are just playing with your fingers ☺)

Resulting artifact in the QMS:

Service Level Agreement (Appendix F9)

A service level agreement (SLA) with lecturers was implemented during project meetings and staff training from 2001. However, in order to avoid alienating our clients, the instructional design team had been hesitant to enforce it or to have lecturers sign their acknowledgement of its terms and conditions. In the light of continued lack of awareness of the stipulated development time, especially during peak periods (see Exhibit 6.16), it was decided in February 2004 to enforce the SLA (Exhibit 6.17).

Exhibit 6.17: SLA is now to be enforced

```
From:      Senior team manager
Sent:      06 February 2004 10:27 PM
To:        Instructional Designers list
Subject:   Laat studiemateriaal / Late study material

Hallo Almal
Dit klink vir my asof dit regtig baie rof gaan met almal en dat
die dosente materiaal baie laat bring.  Julle moet asseblief
met julle projekbestuurders gesels sodat ons die
diensvlakooreenkoms kan 'afdwing' waar nodig.  Anders kan dit
elke jaar slegter word omdat ons die dosente net altyd
akkommodeer.

Translation:
Hello All
It sounds to me as if you are all really having a rough time
and that lecturers are very late in bringing materials.  Please
talk to your project managers so that we can 'enforce' the
service level agreement where necessary.  Otherwise it will
become worse every year because we simply accommodate the
lecturers all the time.
```

The SLA is now negotiated with and signed by the deans of all faculties. When applying online for the creation of a WebCT course, lecturers are now required to click on the “I Accept” agreement before they may submit their application.

6.3.8 Lesson 8: Auditable artifacts of an ISO 9000-compliant QMS

Lesson:

A formal quality management system requires at least a quality policy, document control conventions and a master document list in order to move towards ISO 9000 compliance.

It was not the brief for this particular QMS to be ISO 9000-compliant, as mentioned in section 6.1. Nevertheless, where the specifications of that standard were considered to be helpful and relevant, they were complied with. Exhibits 6.18 to 6.20 present evidence of ISO 9000 requirements that were incorporated in the system. The evidence was generated through communiqués during expert consultation with the QA consultant.

The foremost requirement for a QMS is a *quality policy*, stating an organisation's strategic intent with regard to quality assurance. Figure 3.1, the theoretical framework for a QMS, shows the elements of a QMS, with quality policy the starting item at the apex of the triangle. The QA consultant provided guidelines on such a policy, with regard to its structure and intent, as shown in Exhibit 6.18.

Exhibit 6.18: Requirements for a quality policy

```
E-mail message
From:      Lesley Boyd
Sent:      08 October 2001  11:34 PM
To:        Jill Fresen
Subject:   Quality Policy


Hi Jill
Here is the confirmation of the requirements of a quality
policy.  It should:
* be defined and documented
* indicate objectives/goals for, and commitment to, quality
* be relevant to organisational goals and expectations and
needs of customers
* be understood at all levels of the organization.

You could have it as part of another document, e.g. vision,
mission or strategic intent, if there is a concern about a
proliferation of different strategic statements.

This is something that I thought you might usefully spend time
on in advance of the training workshops.  A quality policy
arises from defining your customers, which you have already
done in your Quality Action Plan, and defining their
expectations and needs at a strategic level.
```

The development of TLEI's customised quality policy is described after Exhibit 6.20, since it became an artifact in the QMS.

The online QMS is the repository for the latest versions of all documentation. Users may be working according to hard copies of certain documents, e.g. screen design guidelines. Ongoing consultation with the QA expert highlighted the need for strict document control conventions (Exhibit 6.19). These are items in the footer of a document which clearly identify its name, draft or version number and date of generation. Document control ensures consistency and currency of all documentation in any formal quality management system.

Exhibit 6.19: Document control conventions

```
E-mail message
From:      Lesley Boyd
Sent:      28 October 2002  4:04 PM
To:        Jill Fresen
Subject:   Document control conventions

A general comment about document control…
We should only issue things as Version 1 once they have been
circulated (or loaded on the QMS) for comment, and the comments
have been incorporated as required.  Up until that point
everything should be First Draft, Second Draft etc as each new
set of comments is included.  It's better to stick with one
Version No. and then have additional drafts of that version,
e.g. Version 6 First Draft, Version 6 Second Draft etc.

I know this is about as interesting as boiled cabbage, but it
hopefully does make sense.

Document control does make provision for you to use the word
'Definitive' alongside a Version which is not a draft, if you
wish.
```

Once all the procedures had been documented and linked to their supporting documents, a *master document list* was required. This is a list of all procedures and supporting documents in the QMS, showing their latest version number and date of generation, so that users may see at a glance what the latest version of each document is. The evidence for this artifact is given in Exhibit 6.20.

Exhibit 6.20: Need for a master document list

```
E-mail message
From:      Lesley Boyd
Sent:      30 May 2003 12:56 PM
To:        Jill Fresen
Subject:   Master Document List

I will do the Master Document Control List showing the correct
draft number of each proc and checklist as soon as I possibly
can, maybe over the weekend.
                                                  continued ...
```

```
E-mail message
From:      Lesley Boyd
Sent:      07 August 2003 04:56 PM
To:        Jill Fresen
Subject:   Tidied up Master Document List

Hi Jill
I just tidied this up and put the date right at the top.  I've
made it Draft 3 until you are ready to load it into the system.
Then you can go to Version 1.  Every time it is changed in the
live system you should increment the Version number.

It might seem like wheels within wheels to have document
control on the master document list, but I think we need it for
the same reason as all the other documents.
```

Resulting artifacts of the QMS:

Quality pledge, document control conventions and master document list

(Appendices F10, F4 and F11)

As a result of this lesson, the following artifacts were incorporated into the QMS:

- quality pledge;
- document control conventions;
- master document list.

The QA consultant provided examples of quality policies from other organisations. I coordinated the creation of a customised quality policy for TLEI via a workshop and a draft document, which was discussed, circulated, translated into Afrikaans and agreed upon by the TLEI management team. It incorporates the notions of fitness for purpose, client satisfaction, cost effectiveness, defined standards, negotiated time frames and continuous improvement of the department's processes and functions (Appendix F10).

The team decided to call the resulting statement a *quality pledge* rather than a quality policy, since the former implies commitment on the part of all team members. The quality pledge was signed by all members of the E-Education Unit. Besides being accessible from the online QMS, it appears on the departmental web site as well as in the annual report. The intention is to hang it in the reception area of TLEI so that all clients and visitors may see the department's commitment to quality.

Document control conventions in the form of a standard footer are used on all procedures and supporting documents, in order to control version numbers and dates of issue. These are visible on the example of a completed procedure in Appendix F4.

The master document list lists each procedure, its version number, supporting documents and date of issue so that team members may compare any hard copies they have with the latest online version. By implication, the master document list must be maintained and updated each time a version number changes on any of the procedures or supporting documents.

6.4 The formal QMS

The artifacts reported in section 6.3 were incorporated into the online QMS. The entire system is described here under the following sub headings:

- Synthesis of lessons learnt and artifacts produced;
- Analysis of the online QMS and its early use;
- Benefits of the QMS.

6.4.1 Synthesis of lessons learnt and artifacts produced

All the procedures and their supporting documents were saved by the task teams in electronic format. They were converted to *.pdf format (Adobe portable document format) and built into the full online version of the QMS. Wherever possible, advantage was taken of the online environment, with respect to graphics, screen layout, navigation and links. Some supporting documents are available for editing in MS Word, for example the sample project proposal, so that project managers can forward it to lecturers for customisation to their own requirements.

The structure of the online QMS is as follows:

- TLEI Quality Pledge;
- Project Timeline (2-dimensional);
- QMS framework (3-dimensional expansion of the Project Timeline);

- master document list;
- all procedures and their respective supporting documents;
- glossary of related terminology;
- links to other useful sites involving standards and guidelines for web-supported learning;
- discussion tool for later user evaluation.

The lessons learnt during the research activities and the resulting artifacts in the online QMS are summarised in Table 6.2.

Table 6.2: Lessons learnt and the resulting artifacts in the QMS

	Lesson learnt	**Resulting artifacts**
1.	Adopt a fundamental instructional design model to serve as the main process in the quality management system.	Project Timeline
2.	Focus attention on the Analysis and Evaluation phases in instructional design in order to avoid expensive re-work.	Needs Analysis Checklist Summative Evaluation Checklist
3.	Train e-learning practitioners in the basics of quality assurance practice.	Template for a procedure Example of a completed procedure
4.	Participants (in this case, e-learning practitioners) and managers sometimes doubt the need for a formalised quality management system or fail to realise its usefulness.	Sanity checks
5.	Instructional designers and project managers in a busy production department need to make time to reflect on their own practice.	Guiding (self-evaluation) questions
6.	Lecturers need guidelines in order to prepare learning materials for electronic delivery.	Minimum requirements Roles and responsibilities
7.	Lecturers often expect immediate completion of web-supported learning products, even if submitted at extreme short notice.	Service Level Agreement
8.	A formal quality management system requires at least a quality policy, document control conventions and a master document list in order to move towards ISO 9000 compliance.	Quality policy (pledge) Document control conventions Master document list

6.4.2 Analysis of the online QMS and its early use

The online QMS is an artifact that was built as a result of the self-evaluation exercise undertaken by the QMS Steering Team and task teams. The positive outcomes of the self-evaluation exercise are discussed in section 6.4.3: *Benefits of the QMS*.

The online QMS is a central repository of documents, both theoretical and practical. The main theoretical document is the Project Timeline, which conceptualises the ADDIE instructional design model, subdivided into procedures. Each procedure was analysed and documented in terms of an overview, its objectives, detailed procedure steps, roles and responsibilities and supporting documents necessary for the operation of the procedure.

There are various types of supporting documents, for example:

- policy documents, e.g. funding policy, project proposal guidelines;
- pro formas which can be customised to a client's requirements, e.g. sample project proposal, funding application form;
- checklists, e.g. needs analysis checklist, multimedia evaluation checklist;
- client satisfaction instruments, e.g. Student WebCT Experience questionnaire and Lecturer Experience and Satisfaction interview schedule;
- protection devices, e.g. Service Level Agreement between TLEI and academic departments;
- standards, e.g. screen design guidelines, design principles and standards, minimum requirements for web-supported courses.

The different types of supporting documents illustrate the variety of items which contribute to a unit's quality management initiatives. The QMS ensures that documents are formalised, agreed upon and centrally stored and maintained, instead of relying on an informal and uncontrolled collection of documents residing on the computers of various team members, in various states of currency.

Some of the documentation is required at project management level, especially at the beginning of an e-learning project. For example, the policy documents, sample project proposal and needs analysis checklist enable project managers to support clients in scoping and initiating an e-learning project. The Service Level Agreement is negotiated with clients early in a project, as well as during WebCT staff training. The importance of such a mutual agreement is to protect both parties (TLEI and academic staff) against unrealistic expectations (see Lesson 7 and Exhibit 6.16).

Other types of supporting documents are used by instructional designers in the course of their normal practice. Indeed the standards and checklists have proved their usefulness in standardising practice, not only for the existing instructional design team, but also for the direction of student assistants, newly appointed instructional designers and lecturers who choose to be 'own designers'. Exhibits 6.21 and 6.22 present evidence of how such guidelines have proved their usefulness.

Exhibit 6.21: Referring a designer to the guidelines in the QMS

E-mail message
From: Instructional designer E.D.
To: Instructional design team
Sent: Tuesday, 29 June, 2004 10:12 AM
Subject: Design principles

Hallo almal
Ek het gister saam met 'n dosent gesit en werk en besef dat die man die basiese ontwerpbeginsels benodig waarvolgens ons werk. Ek dink ons het "many moons ago" so iets opgestel. As julle dalk 'n ander document hieroor byderhand het, wil julle dit nie asb.vir my aanstuur sodat ek dit vir hom kan gee nie.

[Translation:
Hello all
Yesterday I sat and worked with a lecturer and realised that the man requires the basic design principles according to which we work. I think we compiled something like that many moons ago. If you perhaps have a document about this readily available, will you please send it to me so that I can give it to him.]

continued ...

E-mail message
From: Jill Fresen
To: Instructional design team
Sent: Tuesday, 29 June, 2004 12:27 PM
Subject: RE: Design principles

Hello all
That is PRECISELY where the Quality Management System can help us. Go to tlo, access the QMS, select Project Procedures and then Design and Prototype Development. There are two supporting docs: Screen Design Guidelines and Design Standards and Principles. They are not specifically aimed at lecturers, but they should be "waarvolgens ons werk" ☺

Exhibit 6.22: Referring other designers to the standards in the QMS

E-mail message
From: Instructional designer E.D.
To: Instructional design team
Sent: Tuesday, 08 April, 2003 03:31
Subject: Checklists

Hi All
I have merged the two checklists. I would just like to leave the following thoughts with you.

I realised the importance of these checklists while I was working on them, in that if you have such a document, it could be very easy to give it to another instructional designer to do maintenance on the module. The reason for this thinking is that when I give academic staff training, I have to make sure that the lecturers understand that there are different ways in which each programme has been designed. Because when a lecturer then has to start maintaining their own course, you can give them a copy of the checklists. That would help them to remember that if a Content Module has been included, they have to do certain things differently as opposed to when the original instructional designer designed their own navigation.

Furthermore, I feel we should give these checklists to the student assistants, because then we have something more formal to tell them that these are the specs and this is what I want you to do. If the product they then deliver does not comply with the specs, we can deal with it in a proper manner.

Tools such as standards and checklists contribute to standardising instructional design practice, which in turn contributes to higher quality web-supported learning products.

Finally the client satisfaction instruments are those that are part of the summative evaluation procedure, which evaluates client perceptions of the value of web-supported courses after they have been implemented. The issue of client satisfaction was investigated in research question 2 in this study (chapter 5).

Galanti (2003) claims that a blended learning solution (such as WebCT together with classroom sessions) needs to work to align people, resources and processes within an organisation. He highlights the need for summative evaluation of learning interventions, to ascertain whether they have made a measurable impact on the organisation: "Remember to focus on tangible results such as how business processes have improved in terms of quality, efficiency and productivity. And, if the groundwork was properly executed, there is no reason why it shouldn't deliver the expected results" (Galanti, 2003, online reference).

The overall self-evaluation exercise in the E-Education Unit at the University of Pretoria and the lessons learnt have contributed to aligning and improving the instructional design process, as shown in the following section.

6.4.3 Benefits of the QMS

The dynamic, iterative nature of instructional design and the complexity of the systems thinking involved, caused extensive modification of the Project Timeline. During the work of the task teams and the development of the paper-based prototype, the specifications and procedures evolved as they were analysed and documented. We learnt a great deal by questioning ourselves, under the guidance of the QA consultant, about exactly what our processes and procedures consist of, who does what and why. Not only that, but we were forced to pay attention to previously neglected areas of the Project Timeline, for example, Needs Analysis and Summative Evaluation.

In the early stages of implementation, it was found that the online QMS provides the following benefits:

- All documentation is stored in a central, online location.
- All documentation subscribes to regulated document control conventions.
- Updates to documentation are quick and easy, being a web environment.
- The latest version of procedures and supporting documents are available instantly to any member of the team, as well as to TLEI Management.
- Newcomers to the team are able to quickly and independently learn ‘how things are done around here’.
- The processes and procedures of the E-Education unit have been streamlined and standardised as far as possible in such a dynamic and changing environment.

An elegant feature of the online QMS is that, being customised for the domain of web-supported learning, it is itself an example of an instructionally designed, interactive and resource-rich learning environment. The formal online QMS is accessible at the following URL, at least until December 2005: http://www.up.ac.za/telematic/quality/quality.htm[11].

6.5 Summary

Instructional design of web-supported learning interventions in higher education is a highly complex and volatile process, involving various role players with varying priorities and levels of commitment. In designing, developing and implementing a customised online quality management system in the E-Education unit at the University of Pretoria, expert consultation and task teaming methodologies were used. Staff training in quality assurance before and after implementation of the online system was provided. Input from team members was encouraged, in order to iteratively grow a formal QMS that is an attempt at self-evaluation, rather than providing accountability to external quality agencies.

[11] Although originally designed in WebCT, the QMS has since been moved to the TLEI Internet site, to enable easy access for TLEI users as well as international visitors.

This chapter presented evidence of eight lessons that were learnt in attempting to apply standard quality assurance theory to the instructional design process for web-supported learning. In so doing, it answers research question 3 and shows that it is possible to bring together the two discourses in a sensitive way.

The eight lessons learnt are presented here and are summarised together with the artifacts produced, in Table 6.2.

Five lessons were learnt in respect of the instructional design process:

- **Lesson 1:** Adopt a fundamental instructional design model to serve as the main process in the quality management system. Subdivide it into its constituent procedures to be analysed and documented in detail.
- **Lesson 2:** Focus attention on the Analysis and Evaluation phases in instructional design in order to avoid expensive re-work, wasted work or development whose instructional effectiveness is not measured.
- **Lesson 3:** Train e-learning practitioners in the basics of quality assurance practice. Do not allow too much time to lapse between workshops and procedure writing.
- **Lesson 4**: Participants (in this case, e-learning practitioners) and managers sometimes doubt the need for a formalised quality management system or fail to realise its usefulness.
- **Lesson 5:** Instructional designers and project managers in a busy production department need to make time to reflect on their own practice.

Two lessons were learnt in respect of lecturers and their needs:

- **Lesson 6**: Lecturers need guidelines in order to prepare learning materials for electronic delivery. They also need guidance on the roles and responsibilities of all role players in the design and development team, including their own.
- **Lesson 7:** Lecturers often expect immediate completed web-supported learning products, even if they are submitted at extreme short notice.

One lesson was learnt in respect of ISO 9000 compliance:

- **Lesson 8:** A formal quality management system requires at least a quality policy, document control conventions and a master document list in order to move towards ISO 9000 compliance.

The main work *process* is the Project Timeline, which is based on the ADDIE instructional design model. This process was subdivided into various *procedures*, each of which was documented according to a standardised template and using document control conventions. Supporting documents were collected, updated or created where necessary, and linked to their respective procedures.

The result is a formal, online, instructionally designed QMS that has various benefits in formalising and streamlining the processes, procedures and documentation in use by the E-Education Unit. By implication, such guidance for improved practice should translate into improved web-supported learning products, although the dynamic contributions of all role players means that a system alone cannot guarantee improved products[12].

Generalisability issues were discussed in chapter 1, section 1.9.3. Other similar support units at tertiary institutions may learn from the eight lessons and will be able to modify and customise the artifacts of this QMS for their own use in their own particular situations. Evaluation of the effectiveness of the QMS itself after implementation provides scope for further research.

[12] The quality of the resulting learning products was investigated in the first research question for this study (chapter 4).

Chapter 7

Reflections and Recommendations

7.1 Overview of this chapter

This chapter reflects on the findings of this study and on the exploratory journey of the researcher. It makes recommendations based on the findings of the three research questions. The commitment to act on findings by making recommendations in order to improve web-supported learning processes, products and services may be thought of as ‘completing the feedback loop’. This quest for self-evaluation and continuous improvement is one of the basic constructs in this study (see the conceptual framework, originally in Figure 2.5 and updated with findings in Figure 7.1).

This chapter focuses on three things in particular:

- it summarises the research and the findings for each question;
- it discusses lessons learnt with respect to methodology, other related research and the contribution to the scientific body of knowledge;
- it makes recommendations with respect to policy, practice and further research.

The findings of the three research questions are summarised and related to the conceptual framework in the synthesis presented in section 7.3.

7.2 Summary of this research

The intellectual target which drives this study is the attempt to diminish the gap between the ‘quality discourse’ and the ‘online learning discourse’, which until recently have seldom converged (Reid, 2003).

Three knowledge domains provide the context for this study: quality assurance, higher education and web-supported learning. The intersection of the three knowledge domains indicates the research problem that was investigated, namely the quality assurance of web-supported learning in higher education.

This is an exploratory study, based on a case study of the Department of Telematic Learning and Education Innovation (TLEI) at the University of Pretoria, South Africa. TLEI is a service department which provides support to academic staff in terms of educational practice and e-learning projects, amongst other services. In this case study, the unit of analysis is the instructional design process. The web-supported learning opportunities produced are considered to be products. The clients of TLEI are the lecturers and students served by the e-learning team of instructional designers, project managers, education consultants, information and media specialists (see Figure 1.2: *Role players*).

The conceptual framework for this study (Figure 2.5) is based on the confluence of the existing theories: quality assurance theory, instructional systems design and systems theory (see Figure 2.3 and Appendix B).
The concept of *evaluation* is central to the underlying theoretical framework, both in the sense of formative and summative evaluation of web-supported learning products, and in the sense of continuous improvement of an e-learning production unit in terms of self-evaluation and accountability.

Three research questions directed this study:

1. What factors promote quality web-supported learning?
2. What factors contribute to client satisfaction (or frustration) with web-supported learning?
3. What lessons were learnt in applying standard quality assurance theory to the instructional design process for web-supported learning?

Chapter 2 provided an in-depth literature review of the knowledge domains and the particular areas addressed by the research questions. Chapter 3 presented the research design and methodology selected in order to answer the research questions. The research strategies used were a literature survey, case analysis meetings, a student survey (see Appendix D1 for the questionnaire), lecturer interviews (see Appendix E1 for the interview schedule), expert consultation and task teaming.

The findings for the first research question were presented in chapter 4, in the form of a taxonomy of factors to promote quality web-supported learning (Tables 4.3 and 4.4; Figure 4.3). The findings for the second research question were presented in chapter 5 in terms of a student frustration index, a student satisfaction index and contributing factors to student and lecturer experiences with web-supported learning. The findings for the third research question were presented in chapter 6 in the form of artifacts produced as part of a process-based quality management system for web-supported learning, as well as eight lessons learnt in applying standard quality assurance theory to the instructional design process.

7.2.1 Research question 1:

What factors promote quality web-supported learning?

The literature review identified frequently cited studies in the literature in terms of classic benchmarks, indicators and principles (section 2.5.1) and criteria for exemplary or promising courses (section 2.5.2). A comparative analysis of the various frameworks, benchmarks and criteria produced an initial taxonomy of *critical success factors* for quality web-supported learning (Table 2.3). The taxonomy is based on the categories institutional, technology, lecturer, student, instructional design and pedagogical factors.

The taxonomy was corroborated and extended as a result of reviewing additional studies published from 2000 onwards (see Appendix C, Table C11). It was further refined and validated by critical colleagues, who are experienced instructional designers within the case study. The critical colleagues agreed that in order for the taxonomy to be as comprehensive, yet as succinct as possible, *underlying assumptions* and *exogenous factors* should be listed separately. Examples of underlying assumptions that need to be in place for quality web-supported learning are positive attitude, commitment and motivation from lecturers; sound instructional design practice and sound teaching and learning practice. Examples of exogenous factors which are beyond the control of e-learning practitioners are class size, incentives for lecturers and work loads of lecturers and students.

The full list of underlying assumptions and exogenous factors is given in Table 4.3, which must be read in conjunction with the refined taxonomy presented in Table 4.4. The taxonomy was mapped onto Ingwersen's (1996) cognitive model of IR interaction, in order to provide a cognitive and visual interpretation of the categories in the taxonomy (Figure 4.3).

The taxonomy emphasizes the human aspects of enhancing quality, the dynamic nature of the teaching and learning process and the non-negotiable nature of staff and student training, staff and student technical support, and accessibility and reliability of the technology.

7.2.2 Research question 2:

What factors contribute to client satisfaction (or frustration) with web-supported learning?

A student feedback questionnaire was piloted, refined and improved during 2001 and 2002. In July 2003 the WebCT Experience questionnaire was completed online by 4 650 students who had at least one web-supported module. The findings are reported in chapter 5 and Appendix D.

The categories in the student questionnaire were classified as contributing to either student frustration or satisfaction with web-supported learning. The Frustration Index was calculated based on the Technical Adequacy, Educational Support and Affective Domain indices. The Satisfaction Index was calculated based on the Communication Tools and Perceived Learning indices. The findings were that 83% of online students experience moderate to high levels of frustration in their web-supported courses and only 43% experience high levels of satisfaction.

The factors contributing to high levels of student frustration are:

- insufficient computers and printers on campus;
- the extent of technical difficulties experienced;
- inadequate student support CD-Rom;
- inadequate student training;
- sometimes slow response from classmates;
- feelings of annoyance and/or stress.

The expected frequency of technical difficulties experienced is only 1.4 times per week and the expected waiting time for a solution is 1.26 days, both of which appear to be acceptable averages[1].

The factors contributing to student satisfaction levels are:

- feeling comfortable communicating via online tools;
- feeling more freedom to express oneself than in a traditional classroom;
- perceived learning from the contributions of other students;
- promoting the ability to work as a team or group member;
- promoting the ability to plan one's own work;
- experiencing an enriching learning environment.

The second component of client satisfaction investigated was the level of *lecturer* satisfaction with web-supported learning and the service received from TLEI. Personal interviews were conducted in early 2004 with a small sample of lecturers across various faculties. The participants were identified as being experienced and active WebCT users. The Lecturer Experience and Satisfaction interview schedule was a newly developed instrument which

[1] These averages are estimates. They vary according to a student's prior experience with e-learning, as well as whether it is early or late during a semester. They should not be assumed to be constantly applicable.

emerged from the quality management system. It was piloted with a view to testing and improving it for future use in the summative evaluation of web-supported learning products. Recommendations for its refinement were given in section 5.3.4.

Strong agreement was expressed by the interviewees that web-supported learning adds value to the learning experience and supports lecturers in the facilitation and administration of learning. The use of the communication tools is confined mainly to the discussions tool and external e-mail or electronic mailing lists. Almost all the respondents had attended the basic WebCT training course, but few attended the advanced courses. This implies that they are still largely dependent on TLEI for the development and maintenance of their WebCT courses.

The open responses on the interview schedule were analysed in terms of problems experienced, benefits experienced and lessons learnt. The majority of problems were of a technical nature, experienced during the extensive IT upgrade which took place in early 2004. The message was “don’t change things that work” and “communicate with your users well in advance and frequently, otherwise they panic” (comments from lecturers).

The level of satisfaction expressed with the services offered by TLEI was extremely high. The open comments in this regard were overwhelmingly positive and appreciative. These findings provide evidence of return on investment for the university management.

The qualitative, personal nature of the interviews enabled project managers and instructional designers to renew contact with their clients and to encourage them to express sincerely their needs as well as problems and benefits experienced with respect to web-supported learning. This important summative evaluation exercise should be conducted annually.

7.2.3 Research question 3:

What lessons were learnt in applying standard quality assurance theory to the instructional design process for web-supported learning?

A formal online quality management system (QMS) for web-supported learning was designed, developed and implemented in the e-learning unit at the University of Pretoria.

The research methods used were expert consultation and task teaming. The data sources were documentation in the form of communiqués, agendas and notes, as well as archival records in the form of administrative documents. A prototyping approach was used, in which three prototypes were developed: a paper-based prototype of all procedures and supporting documents, an online prototype showing the structure and graphic interface, and the full online beta version of the system.

The QMS analyses and documents the instructional design *process* represented by the Project Timeline (Appendix F1). Each step in the project timeline is documented as a *procedure*, including an overview, its objective, procedure steps, people responsible and supporting documents such as samples, checklists and reports. Eight lessons were learnt during the task team exercises (section 6.3). Various artifacts were collected and produced in response to the lessons learnt (see Appendix F), including the online version of the quality management system itself.

The QMS was not required to be ISO 9000 compliant, but where these requirements were thought to be useful, they were implemented. The resulting QMS is evidence of a self-evaluation exercise in an academic support department, an area for which the HEQC has not yet formulated specific criteria. A voluntary external review by an international expert will take place in late 2004, for which the QMS will provide auditable evidence of a process-based quality management system for web-supported learning.

The main benefit of developing the process-based quality management system exercise was the reflection and discussion on the ways e-learning projects are executed and the identification of areas for continuous improvement. Various other benefits and an analysis of its early use were described in sections 6.4.3 and 6.4.2 respectively.

Although the system was formally launched and demonstrated to TLEI in late 2003, work is still required in the implementation phase. It is necessary to train all practitioners in the use of the system so that it becomes an automatic resource to streamline best practice. It is also necessary to maintain the documentation on an ongoing basis, in the light of the dynamic nature of instructional design.

7.3 Synthesis

This section summarises and interprets the findings from the three research questions (section 7.3.1) and maps them onto the conceptual framework (section 7.3.2).

7.3.1 Summary of findings

The three research questions in this study deal with the phenomenon of quality web-supported learning from three different perspectives, which are derived from the ISO 9001 model (Figure 2.4) and from the resulting conceptual framework (Figure 2.6).

Searching for factors to promote the quality of web-supported learning opportunities (research question 1) focuses on the *products* that are the outputs from the team approach to instructional design. Research question 2, which focuses on client satisfaction as one possible quality measure, emphasizes the *services* provided to clients by an e-learning support unit, such as training, consultation, design and development, or technical support.

Research question 3 focuses on the instructional design *process*, and applies standard quality assurance theory to develop a process-based quality management system for web-supported learning.

The three research questions and their findings are summarised in Table 7.1. Although each research question has its own focus, there are several areas in which the findings overlap and complement each other. An interpretation of the complementary findings is presented after the table.

Table 7.1: *Synthesis of research questions and their findings*

Research question 1: **What factors promote quality web-supported learning?** *[Quality of products]* (see details in Tables 4.3 and 4.4)	**Research question 2:** **What factors contribute to client satisfaction with web-supported learning?** *[Quality of services]*	**Research question 3:** **What lessons were learnt in applying standard QA theory to the instructional design process for web-supported learning?** *[Quality of processes]*
Institutional factors **Technology factors** **Lecturer factors** **Student factors** **Instructional design factors:** • usability • learning principles **Pedagogical factors** **Underlying assumptions** (see next page) **Exogenous factors** (see next page)	**Student frustration:** • insufficient computers available; • insufficient printing facilities available; • extent of technical difficulties experienced; • insufficient support from the student CD-Rom; • inadequate student training in WebCT; • an impersonal learning experience; • slow response from classmates; • feelings of annoyance and/or stress. **Student satisfaction:** • comfortable communicating online; • freedom to express oneself more than in a traditional classroom; • learning from the contributions of other students; • promoting ability to work as a team or group member; • promoting ability to plan one's own work; • an enriching learning environment.	**Lessons learnt:** • **Lesson 1:** Adopt a fundamental instructional design model to serve as the main process in the quality management system. • **Lesson 2:** Focus attention on the Analysis and Evaluation phases. • **Lesson 3:** Train e-learning practitioners in the basics of quality assurance practice. Do not allow too much time to lapse between workshops and procedure writing. • **Lesson 4**: Participants (e-learning practitioners) and managers sometimes doubt the need for a formalised quality management system or fail to realise its usefulness. • **Lesson 5:** Instructional designers and project managers in a busy production department need to make time to reflect on their own practice.
continued…	continued…	continued…

Table 7.1: *Synthesis of research questions and their findings (continued)*

<table>
<tr>
<th>Research question 1:
What factors promote quality web-supported learning?
[Quality of products]</th>
<th>Research question 2:
What factors contribute to client satisfaction with web-supported learning?
[Quality of services]</th>
<th>Research question 3:
What lessons were learnt in applying standard QA theory to the instructional design process for web-supported learning?
[Quality of processes]</th>
</tr>
<tr>
<td>Underlying assumptions:
• positive attitude, commitment and motivation from lecturers;
• commitment and motivation from students;
• sound advice, support and consultation to lecturers with respect to instructional design and educational practice;
• sound instructional design practice;
• sound teaching and learning practice;
• commitment to continuous improvement.

Exogenous factors:
• quality of the institutional learning management system;
• stability of national telecommunications infrastructure;
• class size;
• work load of clients;
• recognition and incentives for lecturers.</td>
<td>Lecturer satisfaction
Benefits:
1. Organisation and administration
2. Communication and interaction
3. Time savings – time, money, queries
4. Good support received
5. Re-thinking, re-planning, re-structuring
6. e-learning adds value
7. Personal and professional development
8. Lecturers coming on board
9. Students gaining new experience, skills
Problems:
1. Technical upgrades / problems
2. Encouraging student participation
3. Encouraging lecturer buy-in
4. Time required for planning and development
5. Library and copyright issues
Lessons learnt:
1. Change management (lecturers and students)
2. Training (lecturers and students)
3. Distance learning, larger numbers of students
4. Human element
5. Discussions, growth
6. Internationalisation</td>
<td>• Lesson 6: Lecturers need guidelines in order to prepare learning materials for electronic delivery. They also need guidance on the roles and responsibilities of all role players in the design and development team, including their own.
• Lesson 7: Lecturers often expect immediate completed web-supported learning products, even if submitted at extreme short notice.
• Lesson 8: A formal quality management system requires at least a quality policy, document control conventions and a master document list in order to move towards ISO 9000 compliance.</td>
</tr>
</table>

Table 7.1 gives an overview of the findings of this study. These are reflected on and interpreted below.

The quest for quality web-supported learning is a complex pursuit, which may be interpreted in various ways, for example continuous improvement, self-evaluation, external accountability, or formative and summative evaluation of web-supported courses. The latter field is extremely well researched (many references are listed in Appendix B2) and is not the main focus of this study. The three research questions in this study, with their respective emphasis on products, services and processes, provide a conceptual basis for attempting to diminish the gap between quality assurance practice and web-supported learning.

The instructional design process is the unit of analysis in the case study. It features centrally in all three research questions. Sound instructional design practice is an underlying assumption for the taxonomy of factors for quality web-supported learning. Clients such as students and lecturers benefit from the added value that instructional design contributes to the production of satisfying web-supported learning experiences. The process-based quality management system demonstrated how to apply standard quality assurance practice to the instructional design process.

Since one of the knowledge domains of the study is web-supported learning, technology issues feature in the findings for two of the research questions. Technology factors are a category in the taxonomy and were highlighted in measuring the satisfaction of students and lecturers. Examples of such issues are the provision and reliability of computer technology, technical support for lecturers and students and hands-on system training for both client groups.

The human element features strongly in all the research findings. Communication and interaction between lecturers and students and between students themselves, feature among the lecturer and student factors in the taxonomy. Positive attitude, commitment and motivation are listed as underlying assumptions for the taxonomy. Working as a team member and learning from the contributions of other students contribute to student satisfaction with web-supported learning. Lecturers experienced problems with encouraging student participation and lecturer buy-in. Making time to reflect on best practice and formalise processes and procedures in the instructional design process proved to be difficult and slow. This occurred in spite of making a conscious attempt from the start to ensure commitment and buy-in via training in quality assurance theory and direct involvement in task teams. Ultimately, the overarching, intangible aspect of the human element is the institutional factor *change management*, which cannot be neglected in the social and institutional environment of web-supported learning.

Another complementary finding is the need for support in embarking on web-supported teaching and learning – support for lecturers in terms of technical, pedagogical and instructional design factors, and support for students in terms of communication, interaction and facilitation of web-supported courses. Various artifacts in the quality management system provide supporting resources, both for lecturers (e.g. roles and responsibilities, minimum requirements) and for instructional designers (e.g. standards, guidelines, checklists and service level agreements).

Thus the findings for the three research questions complement each other and provide a strong platform for quality web-supported learning, woven from various factors, such as critical success factors, client satisfaction measures and process-based guidance for best practice.

7.3.2 Updated conceptual framework

The literature review (chapter 2) contributed to the development of the conceptual framework for this study, which was presented in Figure 2.5: *A process-based quality management system for web-supported learning.* In this section, the findings of the three research questions are mapped onto the conceptual framework.

The following narrative refers to the numbers indicated on the updated conceptual framework (Figure 7.1). The web-supported learning endeavour begins with the needs and expectations (1) of clients, namely lecturers and students. Various input factors (2) contribute to the quality of the eventual outputs, the web-supported courses (products) (4) that are designed and developed by means of the instructional design process (3). The products are evaluated (both formatively and summatively) in the course of usual instructional design practice. In terms of customer satisfaction (5), it is the summative evaluation of the products that produces measures (6) to inform the feedback loop (7), which in turn enables continuous improvement. Distant outcomes (8), such as actual learning that took place (9) (rather then student perceptions thereof) and return on investment (10), provide scope for further research.

The categories of factors reflected under the ***inputs*** part of the framework were generated from the literature review and for that reason, were kept together in a group in the original framework (Figure 2.5). However, with more knowledge gained from answering the research questions, not all those categories are *antecedents* that need to be in place before the instructional design process begins. Indeed, instructional design and pedagogical factors need to be taken into account *during* the instructional design ***process***. For this reason, as well as the fact that the *instructional design process* is the unit of analysis for the formal quality management system (research question 3), they are moved into the *process* part of the expanded framework (Figure 7.1)[2].

Figure 7.1 presents the conceptual framework with overall findings that resulted from this study, mapped onto the corresponding sections.

[2] This tactic of refining thinking in the light of findings is referred to by Miles and Huberman (1994) as *building a logical chain of evidence.*

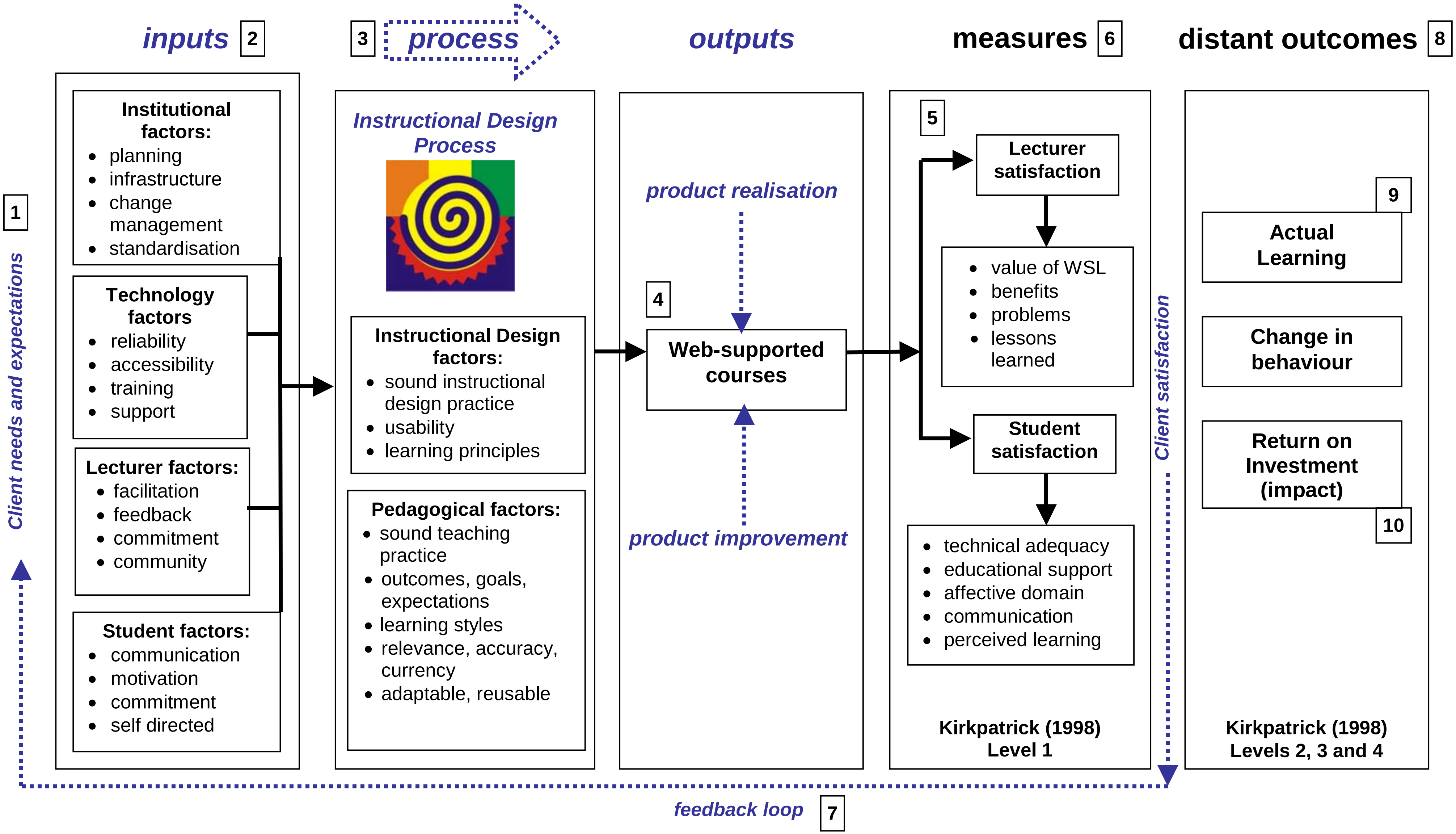


Figure 7.1:

Quality assurance of web-supported learning

The three research questions in this study correlate directly with the sections in the conceptual framework (Figure 7.1):

1. Research question 1 (factors to promote quality web-supported learning) contributes to the *inputs* section (2), which through the instructional design process (3), influences the quality of the web-supported courses (products) (4) in the *outputs* section of the framework;
2. Research question 2 (client satisfaction) (5) is reflected in the *measures* section (6) of the framework;
3. Research question 3 (standard quality assurance theory applied to the instructional design process) is reflected in the *process* section (3) of the framework, as well as client satisfaction (5) and measures (6).

Together, all sections of the conceptual framework and the findings of the research questions reflect the holistic nature of the process-based quality management system for web-supported learning that has resulted from this case study.

7.4 Discussion and reflection

This section discusses what can be learned from this research. It is a reflective section, reviewing lessons learnt in terms of methodological, substantive and scientific aspects of the study. The substantive aspects include a summary of recent findings from the literature. This section also provides a reflection on the exploratory journey that was undertaken from the start of this study (section 7.4.4).

7.4.1 Methodological reflection

This section reflects on the methodology applied, together with its appropriateness and possible limitations. Validity and reliability were discussed in chapter 3, sections 3.3.2 and 3.3.3 respectively. The detailed justification for and limitations of the methodology were discussed in section 3.4.6.

With respect to the literature review of factors to promote the quality of web-supported learning, my interpretation of the factors considered to be important by the authors, influenced the resulting synthesis of critical success factors. Furthermore, there may be many other important factors – the fact that some things such as *class size* were not specifically mentioned by the experts, does not mean that they are insignificant in the effectiveness of the online environment. An attempt to cover such factors was made by specifying underlying assumptions, without which quality web-supported learning cannot materialise, as well as exogenous factors which are beyond the control of e-learning practitioners (Table 4.3).

The collection, analysis and interpretation of the student feedback used quantitative techniques such as frequency counts, expected values, cross tabulations and graphical representations of distributions. My interpretation of which items imply student frustration and which items imply student satisfaction rested on intuition and judgment, both of which play an important part in the scientific method (Reid, 2000). The distinction between frustration and satisfaction items is acknowledged as one of the assumptions on which the statistical analysis is based.

The self-selecting sample was not representative of all students taking web-supported courses. This issue is mitigated by the fact that it was not the intention to fully describe or analyse the distribution of all such students. It is acknowledged that only certain types of students may have participated in the optional survey, for example those with strong opinions to express. Nevertheless, useful demographic and usage data, as well as satisfaction and frustration data, was obtained from those students who chose to complete the questionnaire.

The fact that the self-selecting sample is not replicable from year to year due to the shifting student population does not prevent longitudinal studies to monitor the trends in the satisfaction and frustration indices over time.

The responses to the open items on the student questionnaire provided a rich source of qualitative data. The extent of open responses analysed was demarcated by the point at which data saturation was reached. There is the possibility that further analysis of the open responses will yield additional findings in respect of positive aspects, negative aspects and suggestions for improvement of web-supported courses. This rich qualitative data may at any time be scanned visually by interested parties, in order to report any powerful statements anecdotally for the purposes of management information. The full data set in html format was forwarded to relevant academic departments for their own further use.

The lecturer feedback survey was a pilot study with a small sample of lecturers known to be active in WebCT. A limitation is acknowledged, in the sense that the sample was neither comprehensive nor representative of all lecturers using WebCT. However, the sample was adequate to test the first application of the instrument, which yielded useful findings (see chapter 5).

The design and development of the process-based quality management system made use of expert consultation and task teaming. The research took place in an actual work situation by investigating and documenting the instructional design process and its constituent procedures. The participant researcher strategy was realistic and practical, although it is acknowledged that it may have caused inadvertent distortions in my deductions (Guba & Lincoln, 1981). As the project progressed, various needs of the participants emerged and were immediately addressed, for example the sanity checks ("Why are we doing this?"). Consensus and validation were sought from the participants in the task teams and the QMS Steering Team meetings.

7.4.2 Substantive reflection

Substantive reflection provides the opportunity to compare the results of this study with other related research, as well as to discuss relevant literature that emerged after having closed the literature review in chapter 2 (T. Plomp, personal communication, 27 November 2002).

It appears that both ‘e-learning’ (web-supported learning) and ‘quality’ are constructs that tend to be misunderstood and misrepresented. Parker (2004) refers to the fact that both terms are “so burdened with assumptions as to create their own problematic” (p. 386). Both constructs have their zealous promoters and equally vehement detractors. Both domains are briefly reflected on in this section, in the light of the findings of this study.

Perspectives on web-supported learning

Just as with other technologies and media before it, such as radio, television and computer-based education, questions have arisen as to whether web-supported learning can deliver on its promises. Globalisation and market trends which pressurise higher education providers into offering more programmes online, mean that fraudulent operators emerge and students need to become critical consumers. The ‘increased access argument’ originally claimed as a major advantage of web-based systems (Parker, 2004) has backfired by the simple fact that *lack* of access to computer technology is a reality (as shown in this study – chapter 5).

The integrity of online teaching and learning environments is currently being questioned in the light of various philosophical, professional and change management issues. The buy-in of academic staff is vital in building high quality, online, interactive courses. “The importance of the degree to which faculty feel that they are receiving encouragement and solid support in all areas of online development should not be underestimated” (Caplan, 2004, p. 179). This study found that lecturers are appreciative of and dependent on the support and services provided by the e-learning support unit at the

University of Pretoria (see chapter 5), even though they acknowledge the difficulty in encouraging colleagues to embrace web-supported learning.

The importance of engagement and communication between student-student, student-lecturer and student-content is corroborated by Anderson (2004a) and Parker (2004): "… the online environment begins to take shape. Until students and instructors engage, however, it is still just a shell" (Parker, 2004, p. 389).

The implication is that the basic qualities of a good teacher provide the foundation for a good *e-teacher*. Anderson (2004b) identifies three vital qualities of an e-teacher: the first is that an e-teacher is an excellent teacher: "They like dealing with learners; they have sufficient knowledge of the subject domain; they can convey enthusiasm both for the subject and for their task as a learning motivator; and they are equipped with a pedagogical (or androgogical) understanding of the learning process" (p. 290). Anderson's (2004b) other two qualities of an e-teacher are a set of technical skills ("internet efficacy") and that "an effective online teacher must have the type of resilience, innovativeness, and perseverance typical of all pioneers in unfamiliar terrain" (p. 290). These comments reflect the full meaning of the term *facilitation* of web-supported learning, one of the critical success factors identified in the taxonomy of factors to promote the quality of web-supported learning.

Perspectives on the quality debate

The widespread and emotive quality debate has political, social, technical and philosophical implications (Parker, 2004; McLoughlin & Luca, 2001). The quality debate in terms of the *internal improvement - external accountability* and *industry - education* aspects was engaged in section 2.4.1.

The extremes of the argument may be described as the "tension between externally driven compliance and internally driven improvements" (Parker, 2004, p. 387). Political emphasis on efficiency and accountability has meant that national quality assurance agencies have proliferated worldwide, as have various standards, guidelines and best practices in higher education (see Appendix C1). A balance between internal needs and external demands needs to be sought (Boyd & Fresen, in press). The process-based quality management system in this case study and the artifacts it produced, is a contribution to quality assurance practice and criteria that will assist the HEQC in evaluating academic support units, with particular reference to web-supported learning.

The commercial, corporate flavour of the quality movement (for example, Total Quality Management) has made it difficult for autonomous academic institutions to accept its recommendations. Parker (2004) states “The engineering (or re-engineering) of systems designed to guarantee that manufacturing processes would meet technical specification might seem to imply a uniformity that may not be possible, or even desirable, in the dynamic and heterogeneous environment of higher education” (p. 388). The need to address the human aspects of quality management in higher education was considered throughout this study.

Examples of sensitivity towards participants are described below:

- the progress of the task teams took second place to the demands and pressures of a busy e-learning production unit;
- student sensitivities were considered in the application of the student questionnaire, in the form of the message of invitation and the assurance that their feedback was confidential and would be acted upon;
- lecturer sensitivities were considered by not burdening overworked lecturers with the completion of yet another paper-based or e-mail questionnaire;
- personal thank you letters were sent to the lecturers who participated in the Lecturer Experience and Satisfaction interviews, to assure them of appreciation of their time and involvement.

Whether or not the student is called the ‘client’ or the lecturer is seen as the ‘supplier’ or ‘provider’, a balance is recommended. This balance should be based on institutions providing solid support to students and the committed educator striving continuously to improve the academic experience for the student, as shown in the complementary findings of this study (section 7.3.1).

Other points for reflection raised in the literature

What about the student voice in the evaluation of online courses? Heterick and Twigg (2001) recommend student evaluation of courses and claim that students *are* in a position to judge what they need and want. They suggest a student rating system: "Rather than asking students whether or not they 'liked' the course, we should ask them specific, pre-structured questions designed to take into account those factors that experts believe are necessary to ensure high quality. Responses to these questions would generate an overall 'satisfaction index' similar to the star rating systems used on dot-com sites such as amazon.com and eBay.com" (Heterick & Twigg, online reference).

The questions suggested by Heterick and Twigg (2001) are remarkably similar to some of the items in the student WebCT experience questionnaire in this study. For example:

- How reliable was the technology?
- How challenging was the course?
- Was there sufficient interaction with other students?
- Was there sufficient interaction with the instructor?
- Did you receive adequate technical assistance?

Arbaugh (2000) refers to the fact that prior studies of internet-based courses have been criticised for focusing on individual courses. This study has constructed and calculated not only a satisfaction index, but also a frustration index across a campus-wide spectrum of students participating in web-supported courses.

Parker (2004) reviews and compares standards from four jurisdictions, including two of the classic studies which contributed to the taxonomy produced by this study: Barker (1999) and Institute for Higher Education Policy (2000). The other two standards cited by Parker (2004) are listed in

Appendix C1. The same source also discusses one of the corroborating studies in my later literature review (Herrington et al., 2001; section 4.2.3). Fahy (2004) compares another of the classic studies (Chickering & Gamson, 1987) with the well-known Bloom's taxonomy. Other authors refer to some of the studies reported in chapter 4 (Herrington et al., 2001; Zhao, 2003; Collis & Moonen, 2001).

Anderson (2004a) expands on the themes of student-student, student-teacher and student-content interaction, some of the interactions that were promoted by Chickering and Gamson (1987). Pelz (2004) presents three principles of effective online pedagogy, namely allow the students to do (most of) the work (active learning), interactivity is the heart and soul of effective asynchronous learning and a facilitator should strive for 'presence'. These principles corroborate some of the pedagogical and instructional design factors in the taxonomy synthesized in this study, namely engagement, interactivity and facilitation.

A new initiative to promote and standardise approaches to the quality enhancement of e-learning is the European Quality Observatory (EQO, http://www.eqo.info) (Manouselis & Sampson, 2004). The EQO aims to develop a common conceptual framework for the analysis, description and comparison of quality approaches (QAs) in education, particularly in e-learning. The project has built a web-based respository of metadata to capture and describe specific experiences of the application of various quality approaches and how these may be re-used by other organisations in similar contexts (Hildebrandt & Teschler, 2004).

This research study, together with its context, has been recorded as a user in the EQO web portal. In this way learning from a specific case study contributes to the generalisation and usability of the recommendations made (Ehlers & Pawlowski, 2004).

The studies mentioned in this section, some of which were identified after closing the literature review, corroborate many of the findings of this study.

7.4.3 Scientific reflection

Scientific reflection focuses on what this research has contributed to the scientific body of knowledge and what has been learned during the course of this study.

This research has contributed to the body of knowledge of three intersecting knowledge domains: quality assurance of web-supported learning in higher education. Until now, the field suffered from a distinct gap in knowledge and best practice (see the national and international calls for relevant research – section 1.4).

Although this study is based on a bounded case study of the e-learning support unit at the University of Pretoria, South Africa, various methods and findings are generalisable to other e-learning scenarios. These are:

- The taxonomy of critical success factors is a contribution to the theory of quality web-supported learning and does not rest on the case study alone.
- The techniques for measuring student and lecturer frustration and satisfaction are practical examples of how measures of client satisfaction may be used to 'close the feedback loop' of Deming's PDCA cycle (Gabor, 1990). These measures provide quantitative and qualitative management information for continuous improvement as well as evidence of return on investment.
- The approach used in the design and development of the online QMS and its artifacts may be adopted and customised for similar e-learning situations in higher education. In particular, it contributes to providing a precedent and criteria for the HEQC in South Africa.
- The submission of the exploratory journey and recommendations of this study to the European Quality Observatory provides a practical vehicle for the adaptation of this study to more scenarios than the one it was originally designed for (Hildebrandt & Teschler, 2004).

Several overall lessons were learnt during the course of this study. Notwithstanding the debates against the corporate flavour of Total Quality Management, it was found that by taking a pragmatic approach in the interests of continuous improvement, such principles may be modified and successfully applied to an e-learning support unit. It became clear that client satisfaction needs to be researched and addressed in the interests of service quality. Summative evaluation of web-supported learning by students and lecturers needs to be enabled on a regular basis. In terms of lecturers, the qualitative approach yielded more valuable and meaningful data than a campus-wide e-mail questionnaire would have done. Lecturers are keen and willing to share their sincere experiences and needs. The human element in terms of both lecturer buy-in and student utilisation of web-supported learning determines the ultimate success of using technology to enhance teaching and learning.

7.4.4 Reflection on the exploratory journey

This research study has been a path of continual reflection, self-appraisal and growth. The intellectual ideals, or objectives, of the exploratory journey of discovery were described in section 3.3.1 and are reflected on here.

The first objective was to understand how quality assurance theory may be applied to the instructional design process for web-supported learning. The findings in this case study, with respect to a formal process-based quality management system for web-supported learning (see Figure 7.1), show that standard quality assurance practice may be adapted and applied in this field. The case study has provided a precedent that contributes to institutional and national quality assurance practice with respect to web-supported learning.

It became clear that it was not so much the design and development of the formal quality management system that was unique, but the process, the path taken, the collaboration of the team, the possibilities for studying the impact of our practice and investigating appropriate measures for quality web-supported learning products. This realisation confirmed the *evaluation* aspect within this study: a realisation that I am not only putting artifacts on the table, but evaluating the instructional design process and contributing to best practice in an e-learning support unit.

The second objective was to understand the interplay between the quality of processes and the quality of products in the context of this case study. These concepts were crystallised by the three research questions, which essentially partitioned and zoomed in on these notions. The interpretation of the quality of products, services and processes was discussed in section 7.3.1: *Summary of findings*. This is another example of the application of standard quality assurance terminology to the field of web-supported learning. It contributes to the holistic picture reflected by the updated conceptual framework (Figure 7.1).

The third objective was to interpret client satisfaction in terms of summative evaluation of web-supported products in the quest for continuous improvement. This objective brings together the evaluation aspect of the case (the usual formative and summative evaluation inherent within instructional systems design) and the evaluation aspect of this study (the self-evaluation aspect of the process-based quality management system).

No formal summative evaluation was in place in the e-learning unit until the QMS was implemented. A summative evaluation procedure was written and a summative evaluation checklist was one of the artifacts produced. This provides a match between summative evaluation and the measurement of lecturer satisfaction with web-supported learning. Student feedback data is also a measure of client satisfaction. This is now regularly collected and analysed, also as part of the summative evaluation procedure.

The above reflection illustrates that the objectives set at the beginning of this exploratory study were realised.

7.5 Recommendations

This section presents recommendations that have emerged from the findings of this study. Recommendations in terms of *policy and practice* are given in section 7.5.1 and recommendations for *further research* are given in section 7.5.2, together with suggestions for possible new research questions.

7.5.1 Recommendations for policy and practice

The following recommendations for policy and the practice of improved web-supported learning may be made as a result of this study.
These recommendations have emerged from within the bounds of this specific case study. However they may be translated to similar e-learning situations in other higher education institutions.

Recommendation 1:
A need expressed in the student questionnaire was for lecturers to make better use of the online environment and to facilitate web-supported courses more actively. Being a competent e-teacher includes keeping the learning material up to date, posting student marks frequently, giving timely feedback to students as individuals and in groups, and encouraging more interaction and discussion online. Skills such as summarizing, weaving and grading online discussions need to be enhanced. A new training course for academic staff was introduced in March 2004 - *Facilitation of e-learning* - which attempts to meet this need. The course is a combination of pre- and post-course online components, plus a two-day face-to-face workshop. In this way lecturers are able to experience what it is like to be a student in a web-supported course.

Recommendation 2:
Students expressed the opinion that current training in WebCT did not equip them sufficiently to engage in their web-supported modules. It is recommended that student training in WebCT should be hands-on and customised for the particular module being implemented. All students should feel comfortable and competent in accessing and using the online

environment before they leave the training session. Another suggestion is that follow-up training sessions could be arranged, as students progress through the course and experience specific difficulties with respect to the medium.

Recommendation 3:

The QMS was designed and launched during 2003. Its early use was reported in section 6.4.2. However, for various reasons, it is currently not yet incorporated into the daily practice of instructional designers and project managers in the e-learning support unit. Although it was considered a good idea at the time to develop the QMS in WebCT itself, this means that it is not readily accessible for practitioners who do not normally access WebCT (e.g. education consultants). Therefore it is recommended that the location of and access to the online QMS be re-considered. One possible alternative location is on the TLEI intranet, with one co-ordinator authorised to maintain the documentation. Re-training and re-acquaintance with the updated system would be required.

Recommendation 4:

Summative evaluation is an opportunity not only to evaluate the effectiveness of a web-supported course, but also to collect data on the institution's return on investment. It is therefore recommended that the Lecturer Experience and Satisfaction interview schedule be modified according to the suggestions given in section 5.3.4 and perhaps shortened further. It should be administered at the end of each year in order to measure:

- effectiveness of implemented web-supported courses (e.g. whether they add value to the learning experience);
- lecturer satisfaction with web-supported learning.

It is further recommended that the name of the schedule revert to the *Summative Evaluation Checklist*, as it was named in the QMS. Departmental discussions will need to take place to decide on the format of and distribution channel for the checklist.

7.5.2 Recommendations for further research

In investigating and answering the three research questions in this study, additional issues emerged, which provide scope for further research. For each of the recommendations listed in this section, possible research questions for further investigation are suggested.

Recommendation 5:

The taxonomy of factors to promote the quality of web-supported teaching and learning emerged from the literature review. Although it was extended and refined by additional research papers, as well as by critical colleagues in the case study, it still needs to be tested empirically. Depending on the outcome of such an experiment, the taxonomy could be incorporated into academic staff training courses.

Possible research questions:

Possible research questions to implement this recommendation are:

1. How effective is the taxonomy of factors in promoting the quality of web-supported learning courses?
2. What modifications or improvements to the taxonomy emerge from its use in practice?

Recommendation 6:

In this study, the student feedback data from July 2003 was analysed in detail. An ongoing longitudinal study should investigate the trends in levels of student frustration and satisfaction. Although the findings will not be replicable due to the self-selecting sample and the fact that the student population shifts each year, trends in the frustration and satisfaction indices will provide evidence of continuous improvement as well as areas causing concern.

Possible research questions:

Possible research questions to implement this recommendation are:

1. What trends in student levels of frustration and satisfaction are visible from semester to semester and from year to year?

2. What steps can be taken to reduce levels of student frustration and increase levels of student satisfaction?
3. What is the impact of and return on investment provided by web-supported learning support units at higher education institutions?

Recommendation 7:

The student WebCT experience survey measured client satisfaction at Level 1 of Kirkpatrick's (1998) 4-Level evaluation model: *Reaction*. This implies that student perceptions of their web-supported learning experience were measured. A research project needs to be initiated to investigate and measure *actual* student learning in web-supported courses. Additional in-depth quantitative analysis of the student feedback data could be done, for example, correlations of perceptions of web-supported learning with final results, both at the end of a course and in later job performance of graduates (Kirkpatrick's (1998) Levels 2, 3 and 4).

Possible research questions:

Possible research questions to implement this recommendation are:

1. How can the extent of actual student learning in online courses be evaluated (measured)?
2. Do students successfully achieve specific learning outcomes via web-supported courses?

Arbaugh (2000) makes the same recommendation: "although satisfaction initially may be an important factor in determining whether students continue with Internet-based programs, the viability and credibility of these courses and programs ultimately will hinge on whether they can generate effective learning outcomes" (p. 48).

A paper at a recent conference implied that student learning in one Master's course was evaluated according to all four levels of Kirkpatrick (1998) (Zhang & Van der Westhuizen, 2004). However, those preliminary findings were still based on student *perceptions*, and only one student was of the opinion that she had effectively learnt at level 4 (*Results*: achievement of objectives and impact on the organisation).

Recommendation 8:

Recommendation 3 indicated that the online QMS should be relocated and updated and that re-training and re-acquaintance with the system are required. After that has taken place, the updated QMS should be incorporated into the daily practice of instructional designers and project managers in the e-learning support unit.

Possible research questions:

Possible research questions to implement this recommendation are:

1. What implementation and training strategies will promote the use of the online quality management system for web-supported learning, so as to ensure its adoption and effectiveness?
2. How is the online quality management system used in practice by instructional designers, project managers and education consultants?
3. What suggestions do users have to improve or extend the system? (summative evaluation of the QMS itself).
4. Is the process-based quality management system for web-supported learning translating into specific improvements in client satisfaction measures?

Additional research topics have been mentioned throughout this thesis as being beyond the scope of this study. These include:

- extension of the quality management system to include other delivery media, besides web-supported projects;
- modification of the student feedback questionnaire, in conjunction with Ramsden's Course Evaluation Questionnaire (CEQ) (Ramsden[3], 1991), and the adaptation thereof for distance

[3] Paul Ramsden is well known for developing the Course Experience Questionnaire (CEQ) as an indicator of the quality of teaching in contact learning programmes. This instrument is now officially used by all higher education institutions in Australia (Lawless & Richardson, 2002).

education (Lawless & Richardson, 2002) and web-based courses (Richardson, 2003);

- further field testing, rigorous factor analyses and reliability and validity testing on the modified student feedback questionnaire;
- institutional issues, such as the provision of ubiquitous computing on campus (Smith, 2003);
- the investigation of the Six Sigma methodology with respect to higher education.

These questions indicate that research projects need to be undertaken and in some cases, longitudinal studies and empirical testing are required.

7.6 Conclusion

This study investigated the application of quality assurance practice to web-supported learning in higher education. The rationale presented in chapter 1 motivated this study in terms of six national and international calls, which illustrate the need for research in this field.

The metaphor for this research is the image depicting the instructional design process, shown in the conceptual framework (Figures 2.5 and 7.1). The metaphor incorporates the notions of continuous improvement, awards for excellence, accreditation and meeting criteria or requirements. These constructs are at the heart of the natural human inclination to offer our best, especially in the field of education, where dedicated educators should have the best interests of their students at heart.

The holistic approach in this study applies quality assurance practice to the field of web-supported learning, by integrating the continuous improvement of products, services and processes with respect to web-supported learning. The taxonomy of critical success factors for web-supported products includes underlying assumptions, exogenous factors, institutional, technical, lecturer, student, instructional design and pedagogical factors. Client satisfaction in terms of student and lecturer experiences with web-supported learning was measured. This is one possible measure to inform the feedback loop of continuous improvement. The self-evaluation exercise in an academic support unit provides a precedent and contributes to criteria that will be useful for the HEQC.

In conclusion, lecturers need to be encouraged and supported in embracing new technologies. It is a team effort. Overburdened academics cannot be expected to facilitate learning via new technologies, nor to comply with the demands of external quality assurance agencies, without additional support and incentives. A balance needs to be sought between education innovation, professional development and continuous quality improvement on the one hand and the realities of massification, globalisation, diversity, performance enhancement and accountability on the other. I believe that it is possible to harmonise the debates of managerialism, cloisterism, self-evaluation and external accountablility.

In the seventeenth century, the mathematician Fermat declared: " I have found a very great number of exceedingly beautiful theorems!" (Bell, 1965, p. 56). I have been on a personal voyage of discovery into unchartered topics and enticing territories. I have found gems which contribute to the field of quality web-supported learning in higher education. I have learned a great deal, both personally and that which may be adopted and applied by other practitioners in the field. This epic is testimony to the never-ending desire of educators to improve our practice, our offerings to students and our own professional development.

"What you find in any quest depends mostly on what you set out to find, and where you choose to look for it" (Miles & Huberman, 1994, p. 155)

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[1] This is a company, not an individual.

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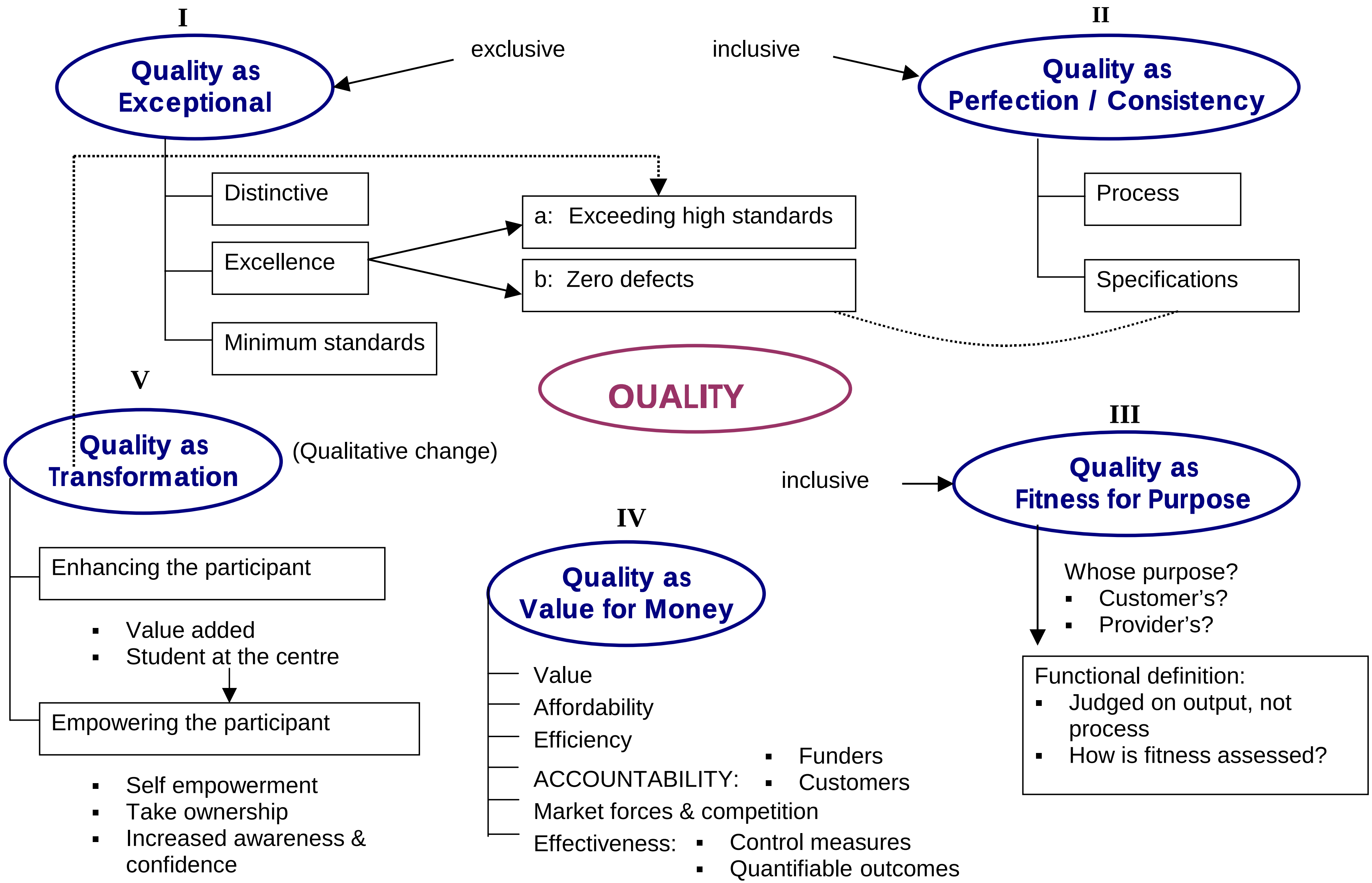
APPENDIX A

Five interpretations of the construct *quality*
(summarised from Harvey & Green, 1993)



Notions of Quality (Summarised from Harvey & Green, 1993)

APPENDIX B

Overview of established theories that support the conceptual framework for this study

B1: Quality Assurance theory

B2: Instructional Systems Design

B3: Systems theory

Appendix B1: Quality assurance theory

The literature review (chapter 2) showed that the topic of quality in higher education and in the specialised area of web-supported learning, is ill defined and can become rather overwhelming: does the concept of *quality courses* refer to quality of the subject content, the pedagogical approach, the instructional design, the assessment strategies, student support, the learning experience, or the product in the sense of satisfying the client's needs? The conceptual framework (Figure 2.5), which is based on the ISO 9001 model (Figure 2.4), reflects the application of standard quality assurance theory to the field of web-supported learning.

Standard **quality assurance theory**, one of the underlying theories of this study, was researched in depth from theoretical and global perspectives in chapter 2. Prominent writers who have engaged in the debate on applying quality assurance practice to education were reviewed in section 2.4.1. The growth of quality assurance practice and recent legislation in South African higher education were presented in section 2.4.4.

The findings chapters (chapters 4, 5 and 6) reflect the findings that emerged from attempting to diminish the gap between the *quality* discourse and the *online (web-supported) learning* discourse.

Appendix B2: Instructional systems design (ISD)

The practice of **instructional systems design (ISD)** has traditionally included phases of formative and summative evaluation (Reiser, 2002; Dick, 2002). In the 1980s, the medium / method was referred to as *computer-based education* or *computer-assisted instruction*. Today the field is more likely to be referred to as information and communication technologies (ICTs), e-learning, interactive learning systems, technology-enhanced flexible learning or asynchronous learning networks.

Over the past three decades, a well-established literature on the instructional design and evaluation of computer-based learning materials has evolved (for example, the work of Bangert-Drowns & Kozma, 1989; Caffarella, 1987; Collis & Moonen, 2001; Flagg, 1990; Gustafson & Branch, 2002; Hannafin & Peck, 1988; Jolicoeur & Berger, 1988; Reeves, 1993; Reeves & Hedberg, 2003; Reiser & Dempsey, 2002).

Evaluation is another everyday term that has different connotations in different situations (Reeves & Hedberg, 2003). Teichler (2000) agrees that the term *evaluation* is widely used and defines it broadly in the field of higher education as “any activity of assessment” (p. 34). Clark (2000), quoting Baker, defines evaluation as “the process by which we judge the worthwhileness of something in order to make decisions” (p. 6). The terms *evaluation* and *assessment* are often used interchangeably (Westerheijden, 1997); some writers prefer *evaluation* (most of the authors in Strydom, Lategan & Muller, 1997), while others appear to prefer *assessment* (Vroeijenstijn, 2001a; 2001b).

Evaluation plays a major role in quality assurance. From an institutional perspective, both internal evaluation (self-evaluation) and external evaluation (audits) are vital components in assessing the quality of academic provision (Sursock, 2001). Higher education institutions evaluate their teaching programmes, their research outputs, the competence of their lecturers and of course, the progress and achievements of their students.

Savenye and Robinson (1996) summarise the link between quality assurance and evaluation by observing that *testing, prototype evaluation* and *quality assurance* are clearly nothing but formative evaluation. Oliver (2000) also highlights this link, stating that “the real benefit of evaluation comes through links to quality enhancement” (p. 90), which clearly reflects the ethos of formative evaluation. Texas A&M University describes the evaluation phase of instructional systems design as follows: “The effectiveness of the instructional process and materials is evaluated at this stage. This is the *quality management* [italics added] component for the program" (Texas A&M University, 2003, online reference).

The practice of evaluation within instructional systems design presents a point for reflection: instructional design is the very science (art? craft? – see Clarke & Estes, 1998) of turning learning materials into interactive, effective and enjoyable learning experiences (products), based on learning theories such as constructivism, engagement and learner-centeredness. Is quality in web-supported learning anything different to the instructional design and evaluation of computer-based education? The link is that *evaluation, quality assurance, usability testing, measurement of effectiveness* and *closing the feedback loop* may be viewed as variations on the same theme, namely continuous improvement of the learning product and its impact on student learning.

Appendix B3: Systems theory

Instructional systems design and quality management systems have links with the established theory of systems thinking. Just as with the terms quality and evaluation, the term *system* has different connotations in everyday life, for example, computer system, eco-system, water supply system, mathematical system, systems analysis and systems engineering.

Fourie (2000) defines a system as "a set of two or more interrelated elements of any kind. It is not an ultimate indivisible element but a whole that can be divided into parts" (p. 52). Peter Checkland, an expert on Soft Systems Methodology (SSM), refers to "the powerful bundle of ideas captured in the notion 'system'" (Checkland, 1999, p. A4). He applies systems thinking to 'human activity systems', which are human situations in which people are attempting to take purposeful action "to improve the situations which day-to-day life continuously creates and continually changes" (p. A4). This clearly links with quality assurance theory in the sense of continuous improvement. Peter Senge (1990) makes use of systems thinking which he describes as a "discipline for seeing wholes.

It is a framework for seeing interrelationships rather than things, for seeing patterns of change rather than static ‘snapshots’” (p. 68).

Senge, Kleiner, Roberts, Ross and Smith (1994) make the perceptive link between systems thinking and the total quality movement:

> One of the most powerful discoveries for us during the past years has been seeing how closely our work on learning organizations dovetails with the ‘Total Quality’ movement. Again and again we have found that organizations seriously committed to quality management are uniquely prepared to study the ‘learning disciplines’. (p. 10)

Fourie (2000) applies a systems approach to quality management. She proposes that quality management systems should be holistic, integrated, organic and evolutionary. Galbraith (1999) claims that a university is an example of a complex social system. “Such systems are characterised by the interaction of closed chains of causality (feedback loops) that together define the system structure and hence how the system behaves over time” (p. 143).

> The notion of the feedback loop is critical in both instructional systems design (formative and summative evaluation, which serve to review and improve the product) and quality management, where it provides measures and management information in order to inform policy and practices (Boyd, 2001b).

A system, then, is a holistic, integrated, complex set of interrelated components, all working together for a higher purpose, much like the human body (Boyd, 2001b). Each part has its own intricate and vital function, each on its own is useless and will die. This philosophy reflects the dynamic, complex and evolutionary nature of teaching and learning and the inherent difficulties in trying to systematise quality assurance practice in a meaningful way with respect to higher education.

APPENDIX C

Frameworks for quality teaching and learning with respect to e-learning

C1: Standards and Guidelines for best practices in distance education

C2: Twenty four benchmarks (Institute for Higher Education Policy,2000)

C3: Quality indicators (Barker, 1999)

C4: Seven Principles (Chickering & Ehrmann, 1996)

C5: Criteria for WebCT Exemplary Courses (Graf & Caines, 2001)

C6: Criteria for USA Office of Educational Research and Improvement (OERI)

C7: Ten Keys (Alley, 2000)

C8: Pedagogical framework (Herrington et al, 2001)

C9: Five pillars (Bourne & Moore, 2002)

C10: Taxonomy of factors to promote quality web-supported learning

C11: Overview of factors for quality web-supported learning found by other studies

Table C1

Standards and Guidelines for best practices in (technology enhanced) distance education

Institution or Author/s	Title of document	URL
Alley (2000)	**Ten keys to quality assurance and assessment in online learning.**	http://www.worldclassstrategies.com/ papers/keys.htm
American Council on Education (ACE)	Guiding principles for distance learning in a learning society	http://www.acenet.edu/clll/dist_learning/dl_principlesIntro. cfm
American Federation of Teachers	Distance Education - Guidelines for Good Practice	http://www.aft.org/higher_ed/technology
BENVIC Project	Benchmarking of Virtual Campuses, a project partially sponsored by the European Commission	http://www.benvic.odl.org
Canadian Association for Community Education (CACE)	**Quality guidelines for technology-assisted distance education** (Barker, 1999)	http://futured.com/form/pdf/english.pdf
Carnegie Mellon University: Learning Systems Architecture Laboratory	SCORM Best Practices Guide for Content Developers (Technical software issues for programmers – one of the goals of SCORM is to create reusable content objects)	http://www.lsal.cmu.edu/lsal/expertise/projects/developersguide
Chickering & Ehrmann (1996)	**Implementing the Seven Principles - Technology as lever**	http://www.aahe.org/technology/ehrmann.htm
Commonwealth of Learning	**Canadian Recommended E-learning Guidelines** (Based on Barker, 1999 – Updated and re-issued 2002)	http://www.col.org/newsrelease/0206ConsumersGuide.htm
Congressional Web-based Education Commission	United States Congressional commission to develop specific recommendations directed at maximizing Internet education possibilities.	http://www.ed.gov/offices/AC/WBEC/FinalReport
Council for Higher Education Accreditation (CHEA)	Quality Assurance and Distance Learning	http://www.chea.org/Research/index.cfm#qualityassurance
Curtin University of Technology	**Standards for Online Teaching (SOLT)**	http://cea.curtin.edu.au/solt/
Department of Education, South Africa	Distance Education Quality Standards Framework, 1996	http://education.pwv.gov.za/teli2/policydocuments/

Global Alliance for Transnational Education (GATE)	Best Practices / Quality Assurance	http://www.edugate.org/certification.html
Institute for Higher Education Policy (2000)	**Quality on the Line. Benchmarks for success in internet-based distance education**	http://www.ihep.com/PR17.html
International Association for Continuing Education and Training	Guidelines for Distance Education	http://www.iacet.org/distance/distance.htm
International Council of Distance Education (ICDE)	ICDE Standards Agency: international standards and accreditation	http://www.icde.org
Johns Hopkins University	Excellence in Distance Education: Standards for developing and delivering courses	Available in hard copy only.
Michigan Virtual University	**Standards for Quality Online Courses**	http://standards.mivu.org
North Central Association - Commission on Institutions of Higher Education	Guidelines and Principles for distance education	http://www.ncahigherlearningcommission.org/resources/distancelearning/
Open and Distance Learning Council	Standards for Open and Distance Learning	http://www.odlqc.org.uk/odlqc/standard.htm
Open University	Quality and Standards in the Open University	http://intranet.open.ac.uk/pvcsg/sqs/f-qual-and-standards/
Pennsylvania State University	Innovations in distance education: an emerging set of guiding principles and practices for the design and development of distance education.	http://www.outreach.psu.edu/DE/IDE/guiding_principles
Quality Assurance Agency for Higher Education (QAAHE)	Guidelines on the Quality Assurance of Distance Education	http://qaa.ac.uk/public/dlg/append1.htm
Southern Regional Education Board, Electronic Campus	**Principles of Good Practice**	http://www.electroniccampus.org/student/srecinfo/ publications/principles.asp
University of Illinois	**Teaching at an Internet Distance: The pedagogy of online teaching and learning**	http://www.online.uillinois.edu/old/retreat2000/tid_report.html

WebCT®	**WebCT Exemplary Course Project – Scoring rubric**	*http://www.webct.com*
Web-based Education Commission	**The Power of the Internet for Learning: moving from promise to practice**	*http://interact.hpcnet.org/ webcommission/index.htm*
Western Interstate Commission for Higher Education (WICHE)	**Guide to Best Practice for Electronically Offered Degree and Certificate Programs**	*http://www.wcet.info/Article1.htm*
Western Co-operative for Educational Telecommunications (WCET)	**Balancing Quality and Access: Principles of good practice for electronically offered academic degree and certificate programs** **Best Practices for electronically offered degree and certificate programs**	*http://www.wcet.info/projects/ balancing/principles.asp* *http://www.wcet.info/resources/ accreditation*

Table C2

Twenty-four Benchmarks for Internet-based Distance Education

(Synthesized from the Institute for Higher Education Policy, 2000)

Category	**Benchmarks**
Institutional support	1. A documented technology plan. 2. Reliability of the technology delivery system. 3. A centralised system to maintain the distance education infrastructure.
Course development	4. Guidelines regarding minimum standards and learning outcomes determine the delivery system used. 5. Instructional materials are reviewed periodically. 6. Course design requires students to engage in analysis, synthesis and evaluation.
Teaching/learning	7. Student interaction with faculty and other students. 8. Feedback to student assignments and questions is constructive and provided in a timely manner. 9. Students learn research methodology.
Course structure	10. Student self-motivation and access to technology are assessed. 11. Supplemental course and organizational information is provided. 12. Students have access to sufficient library resources, traditional and online. 13. Agreement is reached between students and faculty on completion and submission of student assignments.
Student support	14. Students receive information about the study program and all its requirements. 15. Students are provided with hands-on training in accessing resources. 16. Students have access to technical assistance. 17. A structured and efficient system is in place to address student queries and complaints.
Faculty support	18. Technical assistance in course development is available. 19. Faculty members are supported in the transition from traditional teaching to online teaching. 20. Instructor training and assistance, including peer mentoring, is available throughout the progression of the online course. 21. Faculty members are provided with written resource material to support them in facilitating online learning.
Course evaluation	22. The program's educational effectiveness is evaluated. 23. Data on enrollment, costs and successful / innovative uses of technology are used to evaluate program effectiveness. 24. Intended learning outcomes are reviewed regularly to ensure clarity, utility and appropriateness.

Table C3

Quality indicators for technology-assisted distance education (Summarised from Barker, 1999)

Quality inputs and resources	Quality processes and practices	Quality outputs and outcomes
Learning outcomes are: • clearly defined • demonstrable • measurable • achievable • useful • appropriate	Student management systems include: • registration • orientation • intake and placement • pre-entry counseling • recognition of prior learning • accurate management of student records • learner involvement in decision making • assistance with technologies used	Acquired content, skills and knowledge are: • relevant • transferable • purpose-specific • blended
Curriculum content is: • accurate • relevant • scholarly • up-to-date • consistently updated • appropriate to learning objectives • culturally sensitive	Learning management processes include: • quality teaching practices • quality learning approaches • quality assessment practices • appropriate use of communications facilities • effective human resource management practices • accountable programme management	Necessary learning skills acquired for: • successful course completion • lifelong learning • self-directed learning management
Teaching / learning materials are: • well designed • well organised • free of errors • readily available • user friendly • affordable • free of cultural, racial, class or gender bias • accessible to learners with disabilities • easy to use • free of technical hitches	Appropriate use of technologies to: • make students feel comfortable • accommodate and promote individualization • create opportunities for meaningful work • increase information processing skills • promote problem solving abilities • nurture artistic expression • enable active engagement in the construction of knowledge • provide drill and practice where necessary	Completion credits or credentials are: • recognised by professional, national bodies • recognised by other educational institutions • of same value with respect to on-site or distance learning • transferable nationally and internationally

Quality inputs and resources	Quality processes and practices	Quality outputs and outcomes
Complete learning package includes: • course description • course objectives • information about the instructor • learning notes • additional learning resources • activities and assignments • assessment opportunities	Communication facilities are able to: • encourage contact between students and faculty • provide opportunities for interaction and problem-solving • develop reciprocity and cooperation among students • enable students to interact with experts	Return on investment with regard to: • accessibility • objective benefits and utility • effectiveness • efficiency • customer satisfaction
Learning technologies are appropriate to: • field of study • learning outcomes • target population • cost and benefit to the learner • enable instructor support	Human resources management includes: • recruitment and selection of appropriate personnel • requirement for ongoing professional development • technical skills development and support • regular evaluation of competence	
Sound technical design that is: • navigable • updated • complemented by graphics • available in text-only format • includes links to other relevant resources • reliable • complete	Program management is accountable for: • student management, learning management, planning, evaluation, research, continuous improvement, financial viability and continuity	
Appropriate and necessary personnel are available: • teachers, managers, subject matter experts, library staff, tutors, mentors, technical support, learning skills support, career planning, employment counselling etc.		

Quality inputs and resources	Quality processes and practices	Quality outputs and outcomes
Learning resources are: • varied • easily accessible • copyright approved • flexible for different learning styes		
Program plans and budget include: • written policies • adequate budget • financial and administrative commitment to a programme • a technology plan • security of systems		
Routine review and evaluation of: • course content and objectives • learning materials • instructional design • instructors • learning and student achievement • policies and management practices • operational procedures • customer satisfaction		
Product / service information is provided		
Advertising, recruiting and admissions information is provided		
Course package is: • appealing • user-friendly • extensible • inclusive of all administrative services • personalised • coherent and complete • reviewed and evaluated routinely		

Table C4

Seven principles applied to technology-enhanced learning

(Adapted from Chickering & Ehrmann, 1996)

Seven Principles	Applied to technology-enhanced learning
1. Encourage contact between students and faculty.	E-mail, computer conferencing, the internet and learning management environments facilitate online communication. Both synchronous and asynchronous forms of communication promote contact between faculty and students, between experts and students and between students themselves. Total communication increases, with students who would normally be too shy or inhibited in a face-to-face situation, opening up and participating more freely (Chickering & Ehrmann, 1996).
2. Develop reciprocity and cooperation among students.	Co-operative learning, team work and group assignments are enhanced in an online environment. Learning is a social activity (Fullan, 2002) and online learning enables the establishment of vibrant learning communities.
3. Use active learning techniques.	Besides the use of synchronous and asynchronous communication tools, e-learning enables many other activities, such as simulations, online debates and the creation of developmental electronic portfolios. The use of technology as a tool itself can support apprentice-like activities, for example, using statistical software or using the Internet to gather information.
4. Give prompt feedback.	E-mail supports person-to-person feedback, student presentation tools facilitate the submission and sharing of student work and international experts can be involved in responding to discussion questions.
5. Emphasize time on task.	Time efficiency increases when interactions between teacher and students, and among students, fits busy work and home schedules. Students and faculty can save time and effort by accessing online resources without having to physically go to a library or to travel to classes. Computers can record student participation and interaction and help document time spent on learning tasks.

6. Communicate high expectations.	'Significant real-life problems, conflicting perspectives, or paradoxical data sets can set powerful learning challenges that drive students to not only acquire information, but to sharpen their cognitive skills of analysis, synthesis, application and evaluation' (Chickering & Ehrmann, 1996). Knowing that their work will be available for public scrutiny also encourages students to produce their best.
7. Respect diverse talents and ways of learning.	Learning technologies offer a variety of learning experiences, which appeal to different learning styles, for example, visual, audio, text, group and individual activities. They can encourage self-reflection, self-evaluation, problem-based and real-life learning. Constraints of time and place disappear and anywhere, anytime learning becomes a reality.

Table C5

Criteria for WebCT® Exemplary Courses

Academic Rigour	Content Robustness
1. Course objectives are written at a higher level and clearly revealed to students.	1. The quality requirements of assignments (both web-based and non web-based).
2. Course assignments promote critical thinking strategies.	2. The degree to which course content is made available within WebCT.
3. Course requirements include clearly stated expectations defining minimal levels of student participation	3. The degree to which the course content is made available in manageable segments.
4. Course makes **appropriate** use of inherent WebCT technologies.	4. The degree to which students interact with each other and the instructor to communicate about the course.
5. Course makes **exceptional** use of inherent WebCT technologies.	5. The extent to which the course makes appropriate use of digitised images and graphics.
6. Course assignments cause students to apply knowledge and skills in realistic and relevant ways.	6. They type and quality of student assessments included in the course.
7. Course assignments require students to make appropriate and effective use of external resources, including print, library, web-based and other electronic resources.	
8. Course assignments and content facilitate a high level of collaborative activities.	
9. Instructor makes appropriate ancillary resources available.	
10. The course content and requirements are as demanding as a face-to-face course with similar content.	

Table C6

Criteria for USA Office of Educational Research and Improvement (OERI)

(adapted from Confrey, Sabelli & Sheingold, 2002)

	Level 1: Little or no demonstration of the criterion.	**Level 2:** Insufficient or incomplete demonstration of the criterion.	**Level 3:** Adequate demonstration of the criterion.	**Level 4:** Clear and convincing demonstration of the criterion.	**Level 5:** Compelling demonstration of the criterion.
Criterion 1 The program addresses an important educational issue or issues and articulates its goals and design clearly.	Vague, incomplete, incoherent, unclear	Too general, or goals not significant.	Goals adequately significant and design adequately thoughtful and coherent.	Significant, thoughtful, coherent, clear and complete. Description may be only adequate in its clarity and completeness.	Goals, design and description are convincing or compelling and supported by research.
Criterion 2 The program develops complex learning and thinking skills.	Unclear what is being learnt from learning activities.	Unclear how activities contribute to the criterion.	Sufficient description of activities contributing to learning.	Clear description of activities and contribution to learning.	Makes a case through argument and examples of how activities contribute to learning.
Criterion 3 The program contributes to educational excellence *for all.*	Not clear who has access or is served by the program. No evidence of outreach or collaboration.	Does not convey high or clear expectations. No evidence of outreach or collaboration.	Set high expectations and serve diverse groups of learners. Closing gaps in participation of under-served learners.	High expectations for all learners, meet needs of diverse and under-served learners. Active outreach and collaborative partnerships.	Increased both participation and performance of under-served groups of learners.
Criterion 4 The program promotes coherent organizational change.	Vague or no demonstration of vision, goals, involvement of constituencies, enhancement of human capacity or changes in policy.	May claim a vision, but vision is not clear. May establish partnerships, but not clear how they contribute to organizational change.	Promotes some organizational change. Change is not yet comprehensive or fully coherent.	Promotes coherent organizational change.	All indicators are addressed: vision, goals, involvement of constituencies, enhancement of human capacity and changes in policy.

	Level 1: Little or no demonstration of the criterion.	**Level 2:** Insufficient or incomplete demonstration of the criterion.	**Level 3:** Adequate demonstration of the criterion.	**Level 4:** Clear and convincing demonstration of the criterion.	**Level 5:** Compelling demonstration of the criterion.
Criterion 5 The program has rigorous, measurable evidence of its achievements of one or more among Criteria 2, 3 and 4 (learning, equity and organizational change).	If evidence is presented, it is not clearly related to program goals and claims. Often too early to have collected valid evidence.	Considerable amounts of data may be presented, but data do not constitute credible evidence of effectiveness. May be limited in the type of data collected or sample size.	Evidence clearly related to program goals and to claims of effectiveness. The research design meets adequate standards of quality. Evidence sufficiently well documented and analysed.	Evidence clearly related to program goals and to claims of effectiveness. The research design meets adequate standards of quality. Evidence well documented, carefully analysed and complete.	Evidence clearly related to program goals and to claims of effectiveness. The research design is driven by these goals and claims. Clear and appropriate evidence is provided, presenting a compelling case.
Criterion 6 The program is adaptable for use in multiple contexts. It is sustainable and scaleable.	Program may be too new to be able to show adaptability. Program description may be vague or unfocused so that replication or sustainability is not clear.	Program may be locally sustainable, but not scalable or adaptable to a range of settings. May provide no guidelines for implementation.	Adequately available technology, cost-effective, demonstrates some scalability or adaptability.	Convincing demonstration that the program is adaptable for use in multiple contexts.	Programs address all of the indicators and show that they can be widely used in multiple settings.

Table C7

Ten Keys to Quality Assurance in Online Learning (Synthesized from Alley, 2000)

10 KEYS	APPLICATION
1. **Allow the student to exert himself by constructing his own knowledge.** The Internet is an ideal medium for problem-based learning activities.	• Have the student develop an applicable webliography. • Have the student develop a problem-based research paper.
2. **Allow the student to take responsibility for his or her own learning journey.** The web environment is ideal for offering a student richness of information and resources.	• Articulate a 'course structure map' in which the target competencies (learning outcomes) for the course are precisely outlined. • Include assessment of prior learning and the • concrete knowledge, skill or behaviour to be demonstrated.
3. **Minimize frustration and maximize positive tensions that the student experiences.**	• Have a campus portal offering resources for student support and assistance. • Find out what training, guidance and counselling resources are available and provide direct links to these. • Provide a cyber café area or an open forum discussion area (student lounge). • Build very strong feedback mechanisms. • Make use of student groups / teams. • Acquire monitoring and mentoring skills. • Provide reassurance and encouragement. • Have a time-to-completion chart showing the average time required to complete each task in the course.
4. **Provide time for students' self-reflection.** Design in some mechanism for appreciating and recognizing the reflection they do. Share the results of your reflections on some aspect of the class or student work. On the web, the student can control the flow of information to suit his individual needs or preferences.	• Use the chat tool to prompt reflection. • Provide a topic for a debate via online synchronous chat. • Ask students to perform some closing work on the discussion board, such as revisiting all postings in a thread and to post a synthesis or summary. • Prompt students to analyse and justify what they have asserted and to synthesize and evaluate ideas. • Ask students to reflect upon themselves as members of a group by having them analyse their own collaborative styles. • Use the survey tool to survey students about their progress • Have students do a self-audit of work completed and work still to be done.

5. Accommodate various learning styles. Offer the same content in textual, visual and/or audio formats. Allow student to publish content in a variety of media.	• Help learners to understand, exploit and/or compensate for their preferred learning styles. • Have learners complete a learning style inventory - see http://www.indstate.edu/ctl/styles/tstyle.html • Use asynchronous communication tools to accommodate your students' preferences for the pace and order of learning. • Use your learning-style profile of the class in designing learning activities and assigning roles in group work.
6. Promote active learning. (see Gagne's (1985) conditions of learning)	• Motivate the student to gain a new competency. • Encourage the students to learn by doing. • Use action verbs that will cause the learner to demonstrate the new competency. • Make use of formative assessments so that the learner derives added benefit through feedback.
7. Design action oriented learning activities that compel the learners to discover phenomena and seek out new knowledge to explain them.	• Dispatch the learners (possibly in teams) on loosely defined or open-ended discovery adventures. • Have students post poems on the course site anonymously and then all students can exchange anonymous reviews. • Have students interview experts, research a topic, perform a task, or construct a model.
8. Enhance critical thinking and higher order reasoning.	• Use question and answer sessions. • Facilitate critical discussions. • Design learning activities that are genuinely collaborative. • Assign students roles within the group that make results of their individual learning essential to the success of the group. • Design learning activities the enable both private and social modes of learning.

9. Provide for a non-threatening exploration of typical misconceptions that may lurk among prior learning and may conflict with new knowledge. The web environment is ideal for the presentation of self-assessments and curiosity-evoking questions in a non-threatening manner.	• Provide a survey of common misconceptions in the form of a "fun facts" item. • Post tantalizing questions or riddles and provide links to information that explains the riddle or perplexity. • Post an assertion and have students defend or criticise the view. • Ask students to pose observations to substantiate or defend their own respective viewpoints. • Follow up in some way by posting a public reply, answer or summary of student comments.
10. Offer multiple learning paths to encourage students to learn recursively. Content placed online does not need to exhibit the same pre-determined structure as a text book does.	• Present your course content in unsequenced areas or clusters. • Design simple learning activities accompanied by self-assessment within each content cluster.

Table C8

Quality Guidelines for online courses (synthesized from Herrington et al, 2001)

	Quality of Pedagogy	Quality of Resources	Quality of Delivery Strategies
1.	**Authentic tasks:** The learning activities involve tasks that are applicable in real-life settings.	**Accessibility:** Resources are easily located and accessed.	**Reliable and robust interface:** Learning materials are accurate, usable and error free.
2.	**Opportunities for collaboration:** Collaborative learning is used to create outcomes that could not have been achieved individually.	**Currency:** Resources are current, up-to-date and applicable to the subject matter.	**Communication channels:** Dialogue between students and between lecturers and students is encouraged.
3.	**Learner-centered environments:** There is a focus on how and what students have learned.	**Richness:** A rich variety of resources, views and perspectives are available.	**Appropriate bandwidth and download demands:** Learning materials are accessible and downloadable within a reasonable time span.
4.	**Engaging:** Learners are challenged and motivated by learning experiences.	**Purposeful use of media:** Media and resources are used optimally and appropriately.	**Equity and accessibility:** Learning materials and activities are accessible and available to all students, including the disabled.
5.	**Meaningful assessment:** Authentic and integrated assessment is used, rather than separate assignments and examinations.	**Inclusivity:** Learning materials demonstrate social, cultural and gender sensitivity.	**Appropriate corporate style:** Layout and presentation should be consistent with the corporate identity, to ensure quality of presentation.

Table C9

Five pillars of the Sloan-C Consortium (from Bourne & Moore, 2002)

GOAL	PROCESS/PRACTICE	METRIC	PROGRESS INDICES
LEARNING EFFECTIVENESS			
Quality of learning online is demonstrated as at least as good as the quality the institution provides in traditional programs	Academic integrity and control reside with faculty in the same way as for traditional programs at that institution	Faculty perception surveys or sampled interviews compare learning effectiveness in delivery modes Learner/graduate/employer focus groups or interviews measure learning gains	Faculty report online learning is equivalent or better Direct assessment of student learning is equivalent or better
COST EFFECTIVENESS			
Institutional business practices generate and support stable, high quality educational programs and expansion to meet needs	The institution demonstrates financial and technical commitment to its online programs Tuition rates provide a fair return to the institution and best value to learners at the same time Tuition rates are equivalent or less than on-campus tuition	Institutional stakeholders show support for participation in online education Effective practices identified	The institution sustains the program, expands and scales upward as desired, strengthens and disseminates its mission and core values through online education
ACCESS			
All learners who are qualified and motivated are enabled to succeed and complete a course/degree/program through online access to learning in any discipline (continually enlarging the pool of learners)	Program entry processes inform learners of opportunities, and ensure that qualified, motivated learners have reliable access Integrated support services are available online to learners	Administrative and technical infrastructure provides access to all prospective and enrolled learners Quality metrics measure information dissemination; learning resources delivery; and tutoring services	Qualitative indicators show continuous improvement in growth and effectiveness rates
FACULTY SATISFACTION			
Sustain and increase faculty participation in online teaching Expand and deepen faculty awareness of and satisfaction with online teaching Integrate faculty online and face-to-face with online purposes and practices	Process to ensure faculty participation in matters particular to online education (e.g. governance, intellectual property, royalty sharing etc.) Process to ensure adequate support for faculty in course preparation and course delivery	Repeat teaching of online courses by individual faculty indicates approval Addition of new faculty shows growing endorsement	Data from post-course surveys show continuous improvement: At least 90% of faculty believe the overall online teaching/learning experience is positive Willingness/desire to teach additional courses in the program: 80% positive

STUDENT SATISFACTION			
Every learner who completes a course is satisfied with the: Level of interaction with faculty and other students Learning outcomes matching the course description Adequacy and appropriateness of technology and support	Faculty / learner interaction is provided timely and substantive Adequate and fair systems assess course learning objectives; results are used for improving learning	Metrics show growing satisfaction: Surveys (see above) and/or interviews Alumni surveys, referrals, testimonials Outcomes measures Focus groups Faculty / Mentor / Advisor perceptions	Satisfaction measures show continuously increasing improvement Institutional surveys, interviews, or other metrics show satisfaction levels are equivalent to or better than those of other delivery modes for the institution

Table C10

Taxonomy of factors to promote quality web-supported learning

Category	Factor (Study:)	1	2	3	4	5	Sum
Institutional Factors	Technology plan	0	1	1	0	0	2
	Infrastructure / Adequate resources for online learning	0	1	1	0	0	2
	Student advice and consultation	0	1	1	0	0	2
	Institutional evaluation of programme effectiveness	0	1	0	0	1	2
	Promotes coherent organisational change	0	0	0	0	1	1
Technology Factors	Appropriate use of technology	1	0	1	0	1	3
	Reliability / robustness	0	1	1	0	0	2
	Accessibility / 24/7 availability	0	1	1	0	0	2
	Technological support available for lecturers & students	0	1	1	0	0	2
	System training available for lecturers & students	0	1	1	0	0	2
	Accurate management of student records / data	0	0	1	0	0	1
Lecturer Factors	Interaction with students / facilitation of online learning	1	1	1	1	0	4
	Frequent and constructive feedback to students	0	1	1	1	0	3
	Professional training in education - profess develmt	0	1	1	0	0	2
	Regular evaluation of lecturer competence	0	1	1	0	0	2
	Academic background / qualifications	0	0	1	0	0	1
Student Factors	Communication with fellow students	1	1	1	1	0	4
	Time management / time on task	0	0	1	1	0	2
	Learner control over time, place, pace of learning	0	0	1	1	0	2
	Expect efficiency and effectiveness	0	1	1	0	0	2
	Employ critical thinking strategies	1	0	0	0	0	1
	Motivation / commitment / self esteem	0	1	0	0	0	1
	Improve students' problem solving abilities	0	0	1	0	0	1
	Return on investment - customer satis. - cost/benefit	0	0	1	0	0	1

Category	Factor Study:	1	2	3	4	5	Sum
Instructional Design Factors	Co-operative / group learning / team work / reciprocity	1	0	1	1	1	4
	Student engagement in higher cognitive levels / knowledge construction / challenges	0	1	1	1	1	4
	Rich learning resources / Sound learning materials	1	1	1	0	0	3
	Interactivity / Active learning / learning activities	0	0	1	1	1	3
	Design standards / guidelines / minimum requirements	0	1	1	0	0	2
	Routine review and evaluation of courses / products	0	1	1	0	0	2
	Inclusivity/equity: social, cultural, gender, disabilities	0	0	1	0	1	2
	Enhanced student motivation / responsibility for own learning	0	0	1	0	0	1
	Manageable segments / modular / chunking	1	0	0	0	0	1
	Purposeful use of learning media	0	0	1	0	0	1
	Appropriate use of images, graphics	1	0	0	0	0	1
	Offer a complete learning package	0	0	1	0	0	1
Pedagogical Factors	Learning outcomes / objectives are clearly stated	1	1	1	0	1	4
	Communicate high expectations	0	0	1	1	1	3
	Optimal assessment strategies / authentic tasks	1	0	1	0	1	3
	Respect diverse talents and learning styles	0	0	1	1	0	2
	Clearly stated expectations re: min levels of participation, assignment completion	1	1	0	0	0	2
	Provide time for students' self reflection	0	0	0	1	0	1
	Provide a non-threatening, comfortable environment	0	0	1	0	0	1
	Students instructed in proper research methodology	0	1	0	0	0	1
	Relevance and accuracy of content	0	0	1	0	0	1
	Research and continuous improvement	0	0	1	0	0	1
	Educationally significant goals	0	0	0	0	1	1
	Programme is adaptable, sustainable and scaleable	0	0	0	0	1	1

APPENDIX C

Table C11:

Overview of factors for quality web-supported learning found by other studies

Reference	Context	Factors for quality WSL
Alley (2000) (See Appendix C, Table C7)	Summarises the results of a nationwide empirical study in the USA to systematically identify the factors that determine the quality of online learning. Ten key elements for effective online learning were identified.	1. Encourage knowledge construction 2. Encourage students to take responsibility for their own learning 3. Minimize frustration and maximize positive experiences 4. Provide time for students' self reflection 5. Accommodate various learning styles 6. Promote active learning 7. Design action oriented learning activities 8. Enhance critical thinking, higher order reasoning and collaborative projects 9. Provide non-threatening opportunities for exploration 10. Offer multiple learning paths.
Applebee, Dearn, Donnan & Kiley (2003)	Consider the effectiveness of traditional evaluations of teaching in flexible learning environments. Traditional teacher evaluation tools include student feedback on teaching and courses, staff promotion criteria and criteria for teaching awards.	Role of online teacher, e.g. moderation, interaction Teaching with technology IT support Course content Student support Learning activities Authentic assessment Feedback
Arbaugh (2000)	Investigates the effectiveness of Internet-based courses in an MBA programme in terms of perceived usefulness and perceived ease of use of the course software. He provides recommendations for researchers, management educators and business schools.	Instructor characteristics: • Instructor immediacy • Effective interaction • Attitudes towards the course • Attitudes towards the technology • Experience and skill with the medium Student characteristics: • Experience and skill with the medium

Table C11 (continued):

Overview of factors for quality web-supported learning found by other studies

Reference	Context	Factors for quality WSL
Downey (2000)	Considers the application of quality models from the business world (e.g.Deming's quality cycle) to education in general and claims that best practice in teaching and learning technologies should be promoted and refined through continuous quality improvement (CQI).	Self-paced learning Standardisation Any time / any place learning Reduced operational costs, after the initial investment Promoting virtual group or virtual team skills in students[1].
Forman, Nyatanga & Lovemore (2002)*	Presents standards that e-learning should adhere to.	Adequate learner support Interactivity User-friendly navigation Media and technical quality Students require: • Learning-to-learn skills • Independence • Self-management skills
Lee & Dzuiban (2002)*	Discuss quality assurance strategies in university distance education programmes, with particular emphasis on the role of ongoing formative and summative evaluation of learning programmes.	Administrative leadership and support Ongoing programme concerns Web-course development Student concerns and needs Faculty concerns and needs
Oliver (2001)	Addresses the major issues confronting the successful adoption and sustained use of online learning in higher education in the Australian context. Strategies to support and sustain quality online learning programmes are described.	Teacher expertise in online teaching: • teaching online; • technology skills; • technology currency; • teacher training. Student readiness to move online: • technology skills; • access to technology; • technology literacy; • self-regulated learning. Technology infrastructure: • courseware delivery systems • hardware and software • service provision. Provision of content and learning resources: • reusable learning objects. Instructional design: • reusable learning designs.

[1] In Downey (2000), this is the only factor that relates to the Fresen taxonomy (promoting co-operative group learning, team work and reciprocity) – the other items appear to be advantages of online learning.

Table C11 (continued):

Overview of factors for quality web-supported learning found by other studies

Reference	Context	Factors for quality WSL
Oliver (2003)	Develops descriptors and standards for institutional quality audits. While the resulting framework did not specifically target online teaching and learning, some descriptors having an impact on online teaching and learning were identified.	Course materials and resources Teacher qualifications and currency Facilities and resources for teaching and learning Provision of appropriate learning experiences Work, community and professional engagement Assessment procedures Continuous improvement in teaching processes Student selection and entry into courses Student support
Richardson (2003)	Uses the Course Experience Questionnaire (CEQ) and the Revised Approaches to Studying Inventory (RASI) to measure students' perceptions of academic quality in a short web-based course.	Appropriate assessment Appropriate workload Clear goals and standards Generic skills Good materials Good tutoring Student choice
Scott (2001)	Investigates more powerful uses of information and communication technology (ICT), such as interactive learning, production of creative works, online debates and active experimentation and problem solving. He concludes that wasted time and disappointment can be avoided if all proposed applications of ICT are checked against learning quality tests identified in the literature, which are listed in the adjacent column.	Relevance Responsive learning designs Appropriate use of wide range of learning strategies and resources Clear expectations Prompt and detailed feedback on learning More flexible pathways for learning Convenient and flexible access to learning times, locations and resources Responsive administration, support services and infrastructure.
Waddel & Byrne (2003)	Concentrate on the facilitation of online learning after an online course has been implemented. They provide pointers for lecturers to promote the quality of their interaction with and encouragement offered to students.	• Interaction • Community • Engagement • Communication • Respect • Empathy • Attentiveness • Motivation

APPENDIX D

Student survey:

D1: WebCT Experience Questionnaire

Key:

F=Frustration

S=Satisfaction

TA = Technical Adequacy

ES = Educational Support

CT = Communication Tools

AD = Affective Domain

PL = Perceived Learning

D2: Data format, coding and transformation

D3: Coding frame for open questions

D4: Coding of open questions

D5: Items contributing to the Technical Adequacy (TA) Index

D6: Items contributing to the Educational Support (ES) Index

D7: Items contributing to the Affective Domain (AD) Index

D8: Items contributing to the Communication Tools (CT) Index

D9: Items contributing to the Perceived Learning (PL) Index

WebCT Experience Survey

Dear Student
We are evaluating the quality of the WebCT courses at the University of Pretoria. Please take 3 minutes of your valuable time to complete this WebCT Experience survey. We need to know if you had technical or access problems and how you experienced online learning in general.

Question 1 (You may mark more than one option) How do you gain access to a computer? ❑ My own computer at home ❑ My own computer in the residence ❑ My computer at work ❑ IT computer labs ❑ Informatorium computer labs ❑ Other computer labs on campus OC 0 1	**V1** **V2** **V3** **V4** **V5** **V6**	**TA**	**F**
Question 2 When you need to access a computer on campus, can you find one available? • Yes, I always find a computer. • I find it difficult to find an available computer. • No there is never a computer available.	**V7** 1 2 3	**TA**	**F**
Question 3 Do you make use of computer facilities on campus for your other University work (e.g. assignments, WebCT), apart from practical computer classes? • Yes • No	**V8** 1 0	**info**	
Question 4 If so, for what purpose do you make use of campus computer facilities, besides for practical computer classes? (You may mark more than one option) ❑ To read my email ❑ To access my WebCT course/s ❑ To browse the Internet ❑ To complete assignments ❑ To compile my own notes ❑ Not applicable	**V9** **V10** **V11** **V12** **V13** **V14**	**info**	
Question 5 Do you experience a sincere need for printing facilities on campus? • Yes • No	**V15** 1 0	**TA**	**F**
Question 6 If so, do you find it easy to find a printing facility on campus when you need one? • Yes, a printing facility is always available. • I find it difficult to find a printing facility. • No, I can never find a printing facility. • Not applicable.	**V16** 1 2 3 4	**TA**	**F**
Question 7 What is your gender? • Male • Female	**V17** 1 2	**info**	
Question 8 What is your age group? • Younger than 21 • 21-25 • 26-39 • 40 +	**V18** 1 2 3 4	**info**	

Question 9 Approximately how many times per week did you log on to your web-supported course? • Less than once per week (e.g. 3 times per semester) • 1 to 5 times per week • 6 to 10 times per week • More than 10 times per week	**V19** 1 2 3 4	**info**	
Question 10 What was the approximate duration of your online sessions? • 1 to 30 minutes • 31 to 60 minutes • 1 to 2 hours • More than 2 hours	**V20** 1 2 3 4	**info**	
Question 11 What Browser do you usually use? • Netscape 3.0 or less • Netscape 4.0 or later • Internet Explorer 3.0 or less • Internet Explorer 4.0 or later • Konqueror (Unix) • Mozilla (Unix) • Other Browser	**V21** 1 2 3 4 5 6 7	**info**	
Question 12 What type of technical difficulties did you experience? (You may mark more than one option) **TD** ❑ None **0** ❑ Slow Internet access ❑ UP network/server being down **1** ❑ My Internet service provider being down ❑ Logon/registration problems ❑ Too much material to download ❑ Attempted downloads were incomplete/aborted ❑ Lack of technical support ❑ Some links in the course did not work ❑ Other	**V22** **V23** **V24** **V25** **V26** **V27** **V28** **V29** **V30** **V31**	**TA**	**F**
Question 13 How often did you experience technical difficulties of any sort? • Less than once per week (e.g. 3 times per semester) • 1 to 5 times per week • 6 to 10 times per week • More than 10 times per week	**V32** 1 2 3 4	**TA**	**F**
Question 14 How long did it take for technical problems to be solved? • Half a day • 24 hours • 2 - 6 days • 1 week or longer • Never solved	**V33** 1 2 3 4 5	**TA**	**F**
Question 15 To whom did you go to with your technical difficulties? (You may mark more than one option) ❑ My lecturer ❑ The Telematic Learning and Education Innovation personnel ❑ Support at Student Online Services ❑ My fellow students ❑ Client Service Centre	**V34** **V35** **V36** **V37** **V38**	**info**	

Question 16 If you received the standard Welcome Student CD-Rom, what is your opinion of it? • It's great. • It's reasonable, but needs improvement. • It's poor. • Not applicable.	**V39** 1 2 3 4	**ES**	**F**
Question 17 Consider the student orientation / training session for WebCT. (You may mark more than one block) ❑ The session equipped me sufficiently to participate in my web-based course. **TS** **0** ❑ I could not logon during the session. ❑ I was still confused after the session. **1** ❑ I feel my basic computer skills are inadequate. ❑ I think more student orientation is required. ❑ I did not attend the session. ❑ There was no orientation session for my WebCT course.	**V40** **V41** **V42** **V43** **V44** **V45** **V46**	**ES**	**F**
Question 18 I felt comfortable communicating via online communication tools. • Strongly disagree • Disagree • Agree • Strongly agree • I don't know / Not applicable	**V47** 1 2 3 4 5	**CT**	**S**
Question 19 Web-supported communication helped me to express myself more than I would have in a traditional classroom. • Strongly disagree • Disagree • Agree • Strongly agree • I don't know / Not applicable	**V48** 1 2 3 4 5	**CT**	**S**
Question 20 The lack of people's faces, voices and/or body language makes the learning experience impersonal. • Strongly disagree • Disagree • Agree • Strongly agree • I don't know / Not applicable	**V49** 1 2 3 4 5	**AD**	**F**
Question 21 I became frustrated because my classmates were slow to respond to my e-mail and/or discussion messages. • Strongly disagree • Disagree • Agree • Strongly agree • I don't know / Not applicable	**V50** 1 2 3 4 5	**AD**	**F**
Question 22 I learnt from the contributions made by other students. • Strongly disagree • Disagree • Agree • Strongly agree • I don't know / Not applicable	**V51** 1 2 3 4 5	**PL**	**S**

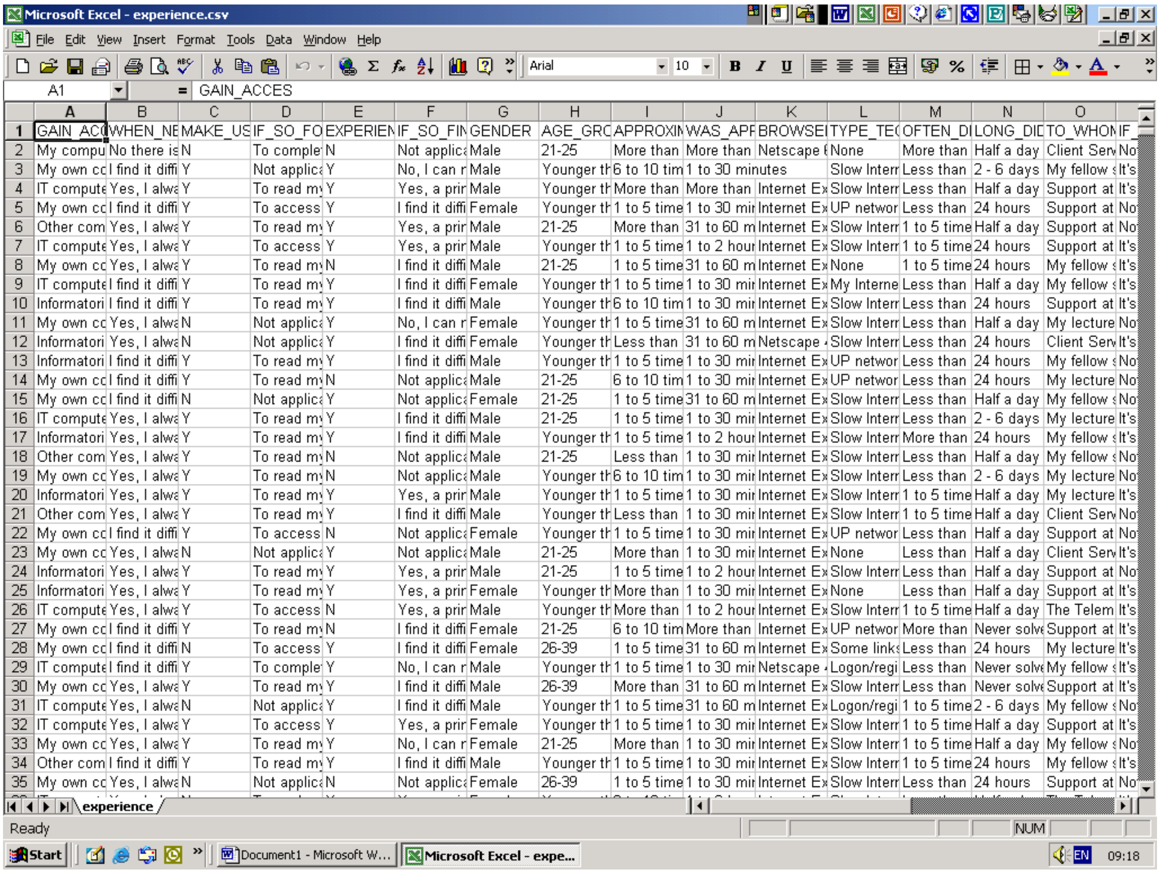
Question 23 Web-supported learning helped me to develop my ability to work as a team/group member. • Strongly disagree • Disagree • Agree • Strongly agree • I don't know / Not applicable	**V52** 1 2 3 4 5	**PL**	**S**
Question 24 Web-supported learning helped me to develop my ability to plan my own work. • Strongly disagree • Disagree • Agree • Strongly agree • I don't know / Not applicable	**V53** 1 2 3 4 5	**PL**	**S**
Question 25 I found the web-supported course to be an enriching learning experience. • Strongly disagree • Disagree • Agree • Strongly agree • I don't know / Not applicable	**V54** 1 2 3 4 5	**PL**	**S**
Question 26 I experienced feelings of annoyance and/or stress during this learning experience. • Strongly disagree • Disagree • Agree • Strongly agree • I don't know / Not applicable	**V55** 1 2 3 4 5	**AD**	**F**
Question 27 *(*transformed)* I found the opportunities for 'anywhere; anytime' learning convenient. • Strongly disagree • Disagree • Agree • Strongly agree • I don't know / Not applicable	**V56** 1 2 3 4 5	**AD**	**F**
Question 28 What were the positive aspects you experienced during your web-supported courses? (Please answer in point form and limit your response to a maximum of 4 points.) …………………………………………………………… …………………………………………………………… …………………………………………………………… ……………………………………………………………	**V57** **V58** **V59** **V60**		
Question 29 What were the negative aspects you experienced during your web-supported courses? (Please answer in point form and limit your response to a maximum of 4 points.) …………………………………………………………… …………………………………………………………… …………………………………………………………… ……………………………………………………………	**V61** **V62** **V63** **V64**		
Question 30 What suggestions can you make to improve your web-supported courses? (Please answer in point form and limit your response to a maximum of 4 points.) …………………………………………………………… …………………………………………………………… …………………………………………………………… ……………………………………………………………	**V65** **V66** **V67** **V68**		

Appendix D2: Data format, coding and transformation

Data format

Table D1 shows a sample of the raw Excel data in alphanumeric format, that was obtained from the student WebCT Experience questionnaire. The first step was to code the data numerically, as described below.

Table D1: *Raw data in Excel*



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	GAIN_AC(	WHEN_NE	MAKE_US	IF_SO_FO	EXPERIEN	IF_SO_FIN	GENDER	AGE_GRC	APPROXIN	WAS_APF	BROWSEI	TYPE_TE(	OFTEN_DI	LONG_DID	TO_WHON	IF_
2	My compu	No there is	N	To comple	N	Not applica	Male	21-25	More than	More than	Netscape (	None	More than	Half a day	Client Serv	No
3	My own co	I find it diffi	Y	Not applica	Y	No, I can r	Male	Younger th	6 to 10 tim	1 to 30 minutes		Slow Intern	Less than	2 - 6 days	My fellow s	It's
4	IT compute	Yes, I alwa	Y	To read my	Y	Yes, a prir	Male	Younger th	More than	More than	Internet Ex	Slow Intern	Less than	Half a day	Support at	It's
5	My own co	I find it diffi	Y	To access	Y	I find it diffi	Female	Younger th	1 to 5 time	1 to 30 mir	Internet Ex	UP networ	Less than	24 hours	Support at	No
6	Other com	Yes, I alwa	Y	To read my	Y	Yes, a prir	Male	21-25	More than	31 to 60 m	Internet Ex	Slow Intern	1 to 5 time	Half a day	Support at	No
7	IT compute	Yes, I alwa	Y	To access	Y	Yes, a prir	Male	Younger th	1 to 5 time	1 to 2 hour	Internet Ex	Slow Intern	1 to 5 time	24 hours	Support at	It's
8	My own co	Yes, I alwa	Y	To read my	N	I find it diffi	Male	21-25	1 to 5 time	31 to 60 m	Internet Ex	None	1 to 5 time	24 hours	My fellow s	It's
9	IT compute	I find it diffi	Y	To read my	Y	I find it diffi	Female	Younger th	1 to 5 time	1 to 30 mir	Internet Ex	My Interne	Less than	Half a day	My fellow s	It's
10	Informatori	I find it diffi	Y	To read my	Y	I find it diffi	Male	Younger th	6 to 10 tim	1 to 30 mir	Internet Ex	Slow Intern	Less than	24 hours	Support at	It's
11	My own co	Yes, I alwa	N	Not applica	Y	No, I can r	Female	Younger th	1 to 5 time	31 to 60 m	Internet Ex	Slow Intern	Less than	Half a day	My lecture	No
12	Informatori	Yes, I alwa	N	Not applica	Y	I find it diffi	Female	Younger th	Less than	31 to 60 m	Netscape 4	Slow Intern	Less than	24 hours	Client Serv	It's
13	Informatori	I find it diffi	Y	To read my	Y	I find it diffi	Male	Younger th	1 to 5 time	1 to 30 mir	Internet Ex	UP networ	Less than	24 hours	My fellow s	No
14	My own co	I find it diffi	Y	To read my	N	Not applica	Male	21-25	6 to 10 tim	1 to 30 mir	Internet Ex	UP networ	Less than	24 hours	My lecture	No
15	My own co	I find it diffi	N	Not applica	Y	Not applica	Female	21-25	1 to 5 time	31 to 60 m	Internet Ex	Slow Intern	Less than	Half a day	My fellow s	No
16	IT compute	Yes, I alwa	Y	To read my	Y	I find it diffi	Male	21-25	1 to 5 time	1 to 30 mir	Internet Ex	Slow Intern	Less than	2 - 6 days	My lecture	It's
17	Informatori	Yes, I alwa	Y	To read my	Y	I find it diffi	Male	Younger th	1 to 5 time	1 to 2 hour	Internet Ex	Slow Intern	More than	24 hours	My fellow s	It's
18	Other com	Yes, I alwa	Y	To read my	N	Not applica	Male	21-25	Less than	1 to 30 mir	Internet Ex	Slow Intern	Less than	Half a day	My fellow s	No
19	My own co	Yes, I alwa	Y	To read my	N	Not applica	Male	Younger th	6 to 10 tim	1 to 30 mir	Internet Ex	Slow Intern	Less than	2 - 6 days	My lecture	No
20	Informatori	Yes, I alwa	Y	To read my	Y	Yes, a prir	Male	Younger th	1 to 5 time	1 to 30 mir	Internet Ex	Slow Intern	1 to 5 time	Half a day	My lecture	It's
21	Other com	Yes, I alwa	Y	To read my	Y	I find it diffi	Male	Younger th	Less than	1 to 30 mir	Internet Ex	Slow Intern	1 to 5 time	Half a day	Client Serv	No
22	My own co	I find it diffi	Y	To access	N	Not applica	Female	Younger th	1 to 5 time	1 to 30 mir	Internet Ex	UP networ	Less than	Half a day	Support at	No
23	My own co	Yes, I alwa	N	Not applica	Y	Not applica	Male	21-25	More than	1 to 30 mir	Internet Ex	None	Less than	Half a day	Client Serv	It's
24	Informatori	Yes, I alwa	Y	To read my	Y	Yes, a prir	Male	21-25	1 to 5 time	1 to 2 hour	Internet Ex	Slow Intern	Less than	Half a day	Support at	No
25	Informatori	Yes, I alwa	Y	To read my	Y	Yes, a prir	Female	Younger th	More than	1 to 30 mir	Internet Ex	None	Less than	Half a day	Support at	It's
26	IT compute	Yes, I alwa	Y	To access	N	Yes, a prir	Male	Younger th	More than	1 to 2 hour	Internet Ex	Slow Intern	1 to 5 time	Half a day	The Telem	It's
27	My own co	I find it diffi	Y	To read my	N	I find it diffi	Female	21-25	6 to 10 tim	More than	Internet Ex	UP networ	More than	Never solve	Support at	It's
28	My own co	I find it diffi	N	To access	Y	I find it diffi	Female	26-39	1 to 5 time	31 to 60 m	Internet Ex	Some links	Less than	24 hours	My lecture	It's
29	IT compute	I find it diffi	Y	To comple	Y	No, I can r	Male	Younger th	1 to 5 time	1 to 30 mir	Netscape 4	Logon/regi	Less than	Never solve	My fellow s	It's
30	My own co	Yes, I alwa	Y	To read my	Y	I find it diffi	Male	26-39	More than	31 to 60 m	Internet Ex	Slow Intern	Less than	Never solve	Support at	It's
31	IT compute	Yes, I alwa	N	Not applica	Y	I find it diffi	Male	Younger th	1 to 5 time	31 to 60 m	Internet Ex	Logon/regi	1 to 5 time	2 - 6 days	My fellow s	No
32	IT compute	Yes, I alwa	Y	To access	Y	Yes, a prir	Female	Younger th	1 to 5 time	1 to 30 mir	Internet Ex	Slow Intern	1 to 5 time	Half a day	Support at	It's
33	My own co	Yes, I alwa	Y	To read my	Y	No, I can r	Female	21-25	More than	1 to 30 mir	Internet Ex	Slow Intern	1 to 5 time	Half a day	My fellow s	No
34	Other com	I find it diffi	Y	To read my	Y	I find it diffi	Male	Younger th	1 to 5 time	1 to 30 mir	Internet Ex	Slow Intern	1 to 5 time	24 hours	My fellow s	It's
35	My own co	Yes, I alwa	N	Not applica	N	Not applica	Female	26-39	1 to 5 time	1 to 30 mir	Internet Ex	Slow Intern	Less than	24 hours	Support at	No

Step 1: Data coding

In the Excel file, each row represents a respondent (from 1 to 4 650). Each column in the file is a variable (V1 to V68). For multiple choice items where only one response was allowed, it was easy to use the Excel Search and Replace function, for example:

> "Replace N with 0 and Y with 1."

In the case of multiple response items, i.e. where the respondent could mark more than one option, a programming statement was required to identify and replace particular alphabetic strings with the following:

- 0 if not marked or
- 1 if selected by a respondent.

Table D2: *Example of Excel programming statements to convert a multiple response item from alphabetic to numeric data*

```
Question 1: (You may mark more than one option)
How do you gain access to a computer?
     ❑ My own computer at home                  V1
     ❑ My own computer in the residence         V2
     ❑ My computer at work                      V3
     ❑ IT computer labs                         V4
     ❑ Informatorium computer labs              V5
     ❑ Other computer labs on campus.           V6
V1 = IF(ISERROR(SEARCH("My own computer at home",A2)),0,1)
V2 = IF(ISERROR(SEARCH("My own computer in the residence",
A2)),0,1)
V3 = IF(ISERROR(SEARCH("My computer at work",A2)),0,1)
V4 = IF(ISERROR(SEARCH("IT computer labs",A2)),0,1)
V5 = IF(ISERROR(SEARCH("Informatorium computer labs",A2)),0,1)
V6 = IF(ISERROR(SEARCH("Other computer labs on campus",A2)),0,1)
```

A sample of the coded data from the questionnaire is shown in Table D3, with the data in numeric format, with the exception of the text-based responses to the three open questions (V57 to V68):

Table D3: *Example of coded data*

1	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
2	0	0	1	0	0	0	3	0	0	0
3	1	0	0	0	0	0	2	1	0	0
4	0	0	0	1	1	0	1	1	1	1
5	1	0	0	0	0	1	2	1	0	1
6	0	0	0	0	0	1	1	1	1	1
7	0	0	0	1	1	0	1	1	0	1
8	1	0	0	0	0	0	1	1	1	0
9	0	0	0	1	0	0	2	1	1	1
10	0	0	0	0	1	1	2	1	1	1
11	1	0	0	0	0	0	1	0	0	0
12	0	0	0	0	1	0	1	0	0	0

Step 2: Data transformation

The questionnaire contained several *multiple response* items, i.e. items to which respondents could select more than one response (for example, questions 1, 12 and 17). Such items generated multiple variables, in one case as many as ten separate variables per item (see question 12). In order for each questionnaire item to produce only one variable[2], it was necessary to transform the data from multiple response items into secondary data. That is, a single new variable was created for each multiple response item such that:

- 0 indicates low frustration;
- 1 indicates higher frustration.

Table D4 shows the example of transforming the six variables generated by question 1, into one binary variable, *Own Computer* (OC). The example is explained below the table.

Table D4: *Transformation of a multiple response item (six variables) into one binary variable*

```
Question 1: (You may mark more than one option)
                                                          OC
How do you gain access to a computer?
     ❑ My own computer at home                      V1
     ❑ My own computer in the residence             V2       0
     ❑ My computer at work                          V3
     ❑ IT computer labs                             V4
     ❑ Informatorium computer labs                  V5       1
     ❑ Other computer labs on campus.               V6

OC = IF (COUNTIF(A4:C4, "=1") >=1, 0, 1)
```

The initial coding for this item allocated 1 or 0 to *each* of the variables V1 to V6, depending on whether the student had respectively selected the option or not (see Table D2). In considering the entire item, selection of any of the first three options implies that the student has access to their own computer in *at least* one location (this

[2] This ensured that each item was weighted equally in its contribution to the frustration or satisfaction indices.

would imply a lower degree of frustration with respect to computer access). The last three options imply that the student does not have access to their own computer (this would imply a higher degree of frustration with respect to computer access).

Variables V1 to V3 (in cells A4, B4 and C4[3] for the first individual) were searched to find at least one '1'. If this was true, then the new variable *Own Computer* (OC) was set to 0 (low frustration). If no '1' was found amongst variables V1, V2 and V3, then it implies that the student does not have access to their own computer in any location. In this case, OC was set to 1 (high frustration). The same function was then copied to all rows (respondents) in the data file.

Similar transformations to secondary data were carried out for the other multiple response items:

- **Question 12:** Type of technical difficulties experienced.
  New variable 'Technical Difficulties' (TD):
  TD = 0 (low frustration) or TD = 1 (high frustration).
- **Question 17:** Student training session in WebCT.
  New variable 'Training session' (TS):
  TS = 0 (low frustration) or TS = 1 (high frustration).

[3] See the Excel programming statement given in Table D4.

Step 3: Data categorisation

Since the intention was to calculate a Frustration Index **(FI)** and a Satisfaction Index **(SI)**, questionnaire items were categorised as contributing to either student frustration or student satisfaction. Intermediate indices were calculated, in each of the questionnaire categories (the categories and indices are shown on the instrument: Appendix D1).

Table D5: *Categories contributing to the Frustration or Satisfaction indices*

Questionnaire category	Intermediate index	
• technical adequacy and technical support (**TA)**	Technical Adequacy Index **(TAI)**	**FI**
• educational support (supportive resources and training) **(ES)**	Educational Support Index **(ESI)**	**FI**
• affective domain (feelings and emotions of students) **(AD)**	Affective Domain Index **(ADI)**	**FI**
• interactivity (use of the communication tools in WebCT) **(CT)**	Communication Tools Index **(CTI)**	**SI**
• perceived learning (**PL)**	Perceived Learning Index **(PLI)**	**SI**

Frustration Index:	FI = TAI + ESI + ADI
Satisfaction Index:	SI = CTI + PLI

After coding and transformation, the Excel data file contained the variables and indices shown in the following tables. Table D6 shows the variables contributing to the Frustration Index and Table D7 shows the variables contributing to the Satisfaction Index. A legend giving details of the variables, is given below each table.

Table D6: *Categories contributing to the Frustration Index (FI)*

TA OC	TA V7	TA V15	TA V16	TA TD	TA V32	TA V33	**TAI**	ES V39	ES TS	**ESI**	AD V49	AD V50	AD V55	AD V56	**ADI**	**FI**
0	3	0	0	0	4	1	**8**	0	1	**1**	0	1	1	4	**6**	**15**
0	2	1	3	1	1	3	**11**	2	1	**3**	1	0	0	2	**3**	**17**
1	1	1	1	1	1	1	**7**	1	1	**2**	2	3	3	2	**10**	**19**
0	2	1	2	1	1	2	**9**	0	1	**1**	3	0	2	2	**7**	**17**
1	1	1	1	1	2	1	**8**	0	1	**1**	2	2	3	1	**8**	**17**
1	1	1	1	1	2	2	**9**	1	0	**1**	2	1	1	2	**6**	**16**
0	1	0	2	0	2	2	**7**	1	1	**2**	3	3	3	2	**11**	**20**
1	2	1	2	1	1	1	**9**	1	0	**1**	3	3	3	3	**12**	**22**
1	2	1	2	1	1	2	**10**	2	0	**2**	2	2	2	2	**8**	**20**
0	1	1	3	1	1	1	**8**	0	1	**1**	0	0	3	2	**5**	**14**
1	1	1	2	1	1	2	**9**	1	0	**1**	0	1	1	2	**4**	**14**
1	2	1	2	1	1	2	**10**	0	1	**1**	0	0	0	4	**4**	**15**
0	2	0	0	1	1	2	**6**	0	1	**1**	2	2	2	2	**8**	**15**

Legend:

TA = Technical Adequacy

TAI = Technical Adequacy Index

ES = Educational Support

ESI = Educational Support Index

AD = Affective Domain

ADI = Affective Domain Index

FI = Frustration Index (FI = TAI + ESI + ADI)

OC = Own Computer: binary data from multiple response Question 1:

- 0=low frustration, i.e. has own computer in at least one location
- 1=high frustration, i.e. does not have own computer at all

TD = Technical Difficulties: binary data from multiple response Question 12:

- 0=low frustration, i.e. no technical difficulties experienced
- 1=high frustration, i.e. technical difficulties of various types were experienced

TS = Training Session: binary data from multiple response Question 17:

- 0=low frustration, i.e. the student felt sufficiently equipped
- 1=high frustration, i.e. the student did not feel sufficiently equipped

Table D7: *Categories contributing to the Satisfaction Index (SI)*

CT V47	CT V48	CTI	PL V51	PL V52	PL V53	PL V54	PLI	SI
1	4	5	3	4	0	0	7	12
3	0	3	0	0	0	0	0	3
4	2	6	2	2	3	3	10	16
3	2	5	0	2	0	0	2	7
4	3	7	3	3	4	4	14	21
3	3	6	3	3	4	4	14	20
3	3	6	3	3	3	3	12	18
3	3	6	3	3	3	3	12	18
3	2	5	3	2	3	3	11	16
0	0	0	0	0	3	3	6	6
3	4	7	4	4	3	3	14	21
0	0	0	3	0	0	0	3	3
3	3	6	3	3	3	3	12	18

Legend:

CT = Communication Tools

CTI = Communication Tools Index

PL = Perceived Learning

PLI = Perceived Learning Index

SI = Satisfaction Index (SI = CTI + PLI)

The frequency distributions and grouped frequency distributions were computed and plotted using S-PLUS. The findings are given in chapter 4.

Step 4: Scale transformation

In some cases, when an item was expressed positively in the Frustration category, the data for that item was transformed so that the responses were consistently ordered from low to high levels of frustration. For example, three of the four affective domain (AD) items were clearly phrased in a way that implied frustration ("I became frustrated because my classmates were slow to respond to my e-mail and/or discussion messages"). The scale ranged from low frustration (Strongly disagree = 1) to high frustration (Strongly agree = 4), as shown in Table D8.

Table D8: *Scale for negatively expressed items in the Frustration category*

Frustration level:

Low $\longrightarrow$ **High**

1	2	3	4	5
Strongly disagree	Disagree	Agree	Strongly Agree	I don't know/ Not applicable

However, one of the affective domain items was phrased positively ("I found the opportunities for anywhere, anytime learning convenient"). The data for this item was therefore transformed, so that 'strongly disagree' became 4 implying high frustration and 'strongly agree' became 1, implying low frustration. This transformation is shown in Table D9.

Table D9: *Data transformation for positively expressed item in the Frustration category*

Original data:

1	2	3	4	5
Strongly disagree	Disagree	Agree	Strongly Agree	I don't know/ Not applicable

0

Transformed data:

1	2	3	4	5
Strongly disagree	Disagree	Agree	Strongly Agree	I don't know/ Not applicable

Frustration level:

Low $\longrightarrow$ **High**

Most of the items included an option 'I don't know / Not applicable' at the higher end of the scale (=5). Since such a response should not contribute to the calculation of either a Frustration or Satisfaction index, these scores were transformed to zero. Where appropriate, the 'I don't know / Not applicable' option was labeled as 'Uncertain'. The neutral option should appear logically in the centre of the scale rather than at the higher end of the scale, since the scale represents a monotonically increasing (or decreasing) level of agreement with the given statements. The graphs in chapter 4 therefore present the 'Uncertain' option in the centre of the distribution.

Appendix D3: Coding frame for open questions

V57: Positive aspects

1.	Convenience / ease of access / flexibility / ease of communication / anytime, anyplace, any pace / userfriendly
2.	Information clear and accessible / can review, repeat information / online if hard copy lost
3.	WebCT – good tools / easy to learn / efficient learning method
4.	Reference material – availability of library material / interesting articles / resources
5.	Good organization of syllabus / study guide / content / class notes
6.	Learnt from classmates / collaborative learning / team approach / group interaction
7.	Good facilitation of online sessions / feedback, encouragement from lecturer
8.	Electronic submission of assignments
9.	Electronic feedback (texts / assignments / results / marks / solutions)
10.	Self esteem / self confidence rose / independence / full potential / self discipline / time management
11.	Improved technical skills / computer literacy / searching information, internet
12.	Fast downloads / fast access / speed
13.	Challenging, exciting, enriching, new learning experience
14.	Other

V61: Negative aspects

1.	Technical problems / slow internet / slow network / slow downloads / downtimes of system / server problems / problems uploading
2.	Malfunctions / errors / illegible acrobat files / links not working / difficulties with attachments
3.	Inadequate response or feedback from lecturer / poor or infrequent online facilitation / inadequate (or no) interaction from lecturer
4.	Lecturer not informed / not prepared / outdated lectures / too little academic support from lecturer
5.	Slow updates / changes to web course e.g. marks, calendar, deadlines
6.	No exam papers / model answers available
7.	Expectations / explanations / instructions not clear
8.	Web facilities not used to full advantage
9.	Inadequate / incomplete course material / class notes not available / not on time / confusing / vague
10.	Too impersonal / face-to-face is better
11.	Difficulties with group dynamics – frustrating, members not pulling their weight, slow response from classmates
12.	AIS page problems / sources, references not available / not accessible
13.	Felt uncomfortable / frustrated
14.	Lack of knowledge / training / support for students
15.	Lack of access to computers and / or printers on campus
16.	Other

V65: Suggestions

1.	More powerful server / faster network
2.	More courses / lecturers should use WebCT
3.	Get lecturers to use it better / motivate lecturers / more interaction, feedback from lecturers / buy-in from lecturers / more encouragement / steering / guiding from lecturers
4.	More interaction from students
5.	Make better use of the tools / discussions / calendar
6.	Better technology skills for lecturers / students / more training in WebCT
7.	More assessment / quizzes / assignments / tasks / tests online
8.	After hours support / IT support / prompt solution of problems
9.	More frequent updating of marks / content / dates / groups
10.	Improve navigation / user friendliness
11.	Other

Appendix D4: Coding of open questions

Table D10: *Sample of coded responses to open questions*

Number	Student	V57	V58	V59	V60	V61	V62	V63	V64	V65	V66	V67	V68
1	2344	14	0	0	0	16	0	0	0	11	0	0	0
2	1808	3	4	14	0	16	0	0	0	11	0	0	0
3	2101	1	1	0	0	1	0	0	0	1	0	0	0
4	1255	2	2	4	0	16	0	0	0	11	0	0	0
5	237	1	0	0	0	16	0	0	0	11	0	0	0
6	4186	10	11	0	0	16	0	0	0	3	0	0	0
7	2330	2	13	10	0	8	8	5	0	5	5	0	0
8	293	1	0	0	0	1	5	2	16	11	11	0	0
9	4174	13	0	0	0	11	0	0	0	11	0	0	0
10	218	1	0	0	0	1	2	0	0	11	0	0	0

Legend:

V57: Positive aspects

V58-V60: More positive aspects[4]

V61: Negative aspects

V62-V64: More negative aspects

V65: Suggestions for improvements

V66-V68: More suggestions

Table D10 shows a sample of 10 coded responses to the three open questions. The respondents were invited to enter up to a maximum of four points per item. Since few respondents entered as many as four points per item, there was a high frequency of blank responses (coded as zero). These entries were excluded from the data analysis.

Before frequencies were calculated, the positive response variables (V57 to V60), the negative responses variables (V61 to V64) and the suggestions variables (V65 to V68) were respectively concatenated, thus producing three consolidated variables, each containing 400 responses.

[4] Space was allowed for a maximum of four points, each of which became a separate variable.

Appendix D5:

Items contributing to the Technical Adequacy (TA) Index

The Frustration Index (FI) was based on the contributing indices Technical Adequacy (TA), Education Support (ES) and Affective Domain (AD). This Appendix presents bar charts of the variables which contributed to the *Technical Adequacy* Index.

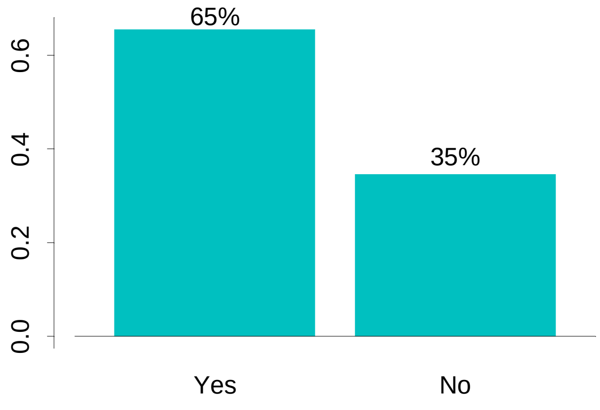
Evidence	Interpretation
	A fairly high proportion (65%) of respondents have their own computer, either at home, in the residence or at their place of work. The graph is approaching a reverse 'J' shape, but 35% of students experience frustration at not having their own computers.

Figure D1: Distribution of the 'Own Computer' variable (OC) (Question 1)

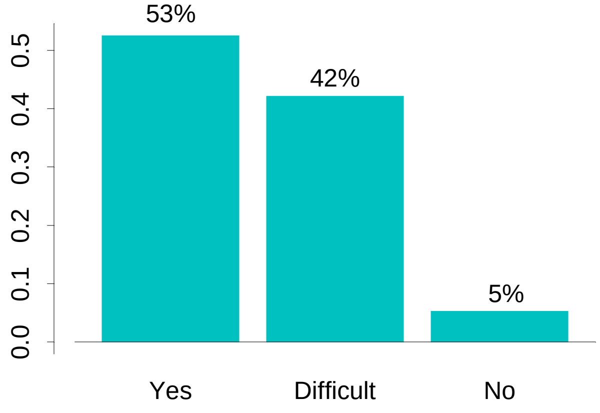
Evidence	Interpretation
	Approximately half the students (47%) experience moderate to high frustration due to the lack of access to computers on campus. Although only 5% experience high frustration (a good sign), the magnitude of the middle bar (moderate frustration) is to high.

Figure D2: Availability of computers on campus (Question 2)

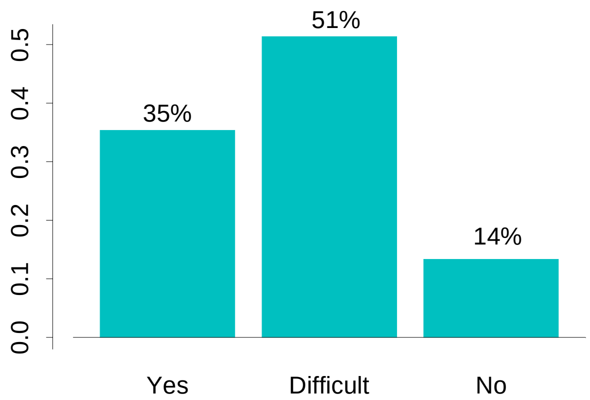
Evidence	**Interpretation**
	The graph shows that 65% of students who need to use printers on campus find difficulty or are not able to access a printer when they need one.

Figure D3: Availability of printers on campus (Question 6)

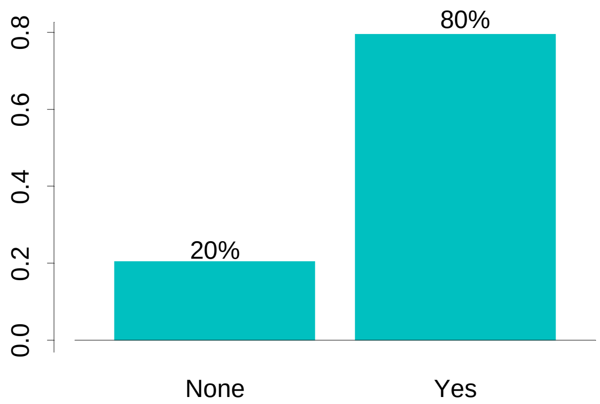
Evidence	**Interpretation**
	The graph shows that 80% of respondents are frustrated by experiencing technical difficulties of some sort[5]. This extent of technical difficulties is unacceptably high.

Figure D4: Technical difficulties experienced (Question 12)

[5] Question 12 list options for the type of technical difficulties experienced.

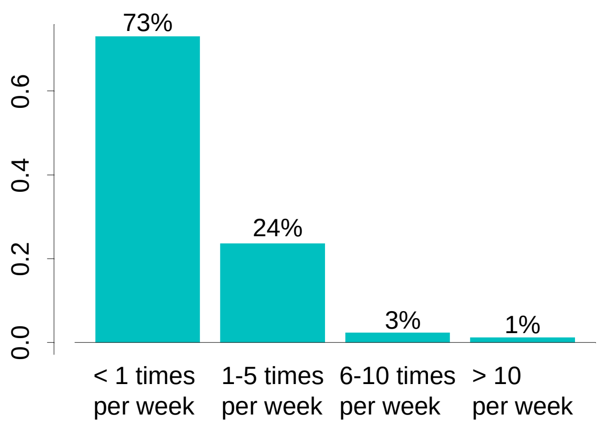
Evidence	Interpretation
	This graph exhibits the desired reverse 'J' shape. It is encouraging to note that 73% of respondents experienced technical difficulties less than once per week.

Figure D5: Frequency of technical difficulties (Question 13)

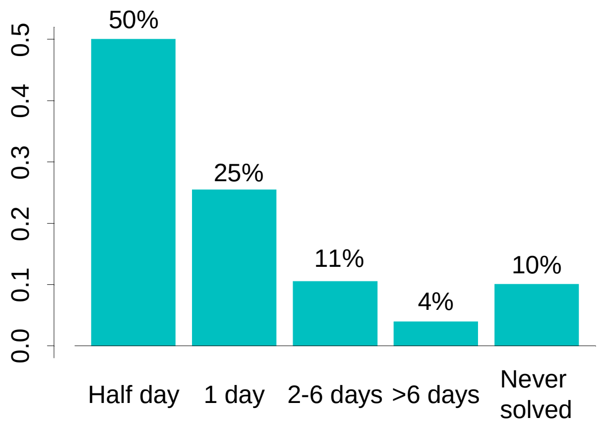
Evidence	Interpretation
	This graphs exhibits the desired shape, with the exception of the category 'Never solved'. The fact that 10% of technical difficulties are never solved is a cause for concern. This may indicate unsolvable system problems, problems beyond the skills of the technicians, or

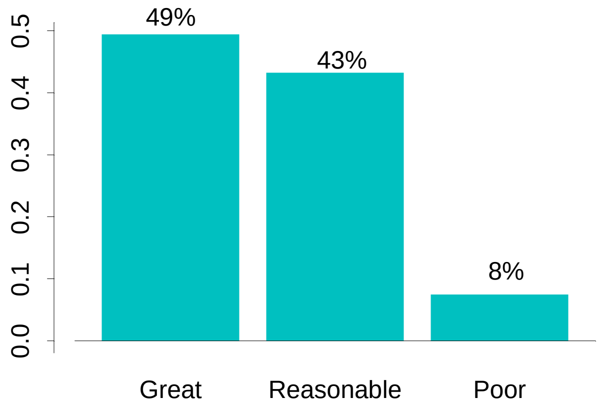
Figure D6: Time taken to solve technical difficulties (Question 14)

Appendix D6:

Items contributing to the Educational Support (ES) Index

The Frustration Index (FI) was based on the contributing indices Technical Adequacy (TA), Education Support (ES) and Affective Domain (AD). This Appendix presents bar charts of the variables which contributed to the *Educational Support* Index.

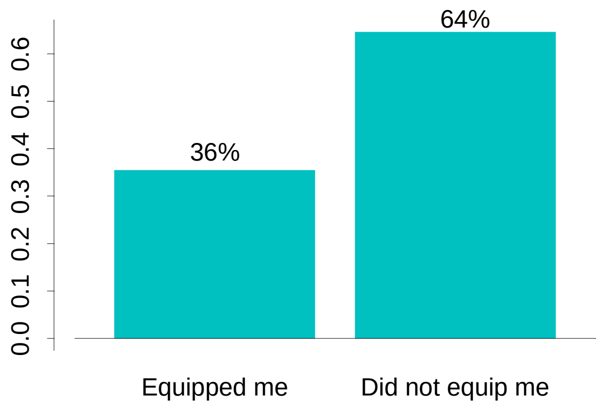
Evidence | **Interpretation**



Of the respondents who received the student support CD-Rom, only 49% think it's great. The support CD-Rom should ideally satisfy more than half the students using it.

Figure D7: Opinions of the student support CD-Rom (Question 16)

Evidence | **Interpretation**



It is a cause of concern that 64% of students who attended the WebCT training session were of the opinion that for various reasons[6], they were not equipped to participate in their web-supported course.

Figure D8: Opinions of the WebCT student training session (Question 17)

[6] Question 17 lists the type of problems experienced.

Appendix D7:

Items contributing to the Affective Domain Index (ADI)

The Frustration Index (FI) was based on the contributing indices Technical Adequacy (TA), Education Support (ES) and Affective Domain (AD). This Appendix presents bar charts of the variables which contributed to the *Affective Domain* Index.

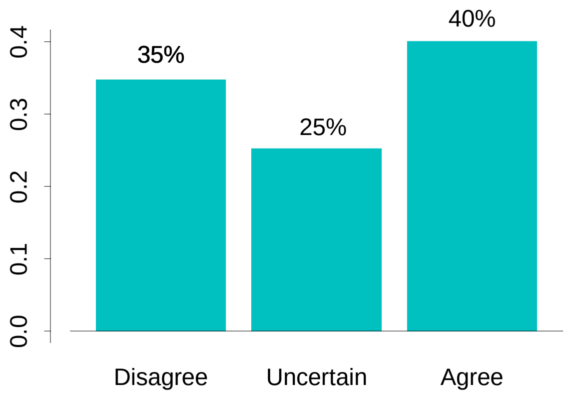
Evidence	**Interpretation**
	This graph shows that although a fair number of respondents disagreed that the web-supported learning experience is impersonal, there are still too many (40%) who agree with the statement.

Figure D9: The learning experience is impersonal (Question 20)

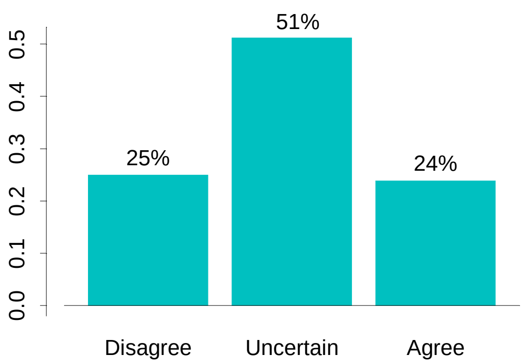
Evidence	**Interpretation**
	This graph reflects an equivalent number of respondents disagreeing as agreeing with the statement and too many in the 'Uncertain' category.

Figure D10: Slow response from my classmates (Question 21)

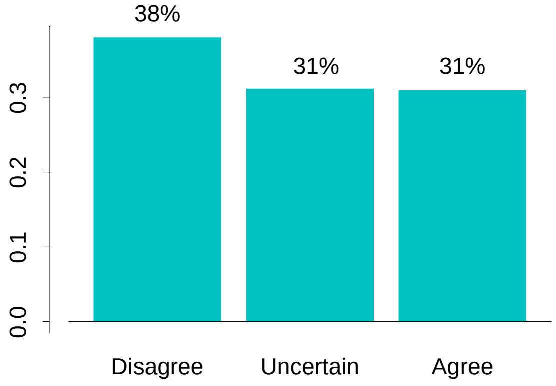
Evidence	**Interpretation**
	This graph is beginning to reflect a reverse 'J' shape; however there are still too many respondents (31%) agreeing with the negative statement, thus contributing to their frustration in the online environment.

Figure D11: Feelings of annoyance and/or stress (Question 26)

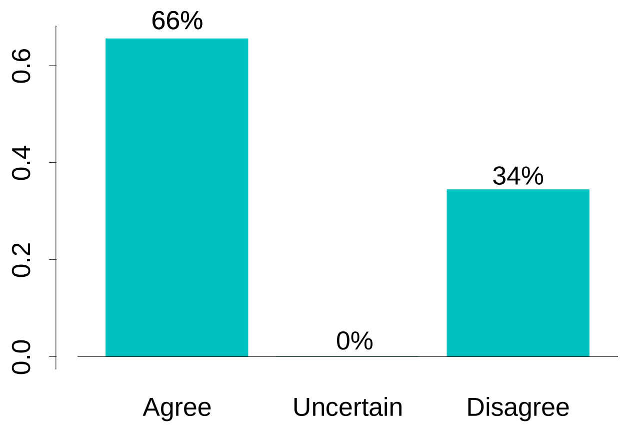
Evidence	**Interpretation**
	This statement is positively phrased, for which the scale on the horizontal axis has been transformed. Therefore we still expect a reverse 'J' shape, which is apparent in this graph. The number of respondents agreeing with the positive statement is reasonably high (only 66%).

Figure D12: Anywhere, anytime learning is convenient (Question 27)

Appendix D8:

Items contributing to the CommunicationTools Index (CTI)

The Satisfaction Index (SI) was based on the contributing indices Communication Tools (CT) and Perceived Learning (PL). This Appendix presents bar charts of the variables which contributed to the *Communication Tools* Index.

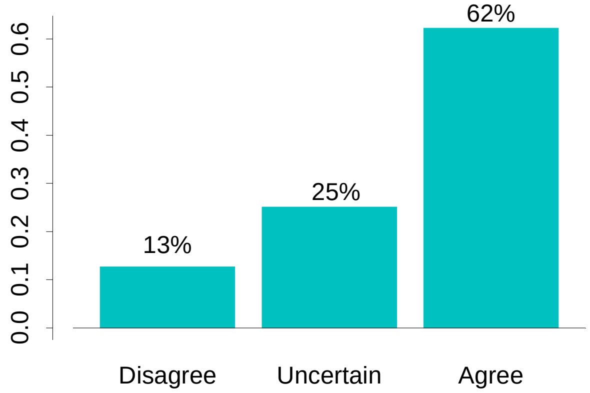
Evidence	**Interpretation**
	This graph exhibits a very nice 'J' shape, i.e. a small proportion of respondents (13%) disagreed with the positive statement and a large proportion of respondents (62%) agreed with it.

Figure D13: I felt comfortable communicating online (Question 18)

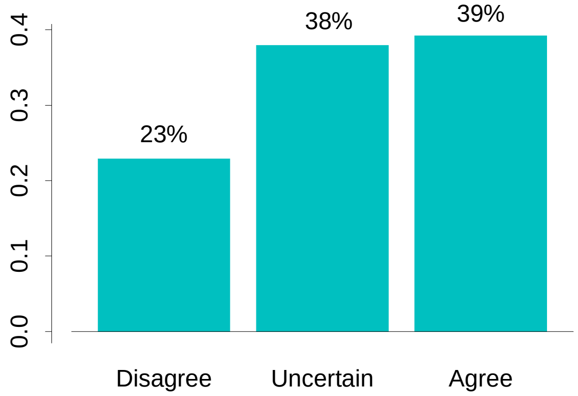
Evidence	**Interpretation**
	This graph exhibits an approximate 'J' shape, although the middle bar, i.e. the number of respondents who were uncertain, is rather high and the number of respondents who agree with the statement should be preferably be higher.

Figure D14: More self expression than in the traditional classroom (Question 19)

Appendix D9:

Items contributing to the Perceived Learning (PL) Index

The Satisfaction Index (SI) was based on the contributing indices Communication Tools (CT) and Perceived Learning (PL). This Appendix presents bar charts of the variables which contributed to the *Perceived Learning* Index.

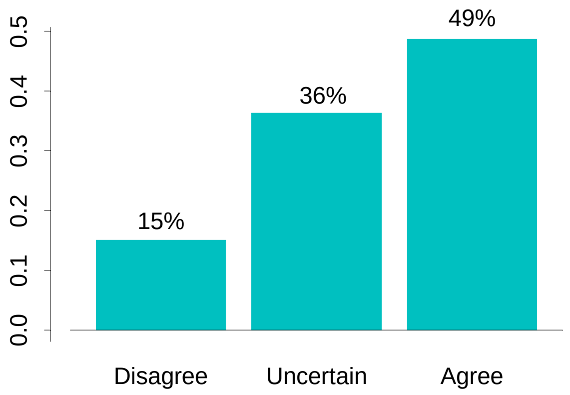
Evidence	**Interpretation**
	This graph exhibits a good 'J' shape, i.e. a small proportion of respondents (15%) disagreed with the positive statement and a larger proportion of respondents (49%) agreed with it.

Figure D15: I learnt from the contributions of other students (Question 22)

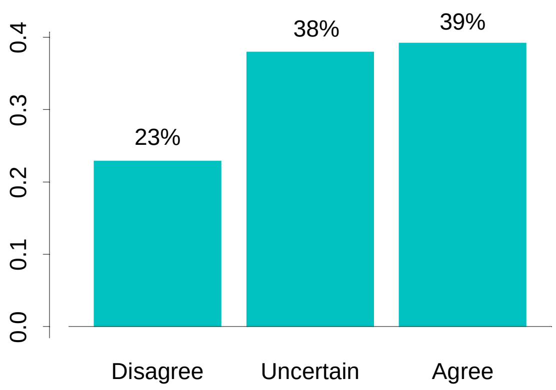
Evidence	**Interpretation**
	This graph also reflects a positive finding with respect to team work, although the 'Agree' category should preferably be higher. The central bar ('Uncertain') is rather too high.

Figure D16: Developed my ability to work as a team/group member (Question 23)

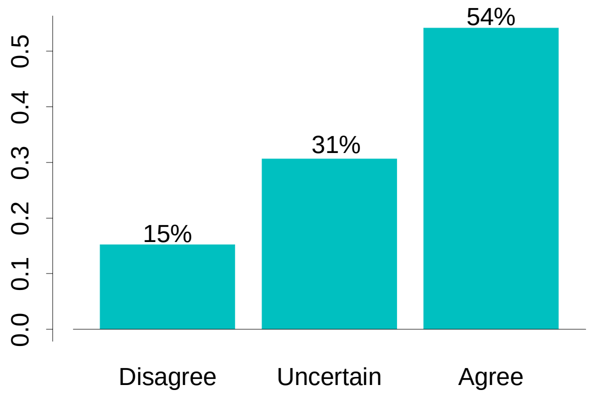
Evidence	**Interpretation**
	This graph exhibits an acceptable 'J' shape, with a good proportion of respondents (54%) agreeing with the positive statement.

Figure D17: Developed my ability to plan my own work (Question 24)

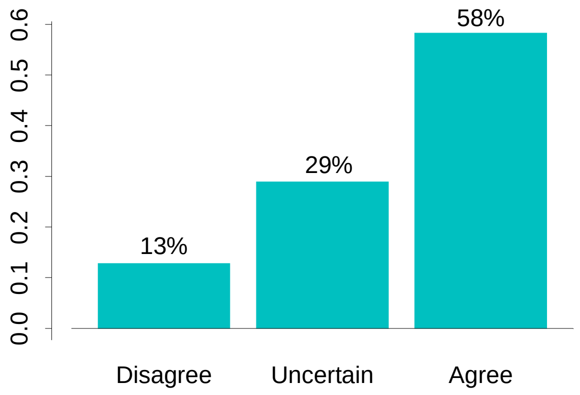
Evidence	**Interpretation**
	This graph also exhibits an acceptable 'J' shape, with 58% of respondents agreeing with the positive statement.

Figure D18: Web-supported learning is an enriching learning experience (Question 25)

APPENDIX E

Lecturer interviews:

E1: Lecturer Experience and Satisfaction interview schedule

E2: Samples of data from open questions

APPENDIX E

Lecturer Experience and Satisfaction Questionnaire

Using electronic media in teaching is a different process and experience from conventional face-to-face teaching in terms of changes to pedagogy and the adoption of ICTs. The commitment and willingness of academic staff to adopt e-learning enables the University to respond to growing demands from students for electronic access and to maintain and improve the quality of learning effectiveness.

Important factors contributing to the satisfaction of lecturers involved in e-learning are opportunities for effective online interaction with students with diverse backgrounds and interests, as well as opportunities for leadership, research, publications, recognition, collegiality and professional development (Lorenzo & Moore, 2002). Ongoing staff training and development are essential to ensure staff readiness for online teaching and ICT developments (Oliver, 2002).

Please contribute to our research by completing this survey to establish the extent of lecturer involvement and satisfaction with e-learning and the associated support services at the University of Pretoria.

Department:	
Programme:	
Delivery medium:	WebCT Multimedia
Project Leader:	
Date:	

Overall effectiveness of the WebCT course or Multimedia programme ("e-learning component")					
	Strongly disagree	**Disagree**	**Neutral N/A**	**Agree**	**Strongly agree**
In my opinion, the e-learning component adds value to the learning experience for students.					
The e-learning component promotes active learning / problem-based learning / learner-centered activities.					
I used the e-learning component to support me in my administrative tasks.					
I found that the e-learning component supported me in the facilitation of learning.					

Rank these online tools according to:	**Discussion**	**e-mail**	**Chat**	**Calendar**
• Frequency of **your** use of the tool: **0=never; 1=seldom, 2=monthly; 3=weekly; 4=daily**				
• Your opinion of the tool's usefulness: **0=useless; 1=supportive; 2=indispensible**				

My overall evaluation of the **worth** of this e-learning component in enhancing the teaching and learning experience:	**A Excellent**	**B Very Good**	**C Good**	**D Poor**	**E Unaccept-able**

What do you perceive as the **worth or value** of the e-learning component?

<table>
<tr><th></th><th>High Impact</th><th>Intermediate</th><th>Web Page Design</th><th>WebCT Designer</th><th>Facilita-tion of e-learning</th></tr>
<tr><td>Which WebCT or Facilitation training course/s did you attend?</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Did you attend each training course before, during or after you presented your module?
(b=before; d=during; a=after)</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="6">Learning outcomes</td></tr>
<tr><td></td><td>Strongly disagree</td><td>Disagree</td><td>Neutral N/A</td><td>Agree</td><td>Strongly agree</td></tr>
<tr><td>The e-learning component contributed to the achievement of subject specific learning outcomes.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="6">In what way?</td></tr>
<tr><td>The e-learning component provided meaningful assessment opportunities.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="6">In what way?</td></tr>
<tr><td>The e-learning component enhanced the learning experience due to instructional design features, e.g. activities, chunking, resources, interaction.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="6">In what way?</td></tr>
<tr><td colspan="6">Problems experienced</td></tr>
<tr><td colspan="6">What problems did you as a lecturer experience in the design and development of this e-learning component?</td></tr>
</table>

What problems did you as a lecturer experience in the **facilitation / presentation** of this e-learning component?
Benefits experienced
What benefits did you as a lecturer experience in the **design and development** of this e-learning component?
What benefits did you as a lecturer experience in the **facilitation / presentation** of this e-learning component?
Overall evaluation
Might there be lessons learnt from this implementation that could be shared for future use?
What effect or impact has this e-learning component had on teaching and learning in your department?

Quality of service from Department of Telematic Learning and Education Innovation and AIS						
In the interests of continuous improvement, please rate the service you received from the following units:						
Project Management	**A** **Excellent**	**B** **Good**	**C** **Satisfactory**	**D** **Poor**	**E** **Not applicable**	**F** **Unaware of service**
Education Consultancy	**A** **Excellent**	**B** **Good**	**C** **Satisfactory**	**D** **Poor**	**E** **Not applicable**	**F** **Unaware of service**
Instructional Design	**A** **Excellent**	**B** **Good**	**C** **Satisfactory**	**D** **Poor**	**E** **Not applicable**	**F** **Unaware of service**
Graphics	**A** **Excellent**	**B** **Good**	**C** **Satisfactory**	**D** **Poor**	**E** **Not applicable**	**F** **Unaware of service**
Information Service (AIS)	**A** **Excellent**	**B** **Good**	**C** **Satisfactory**	**D** **Poor**	**E** **Not applicable**	**F** **Unaware of service**
Other comments related to service and support provided for e-learning:						

Thank you.
We appreciate your time and commitment to the promotion of e-learning
and associated services at the University of Pretoria.

Appendix E2: Sample of data from open questions

Although open-endedness presents problems in analyzing the data, "an open-ended question can catch the authenticity, richness, depth of response, honesty and candour which are the hallmarks of qualitative data" (Cohen et al. p.255). This small scale pilot study invited honest and personal responses from participants in an attempt to probe the real experiences of lecturers participating in online teaching.

Samples of the data from the open questions is presented in the following categories, as per the questionnaire:

- problems experienced in design and development
- problems experienced in facilitation and presentation
- benefits experienced in design and development
- benefits experienced in facilitation and presentation
- overall evaluation and lessons learnt.

Problems experienced in design and development

Various problems in this area were reported by participants. Some of the more typical statements are listed in Table E1.

Table E1: *Problems experienced in design and development*

• The biggest problem is the human one: be up to date, motivate other lecturers, get students activated.
• Trying to keep everyone to the planned time schedule.
• Copyright problems for articles distributed on CD-Rom. Now students pay for paper-based readers – more under our control and bulk printing makes it cheaper for students.
• Problems with new platform (early 2004). Major frustration for students. Lecturer couldn't access WebCT for a month. Study materials were available very late and students were very frustrated by this delay.
• Scanning of articles at the library and quality of scanned material.

Problems experienced in facilitation and presentation

Some of the problems mentioned by respondents are listed in Table E2. Problems mentioned by two or three respondents are indicated by 'x2' or 'x3' respectively.

Table E2: *Problems experienced in facilitation and presentation*

- Students found it difficult to understand how to work through WebCT. Had to do refresher courses. Their knowledge of basic computer skills is lacking.
- Students don't start participating in time or frequently enough. (x3)
- Lecturers frustrated with changes on WebCT interface – franticness among students and lecturers. Induces unnecessary stress and some students quit the programme. You don't develop automaticity by frequent changes to the interface.
- Lack of lab access for students. (x2)
- Students complain about printing costs, especially undergraduates. (x2)
- Lecturers do the minimum - limited online facilitation. (x2)

Benefits experienced in design and development

Various benefits in this area were reported by participants. Samples of typical statements are listed in Table E3.

Table E3: *Benefits experienced in design and development*

- It refined my thinking and enhanced my organization and forward planning.
- Personal and professional development.
- Annual updates are easy now. System is now in place for the annual re-application for copyright permission.
- Support of the instructional design team at TLEI. (We'd never do it if we had to do it ourselves.)
- Better structuring of the learning material and stronger focus on outcomes. (x3)
- Quick to update, but students still make hard copies of earlier versions.
- Lecturers have begun to think on a higher level in their own subject area.

Benefits experienced in facilitation and presentation

Lecturers who use online learning effectively are aware of the way in which the electronic environment may enhance teaching and learning. Some of the benefits mentioned by participants in facilitating their online courses are listed in Table E4.

Table E4: *Benefits experienced in facilitation and presentation*

- An enormous saving in terms of time and money.
- Communication and speed.
- Sending information to all students at same time using discussion tool. Assignment tool invaluable. Putting presentations up onto discussion board saved costs. Allowed learners to experience something new and learn a new skill.
- If used properly, electronic sources can help foster a culture of independence and self-sufficiency among students.
- Upload learning material before or after contact session.
- Accessing student marks on WebCT – for lecturers and students.
- The ability to illustrate real world 3-dimensional examples.

The last two open questions asked about the overall evaluation of the e-learning component and lessons learnt. Typical examples of the feedback are given in Table E5.

Table E5: *Overall evaluation and lessons learnt*

- Definitely facilitates large groups administratively
- You can't do it alone – it's a team effort.
- The success depends on the perspectives of the lecturers and students.
- Can be far away and still experience quality education, especially the team experience.
- Train users in computer literacy before the start of e-learning. This warrants the investment in e-learning infrastructure and facilities.
- Do not change things that work – the roll-out of the new WebCT version and the disappearance of the upload function on the lecturers' portal are two examples.
- Reliability and access must be high. One negative experience can lead to resistance from students.
- Quality of teaching and learning was enhanced.
- Concern about 'dumping' material on the web with regard to the web-enablement targets set by management.

The categorization and interpretation of the data from the open questions is presented in chapter 4, section 4.3.2, together with review and reflection on the salient features.

APPENDIX F

Artifacts in the quality management system (QMS) for web-supported-learning

F1: Project Timeline

F2: Needs Analysis Checklist

F3: Template for a procedure

F4: Example of a completed procedure

F5: Sanity Checks (Boyd, 2003)

F6: Guiding Questions (Boyd, 2003)

F7: Minimum Requirements for web-supported courses

F8: Roles and Responsibilities

F9: Service Level Agreement with lecturers

F10: Quality Pledge

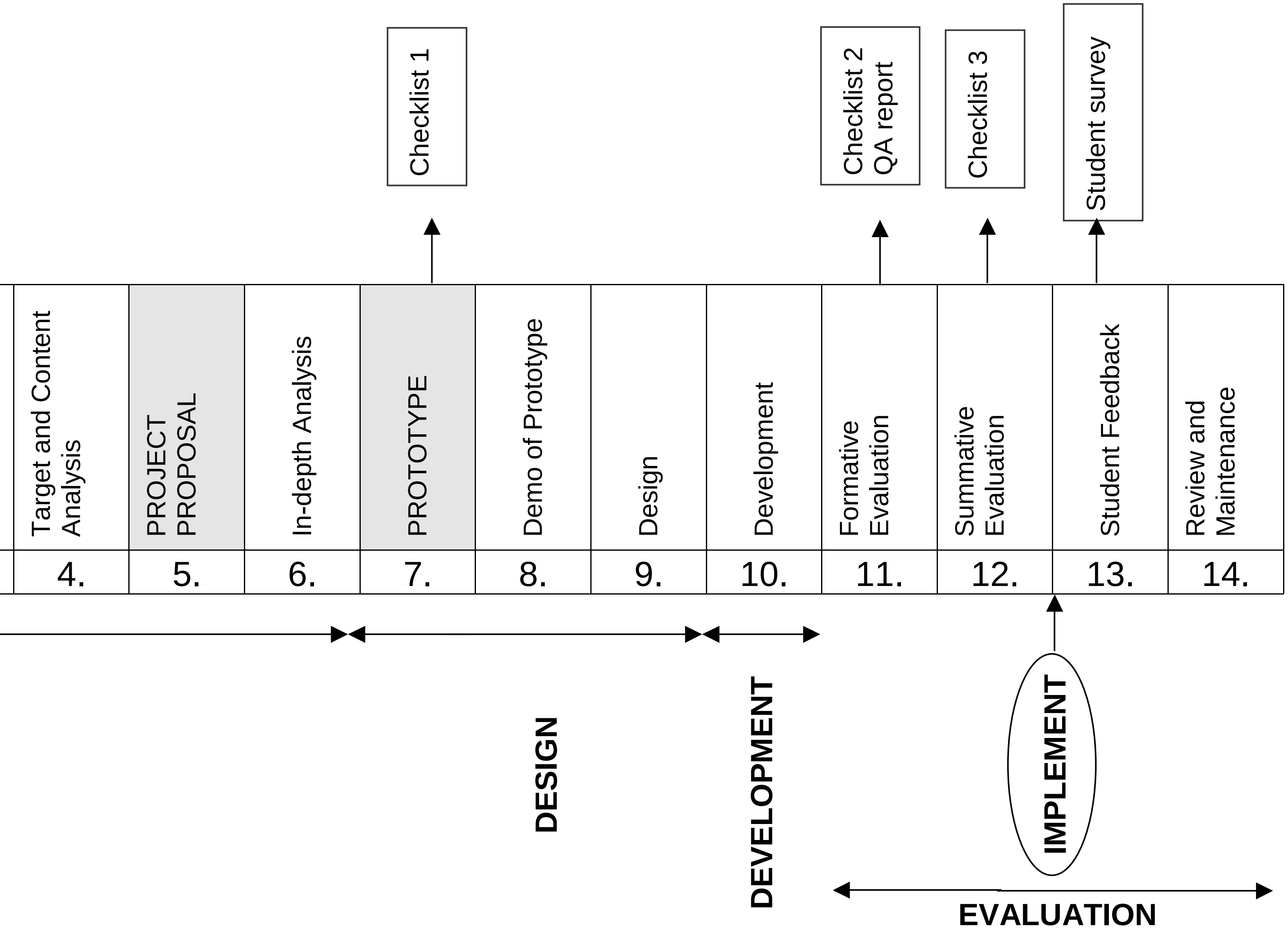
F11: Master Document List

APPENDIX F1

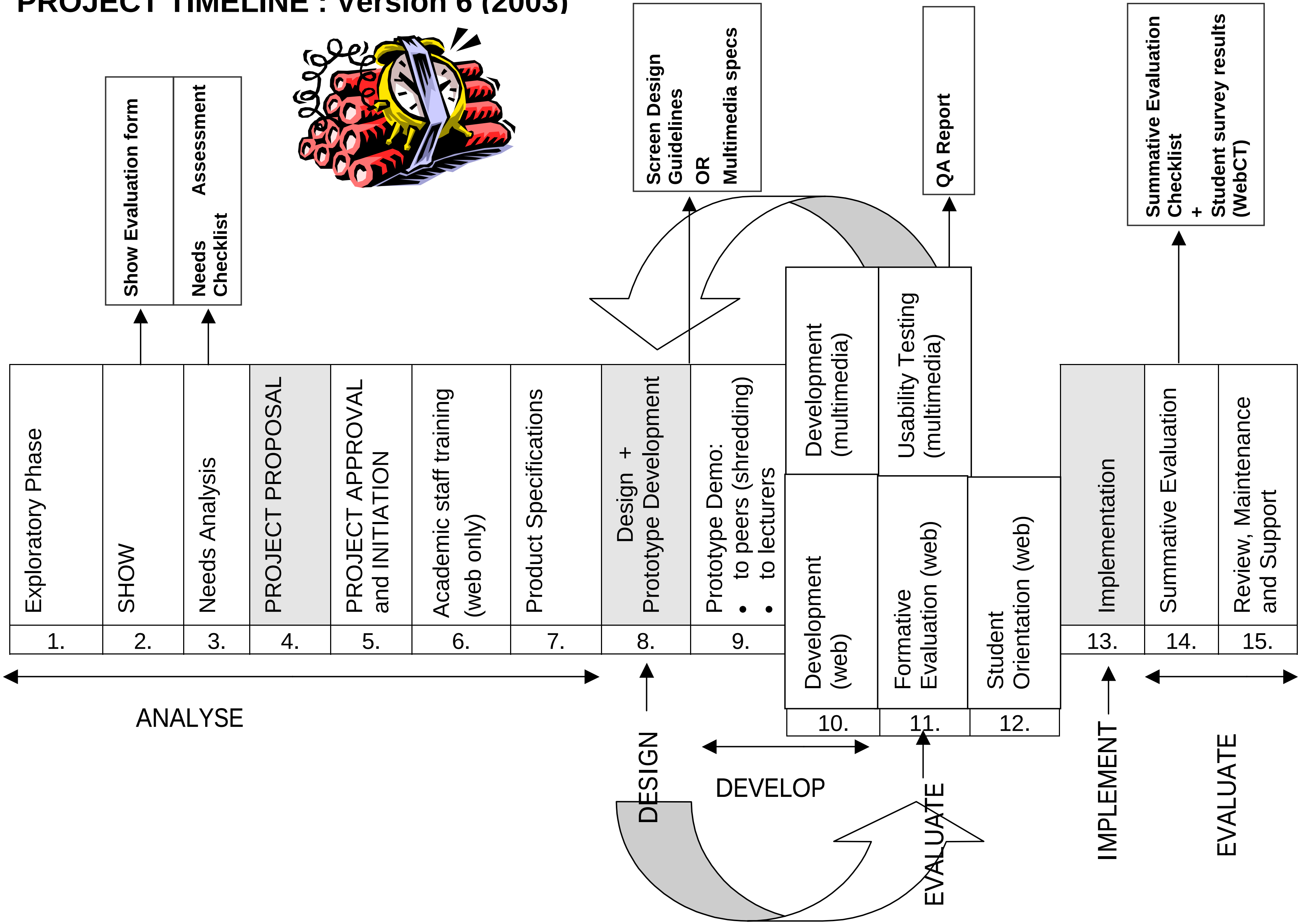
Project Timeline

- **Version 1 (Fresen, 2001)**
- **Version 6 (Instructional Design team, 2003)**

PROJECT TIMELINE : Version 1 (Fresen, 2001)



PROJECT TIMELINE : Version 6 (2003)



APPENDIX F2

Department of Telematic Learning and Education Innovation

Needs Analysis Checklist: E-Education Project

Please help us to define your needs and the scope of your proposed e-learning project, in order to ensure consistency, accuracy and comprehensiveness.

Department:		Date:	
Goal analysis			
Which programme / modules do you have in mind?			
What is / are the general goals / aims of your programme / modules?			
Overall Media analysis (programme level)			
Which delivery media **do you have in mind that could be meaningfully applied in this project?** *(Please mark with an X)*	Online (web-supported) learning		
	Multimedia CD-ROM		
	Resource CD-ROM		
	Video		
	Audio		
	Video conferencing		
	TV broadcasting (DSTV)		
	Paper-based materials		
	Computer-based testing		
How would you describe your learning model, i.e. teaching and learning strategy, assessment strategy, mix of delivery media etc.			

<table>
<tr><td colspan="2">What are your current method/s of teaching, e.g. lectures, tutorials, practicals, group work, etc?</td><td colspan="4"></td></tr>
<tr><td colspan="6">Target population analysis</td></tr>
<tr><td colspan="2">What are the approx. student numbers in these programmes / modules?</td><td colspan="2"></td><td>What is the average age of the students?</td><td></td></tr>
<tr><td colspan="6">Please characterise your students by completing the following table:</td></tr>
<tr><td>Undergraduate</td><td colspan="2">Postgraduate</td><td>Full time</td><td colspan="2">Part time</td></tr>
<tr><td>Urban</td><td colspan="2">Rural</td><td colspan="3">Language preference:</td></tr>
<tr><td>Computer literacy:</td><td colspan="2">Novice</td><td colspan="2">Average</td><td>Expert</td></tr>
<tr><td colspan="3">% with access to own computers:</td><td colspan="3">% with access to the Internet:</td></tr>
<tr><td colspan="6">Overall Task analysis</td></tr>
<tr><td colspan="2">What new knowledge and skills do your students need to acquire and how best may this be facilitated?</td><td colspan="4"></td></tr>
<tr><td colspan="2">What will the students be required to DO or how will they have to perform after this training intervention?</td><td colspan="4"></td></tr>
</table>

Thank you for completing this form

Appendix F3: Template for a procedure (Boyd, 2003)

TITLE

Insert full title here, e.g. Project Approval and Initiation Procedure

OVERVIEW

Write a few lines giving an overview of the procedure, so that readers can understand what the procedure is dealing with, and how it fits in with other procedures, before they read the whole document.

OBJECTIVES

The objectives of this procedure are to ensure that:

a) Write down the required standard of operation; what must be achieved in order for this section of work to be completed efficiently and effectively.
b)
c)

PROCEDURE STEPS

1. Write down the sequential list of activities which must happen in order to achieve the objectives.

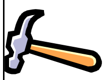
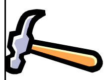
   - What documents are the inputs to this procedure?
   - What happens to them next?
   - Who does what?
   - What are the outputs of this procedure?
   - Are there any meetings held and if so what is their purpose?
   - What supporting documentation, standards or guidelines are referred to?
   - Where are all the documents filed? Are they held physically or electronically?

   When documenting procedure steps it is useful to consider Rudyard Kipling's 'six good serving men – their names are WHO, WHAT, WHERE, HOW, WHY and WHEN'. When referring to people, use the job titles rather than individual names.

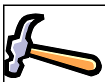
RESPONSIBILITIES

	TLEI	Academic Department
1. Complete the table showing the major procedure steps and who is responsible. This table should make it clear where responsibilities lie.	Use job titles e.g. Project Manager Instructional Designer Education Consultant Graphic Designer AIS Information Specialist	Use job titles e.g. Project Leader Lecturer/s
2.		
3.		
4.		

SUPPORTING DOCUMENTS & OUTPUTS

<table>
<tr><th>SUPPORTING DOCUMENTS</th><th>OUTPUTS</th></tr>
<tr><td> List the supporting documents or inputs of this procedure. These could be:
outputs which were received from a previous procedure, e.g. a signed Project Proposal
blank supporting documentation such as checklists or forms which are completed during this procedure, e.g. a letter of Approval template
guidelines or information which is not changed during the procedure, e.g. tariff lists, guidelines for project proposals</td><td> List the outputs from this procedure, e.g. Approved Project Proposal, customised letter of approval, a completed checklist
For each item in this table, identify whether it is mandatory and must be produced (the hammer) or optional and down to individuals' discretion (the scales).</td></tr>
</table>

Key:

 Mandatory	Optional 

Appendix F4: Example of a completed procedure

TITLE

Design and Prototype Development Procedure

OVERVIEW

The design phase uses the output from the Product Analysis procedure and content received from the academic department, to develop a prototype that will be refined during the development phase. This prototype is used to demonstrate possible functionality, "look-and-feel" and usability of a proposed product for academic and peer approval.

OBJECTIVES

The objectives of this procedure are to ensure that:

a) The design of any product will add educational value to the learning experience.
b) The correct programming approach is selected:
   - Multimedia: to determine the strategies and coding that will be necessary in creating a multimedia,
   - WebCT: to determine which features of WebCT will be used.
c) Multimedia: A flowchart and storyboard are developed to specify the structure and sequence of the content.
   WebCT: A template is created to structure and sequence the content, and includes the correct tools to accommodate the needs specified by the academic department/s.
d) A graphic "look and feel" is developed that will suit the particular needs of the product.
e) A prototype is developed that will demonstrate the educational value added, the functionality and the proposed layout, navigation and structure of the final product. This prototype is then used as a first iteration for review by the academic department and e-education.

PROCEDURE STEPS

1. Decide on the authoring tool and programming approach to use.
2. Use the product analysis and content provided to develop a flowchart and storyboard / WebCT template for the product.
3. Use the product analysis and content provided to decide on applicable media and WebCT tools to incorporate in the prototype.
4. Contract (by email so that there is a record of the request) with the graphic division for the development of a "look and feel" for the product, if applicable.
5. Build the Prototype:
   a. Create a small shell to demonstrate navigation options and "look and feel" of the product.
   b. Demonstrate the educational value added by including an example of each envisioned element of the product, e.g. different question types available in a multimedia product, the use of the tools within WebCT, graphics, photo's and videos.

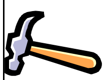
6. Complete the Multimedia Design Specifications document as far as is possible at this stage.
7. Share any new knowledge about good ways to do things with other instructional designers during the demo of the prototype (“shredding session”) – see Prototype Demonstration procedure.

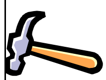
RESPONSIBILITIES

	TLEI	Academic Department
1) Development of flowchart and storyboard / WebCT template.	Instructional Designer Project Manager	
2) Decide on applicable media	Instructional Designer Project Manager	
3) Development of “look and feel”	Graphic Designer Instructional Designer	
4) Decide on the authoring tool and programming approach	Instructional Designer Project Manager	
5) Build the Prototype	Instructional Designer	Content specialist
6) Complete the Multimedia Design specifications document.	Instructional Designer	

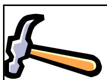
SUPPORTING DOCUMENTS & OUTPUTS

SUPPORTING DOCUMENTS	**OUTPUTS**


• Completed Instructional Design Toolkit
• Content from client
• Multimedia specifications document
  • WebCT templates for mini-proposals
  • Minimum requirements for WebCT portals
  • Minimum requirements for WebCT modules
  • Screen Design Guidelines for WebCT

• Design standards and principles for Multimedia
• Multimedia Evaluation Checklist
• Peer Evaluation Checklist (WebCT)
	
	• Start compiling multimedia specifications document
	• WebCT template (Full proposals)
	• Flowchart & storyboard (multimedia)
	• Prototype

Key:

 Mandatory	Optional 

Appendix F5: Sanity checks (Boyd, 2003)

QUALITY MANAGEMENT SYSTEM

SANITY CHECK FOR PROCEDURES

Why are we documenting procedures?

- To provide a defined framework for all role players to work together consistently along the entire Project Timeline
- To enable everyone, including new staff, to understand 'the way things are done around here'
- To identify together areas for improvement
- To provide an integrated and simple method to access and use supporting documentation e.g. checklists, forms, templates
- To ensure that the right tools are available to allow for comprehensive checks and to minimize errors
- To try and catch any errors as soon as possible before it's too late or too expensive to fix them
- To evaluate completed projects and help to assess their impact on teaching and learning at UP
- To learn lessons which may help to improve future projects
- To share more with each other about ways of doing things
- To demonstrate to any external stakeholders (eg auditors or UP management) that TLEI has a formal quality management system in place to control e-education projects

SANITY CHECK FOR CHECKLISTS

- What is the objective of this checklist?
- Do you use the checklist already or is it new?
- What is the feedback from using it in practice?
- Do you wish to change any of it?
- What do you do with all the completed checklists?
- Each checklist must be VALUE ADDED, ie do the people who use it thinks it adds value in practice?

Appendix F6:

Guiding questions to reflect on procedures (Boyd, 2003)

Here are some specific questions which could be raised when documenting each one of the procedures:

Procedure No 1a: Full Project Proposals (completed)

Procedure No 1b: Mini Project Proposals (completed)

Procedure No 2: Project Approval and Initiation (completed)

Procedure No 3: Academic Staff Training
How are academic staff sufficiently prepared for running effective telematic learning programmes?

Procedure No 4: Product Specifications
(used to be called 'In-depth analysis' on the Timeline diagram)
How do you create specifications for the product to ensure that requirements are accurately and comprehensively stated, according to the complexity and size of the modules or programme?

Procedure No 5: Prototype Development
How do you go about constructing a prototype? What are the objectives of a prototype? Do you need to use a Checklist to ensure that all aspects of the prototype development have been addressed? Do you wish to use or amend 'Checklist 1'?

Procedure No 6: Prototype Demonstration
How do you ensure thorough evaluation of the prototype? How do you document feedback from the client? Do you revise the product specifications if necessary?

Procedure No 7a & 7b: Multimedia and WebCT Design
Do you use a systematic way of designing the product, which is shared by everyone but adapted as required according to different situations (eg formulation and use of generic outcomes, or a WebCT template?)
Do you use other design conventions, standards or guidelines?
What are they and how do you access them?
How do you share new knowledge about good ways to do things?

Procedure No 8a & 8b: Multimedia and WebCT Development
Do you use a systematic way of developing the product, which is shared by everyone but adapted as required according to different situations?
Do you use other development conventions, standards or guidelines?
What are they and how do you access them?
How do you share new knowledge about good ways to do things?
What other standards are in place eg with regard to video, TV, photography and graphics?
Do you carry out 'peer reviews' to ensure that standards and guidelines are being correctly used?
Do academic departments or any other third parties ever supply components to be included in the final product (apart from raw content material)? If so, how do you ensure that this meets your required standards and guidelines?

Procedure No 9: Formative Evaluation and Usability Testing
Do you use a systematic way of testing and evaluating a product prior to implementation?
What testing method do you use and how do you record the results?
Do you test the product in all its different learning environments (field testing)?
How is the product evaluated by the academic department before acceptance?
What happens to all comments and results of the evaluation; how do you ensure that these are all taken account of?

Do you wish to use or amend Checklist 2, or write a new checklist?

Procedure No 10: Student Orientation
How are students sufficiently prepared for participating in a telematic programme?

Procedure No 11: Implementation
How is the final product approved or accepted by the academic department? Should there be a formal 'signing off' of the final product?

How is the completed and accepted product made available for live use on the Virtual Campus, ie what is the 'Go-live' procedure? What other replication, installation or delivery procedures are required?

Procedure No 12: Student Feedback
How are the student surveys constructed and carried out? What happens to the information supplied by students? How are statistics generated and how are they used? Are there any other methods of obtaining student feedback other than by using surveys?

Procedure No 13: Summative Evaluation
How do you evaluate the overall effectiveness of the product in optimising the learning experience? How do you take account of lecturer feedback about the product? How do you evaluate how well the product contributed to achieving the specified learning outcomes? Whose responsibility is this? Might there be lessons learnt from this implementation that could be shared for future use?

Do you wish to use or amend Checklist 3, or write a new checklist?

Procedure No 14: Review and Maintenance
Do you periodically review the product with the academic department?
How do you negotiate maintenance and enhancement work with the academic department?
Do you carry out maintenance and enhancement work using the same procedures and guidelines as for new systems?
How do you control the introduction of changes into live systems?

Procedure No 15: Project Management

How do you ensure that projects are kept on time according to the agreed timescales, as far as is possible? How are academic departments informed about progress of projects? What information must be maintained in order to sufficiently monitor a project? Where is this information held and who is responsible for keeping it up to date? What statistics are produced to illustrate departmental performance on projects, satisfaction of academic departments, etc?

APPENDIX F7

Minimum Requirements for web-supported courses:

Version 1 (TLEI team, 2001 onwards)

Minimum Requirements for Web-Supported Courses

The **study guide** must be submitted to the instructional designer both in hard copy and electronically (*.rtf or *.doc in MS Word). It may be sent either on disk or as e-mail attachment/s.

ORGANISATIONAL COMPONENT

0. Welcome

Minimum:

- Course title
- Course code
- Word of welcome / introduction
- Educational approach

Recommended:

- Description of the course
- Significance of the course within the programme
- Role of the student in self-directed learning

1. Lecturer's details

(OR Link to departmental homepage with the lecturer's information)

Minimum:

- Name of lecturer(s)
- Telephone & fax numbers
- E-mail address(es)

Recommended:

- Photo of lecturer(s)
- Subject(s) for which the lecturer(s) is/are responsible
- Consulting hours for students
- Qualifications

Optional:

- Research areas
- Titles of conference & journal papers
- Brief CV: Academic and professional experience

2. Schedule / Calendar

Minimum:

Overall course schedule (preferably per week) indicating *inter alia*

- Progress targets for students
- Dates for assignments
- Dates for contact sessions
- Dates for formal tests / examinations (if applicable)

3. Learning Resources

Minimum:

- Prescribed study material/s
- List of additional study material/s

Recommended*:*

- Links to applicable Internet sites
- *Pdf* documents (for example AIS scanned articles)
- *PowerPoint* slideshows

4. Learning Activities / Assignments

Minimum:

- List and description of all individual / group assignments
- Guidelines for structure, bibliography, layout, etc.
- Submission instructions (electronic or postal)

Recommended:

- List and description of other online learning activities, such as quizzes, self tests, student presentations, chat sessions etc.
- List and description of offline learning activities, such as practicals, tutorial sessions, interactive television etc.
- Does your instruction rate 6 stars?
  (Adapted from Dave Merrill: http://www.id2.usu.edu/5Star/Index.htm)

5. Assessment Policy

Minimum:

- Calculation of semester and year marks
- Policy on absence from tests / late submission of assignments
- Policy regarding academic dishonesty

Recommended:

- Assignment requirements: structure, technical, language, format
- Indication of grading for online participation, if applicable

6. Communication Tools

Minimum:

- List and description of communication opportunities
- Approach for using online tools (which tools and why?)
- Clarify frequency of online communication by lecturer

Recommended:

- Telephone
- WebCT e-mail or ordinary e-mail
- Discussions tool (sub-divided into topics)
- Chat rooms (optional for informal/social student exchanges?)

STUDY COMPONENT

7. Overall module specifications

Minimum:

- Purpose statement of the module
- Learning presumed to be in place
- Programme map / site map
- Critical cross field outcomes that are applicable to this module

8. Module structure

Minimum:

- Global list (or table) of themes which may be subdivided into study units
  For each Study Theme:
  - ☞ Specific learning outcomes (max 6)
  - ☞ Assessment criteria for each specific learning outcome
  - ☞ List of study units – title and appropriate study material/s
  - ☞ Self-study activities
  - ☞ Assignments for assessment

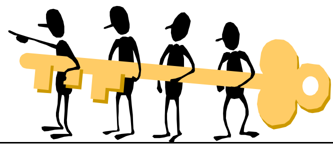
Optional: Glossary

APPENDIX F8

Roles and Responsibilities (Fresen, 2001)

Telematic Learning Projects

Roles and Responsibilities



Project Leader
(Academic dept.)

The Project Leader is usually the Head of Department or other senior staff member.
His/her responsibilities include:

- compile and submit the project proposal
- manage seed funds allocated to the project on approval of the proposal
- submit annual report on the use of the seed funds
- co-ordinate the submission of content from lecturers
- ensure the quality of the content
- ensure that agreed deadlines are met
- participate in evaluating and approving the prototype
- participate in the Quality Assurance team
- authorise attendance at staff training courses
- include student web orientation session in the programme for the first contact or registration session

Project Manager
(TLEI)

The Project Managers at TLEI take responsibility for different faculties. Their responsibilities include:

- promote the adoption of web-based learning
- present "shows" to interested departments
- initiate project meetings with the academic department
- provide project status reports to the project leader
- initiate internal project meetings
- circulate minutes of project meetings
- manage the overall progress of the project
- ensure that agreed deadlines are met
- participate in evaluating the prototype
- participate in the Quality Assurance team
- analyse student feedback

Lecturer/s
(Academic dept.)

The lecturer/s whose course is to be implemented on the Web has/have the following responsibilities:

- attend the Hi Impact WebCT training course
- redesign the course content and strategy in line with the minimum requirements for web-based courses
- edit all content for correct language usage
- source applicable online resources, such as online journal articles and internet sites
- submit hard copy and electronic versions of the final version of the study guide to the instructional designer
- liaise with the information specialist with respect to scanning of articles
- obtain copyright permission for the use of articles, images, photos, video clips, sound clips etc.
- liaise with the graphic artist and the instructional designer with respect to the graphics to be used and the "look and feel" of the course
- participate in evaluating the prototype
- participate in the Quality Assurance team
- be available to assist with student orientation sessions
- become a facilitator of online learning
- manage the communication, interaction and activities in the online course
- assume responsibility for entering grades, use of communication tools, posting messages and use of assignment and student management tools

Instructional Designer (TLEI)

There are eight instructional designers at TLEI.
Their responsibilities include:

- consult frequently with the lecturer/s
- report problems to project managers
- provide guidance and suggestions about the content, strategy and structure of the web based course
- design, develop and demonstrate the prototype
- participate in evaluating the prototype
- design and develop the course
- ensure that agreed deadlines are met
- follow quality assurance guidelines
- carry out ongoing formative evaluation
- participate in the Quality Assurance team
- implement changes, edits required after evaluation
- liaise with systems experts with respect to student registration, uploading course to production system
- organise and present student orientation sessions
- load student survey and download results
- carry out ongoing maintenance of the course according to negotiated delivery times

Educational Consultant (TLEI)

Educational consultants are based in the Education Innovation division of TLEI. Their services include:

- collaborate on education philosophy and learning models (macro design)
- provide assistance with the development of outcomes based curricula in compliance with SAQA requirements
- guide and support the lecturer in redesigning the content and structure of courses within a flexible learning environment
- advise on teaching and learning strategies
- advise on the design and development of assessment strategies and learning activities
- advise on the design of learning materials that optimise learner interaction and engagement therewith
- advise on techniques to enhance online communication between learners and facilitator and between learners
- provide relevant resources on teaching and learning theories, techniques and strategies

Information Specialist (AIS)

Information specialists at the AIS form part of the project team. Their responsibilities include:

- source applicable online resources, such as online journal articles and internet sites
- scan articles required by the lecturer and provide them to the Instructional Designer in pdf format
- create web pages for searching and referencing
- advise on reference techniques (for example, the Harvard Method)

Graphic Artist (TLEI)

There are four graphic artists at TLEI.
Their responsibilities include:

- consult with the lecturer, instructional designer and project manager
- ensure that agreed deadlines are met with regard to the development of graphics
- produce a concept design for the "look and feel" of the online course
- produce all the necessary graphics, banners, icons for the course

APPENDIX F9

Service Level Agreement with lecturers

University of Pretoria

TELEMATIC LEARNING AND EDUCATION INNOVATION

Service Level Agreement for Web-supported Courses

Introduction	The Department of Telematic Learning and Education Innovation (TLEI) strives to provide exceptional service to its users in academic departments. In order to meet expectations, it is necessary to reach agreement on the development process and mutual commitments.
Services	In addition to web-based and multimedia course development, the E-education division of TLEI offers graphic, video and photographic services. TLEI recommends that Departments make use of these services to ensure a high standard of quality.
Projects	TLEI can only allocate internal resources to projects where the required project proposal has been approved by the Steering Committee for Telematic Learning and Education Innovation. ☞ For details about the submission of project proposals, see http://www.up.ac.za/telematic/intranet/projects/projects.htm
Ownership	The ownership of a Telematic project resides with the Academic Department and therefore the Project Leader is usually the Head of Department or appointed senior lecturer.
Management of seed funds	The seed funds allocated by the Steering Committee to a project are managed by the Project Leader in the academic department. ☞ For details see http://www.up.ac.za/telematic/intranet/projects/projects.htm#funding
Project team	For each project approved by the Steering Committee a project team is appointed consisting of the following role players: • Project Leader (Head of Academic Department) • Project Manager (TLEI) • Lecturer/s • Instructional Designer (TLEI) • Educational adviser (TLEI) • Information specialist (AIS) • Graphic artist (TLEI) • Other support services, if necessary

Web Content Development

Study guide	• The final version of the course study guide, complying with our minimum requirements, is the source document for the initial HTML development of web-based courses.
Development time	• Allow **two weeks** for the development of the prototype after the **final** study guide had been submitted to TLEI, with the exception of the peak periods November to February and June to August each year, during which **four weeks** development time is required. • This development period may need to be extended for comprehensive courses including for e.g. a large volume of course content, interactivity, intricate navigation systems and scanned articles. • If the prototype is intended as a template for further modules, allow **one week per module** after the final version of each study guide has been submitted**.** • All development and QA should be scheduled for completion at least one week before the commencement of the course.
Formats	• Do not use styles, underlined text, colours, highlights, track changes, hyperlinks and strange fonts when preparing the study guide. • Specified fonts : Arial and Times New Roman. • Do not "Save as HTML" in Word. • Hyperlinks will be added by the web developer**.**
Instructions to the web developer	• Instructions to the developer should be submitted electronically in a separate document and must not be included in the study guide.
Graphic design	• Graphic work is completed simultaneously with the development of the web pages. • Evaluation of the prototype includes evaluation of the look and feel and general graphic design.
Services for the account of the Academic Department	• The Academic Department will be invoiced for the following services: o Commercial images from an image library o Scanning o Photography o CD reproduction o Video shooting and editing o Copyright clearance for video / sound clips used by TLEI in developing a product Price lists, which are updated bi-annually, are available from TLEI and Departments are required to familiarise themselves with the current price list.

Reproduction of CD-ROMS – Art work for the inlays	• The art work for the front and back inlays of the CD-ROM is discussed at the time of the evaluation of the prototype. • The graphic design section of TLEI will submit a concept design. • Reproduction of these inlays is outsourced and takes 5 working days after final approval of the design by the project leader.
Reproduction of CD-ROMS – duplication of CD-ROMS	• The graphic design section of TLEI will reproduce a maximum of 5 CD-ROMS for demonstration purposes. • Reproduction of more than 50 CD-ROMS is outsourced, and takes 4 working days from the time of the placement of the order to final delivery to TLEI. • In-house reproduction will take 3 working days once the Project Leader and Instructional Designer are satisfied that all the content is ready for the CD-ROM.
Quality Assurance	• Departments submitting video and photographic content which they have produced themselves must ensure that they comply with the standards documents produced by TLEI. • The Project Team is responsible for quality assurance of course design and development. • All interface design for web courses developed by lecturers themselves is subject to approval by the Project team. • The Project Leader is required to participate in the QA sessions and to sign off the QA report when the web course is acceptable. • After sign-off, the web course is transferred to the Virtual Campus, for live delivery to students. • Once the course is on the Virtual Campus, the content may not be changed during the semester, with the exception of dates and/or small errors.
Maintenance	• In the event that more than 6 HTML pages require editing, a reasonable time schedule must be negotiated with the Project Manager. • Smaller changes to content must be requested electronically in the following format, referring to either the study guide or the actual web page : Example Study guide <u>p.1 – par. 2.</u> Replace “workshop date to be announced” with “Workshop : 15 September 2000” OR Web page <u>Under Workshops : par 2.</u> Replace “workshop date to be announced” with “Workshop : 15 September 2000” • Handwritten changes will not be accepted. • An annual review of the course can be negotiated with the Project Manager.

Additional content	• A reasonable delivery date should be negotiated with the Project Manager in the event that additional content needs to be added to the study guide. • It is the lecturer's responsibility to inform students of additional material/changes via the Discussions Tool.
Facilitation of learning	• It is the lecturer's responsibility to facilitate the learning process and to ensure that communication takes place, making use of the communication tools in WebCT.
Marks	• It is the responsibility of the lecturer to add and release students' marks in the WebCT course.
Staff training in WebCT	• Lecturers are requested to attend at least the WebCT High Impact training course, offered once a month. • Advanced training in WebCT is available for those lecturers who wish to acquire WebCT Designer skills. • The online registration form is at http://www.up.ac.za/telematic/intranet/training/webct/registration.htm

APPENDIX F10:

Quality Pledge

University of Pretoria Department of Telematic Learning and Education Innovation

A VISION

To establish education excellence at the University of Pretoria.

B MISSION

TLEI leads, facilitates and participates actively in actions aimed at education innovation focussed on the establishment of flexible learning environments, to address the education needs of our clients.

C QUALITY PLEDGE

We undertake to implement our mission in a manner which takes into account the needs, knowledge, skills and attitudes of our clients, namely academic staff and students as well as external clients and stakeholders.

We commit ourselves to the delivery of services, products and systems which embrace the following principles:

1. Fitness for purpose
2. Client satisfaction
3. Cost effectiveness
4. Defined standards
5. Negotiated time frames
6. Continuous improvement of our processes and functions.

Approved and signed by all the staff of TLEI:

…………………………………….
DATE

APPENDIX F11:

Master Document List

TLEI QUALITY MANAGEMENT SYSTEM			
MASTER LIST OF PROCEDURES, FORMS AND CHECKLISTS at 7 AUG 2003			
Procedure No.	**Procedure Title**	**Current Version**	**Date**
1a	**Full Project Proposals**	Version 1	07-Aug-03
	Sample Project Proposal		
	Show Evaluation Form		
	Needs Assessment Checklist	Version 1	07-Aug-03
	Intranet - Tariff Lists		
	Intranet - Guidelines for project proposals		
	Intranet - Criteria for evaluation of proposals		
1b	**Online course registration procedure**	Version 1	07-Aug-03
	Intranet - Mini Project Proposal form		
	Letter of Approval template		
2	**Project Approval and Initiation**	Version 1	07-Aug-03
	Letter of Approval template		
	Intranet - Seed funds policy		
	Seed funds application form		
3	**Academic Staff Training (WebCT)**	Version 1	07-Aug-03
	(under control of presenters and CE@UP)		
4	**Product Analysis**	Version 1	07-Aug-03
	Instructional Design Toolkit		
	Preliminary schedule		
5	**Design and Prototype Development**	Version 1	07-Aug-03
	Multimedia Design Specifications		
	Minimum requirements for WebCT portals		
	Minimum requirements for WebCT modules		
	Screen design guidelines for WebCT		
	Design Standards and Principles		
	Multimedia Evaluation Checklist		
	Video Design Standards		
6	**Prototype Demonstration**	Version 1	07-Aug-03
	Design Standards and Principles		
	Screen design guidelines for WebCT		
	Multimedia Evaluation Checklist		
7a	**WebCT Development**	Version 1	07-Aug-03
	Screen Design Guidelines		
	Design Standards and Principles		
	Video Design Standards		
7b	**Multimedia Development**	Version 1	07-Aug-03
	Multimedia Design Specifications		
	Video Design Standards		
8a	**Formative Evaluation for WebCT**	Version 1	07-Aug-03
	QA Report		

8b	**Usability Testing for Multimedia**	Second Draft	07-Aug-03
	Consent Form		
	Online heuristic evaluation		
	Multimedia Design Specifications		
	Multimedia Evaluation Checklist		
	QA Report		
9	**Student Orientation**	Version 1	07-Aug-03
	WebCT training questionnaire		
10	**Implementation**	First Draft	23-Apr-03
	?		
11	**Summative Evaluation**	Second Draft	01-Aug-03
	WebCT Experience Survey		
	WebCT Course Specific Survey		
	Summative Evaluation Checklist		
12	**Review, Maintenance & Support**	First Draft	10-Mar-03
	?		
13	**Project Management**	First Draft	28-May-03
	Request for transfer of seed funds		