Evaluation of the use of an online learning management system at the Nelson R. Mandela School of Medicine, University of KwaZulu-Natal, Durban, South Africa.

Zanele Victoria Ndamase
Student Number: 201509243

A thesis submitted as partial fulfillment of the requirement for the degree of Master of Arts (Digital Media)

UNIVERSITY OF KWAZULU-NATAL

Supervisor: Professor Alan Amory
Co-supervisor: Ms Kathy Murrell

2006

Declaration

This research has been carried out as partial fulfilment of the requirement for the award of a degree of Master of Arts (Digital Media) in the Faculty of Human Sciences at the University of KwaZulu-Natal. I declare that this thesis is my own work that I have achieved through consulting various sources acknowledged here.

Zanele Victoria Ndamase
University of KwaZulu-Natal
Durban

Acknowledgements

This serves as conveyance of my innermost gratitude to all those who saw me through my efforts to reach this stage. They include the following:

- Professor Alan Amory for his tireless guidance, overwhelming insight, and considerate supervision.

- Ms Kathy Murrell for her kind and professional disposition as well as help in the structure and editing of this document.

- All the members of the Nelson R. Mandela School of Medicine for the cooperation they displayed during the period of my study. This particularly includes the 1st and 2nd year medical learners of 2002, and Ashni Balram, their mediator.

- My daughter, Gcina Cassandra Ndamase for her patience with me at a time I had to indulge her with love.

Abstract

This study investigates the use of a Web Based Learning environment to support a newly introduced Problem Based Learning curriculum at the Nelson R. Mandela School of Medicine.

Questionnaires, observations and interviews form the basis of this qualitative study amongst first and second year students. Attempts are made to interrogate the way in which staff members use the system to support a constructivist learning environment. In addition similar prior research at this institution is taken into account and reported in the literature review.

While not disputing the findings of earlier research the qualitative methodology used here shows some discrepancies with previous research. In particular, although learners are able to, and do, make use of the system it is predominantly used for the dissemination and retrieval of information. The basic premises of construction of knowledge are not facilitated by the Medical School's use of the Web Based Learning environment and of great concern was the small number of staff members who saw it as an integral part of the new curriculum and learning process.

Table of Contents

Table of Figures

Table of Tables

List of Acronyms

PBL	Problem Based Learning
ICT	Information and Communication Technology
CMC	Computer Mediated Communication
LE	Learning Environments
WBLE	Web Based Learning Environments
CTGV	Cognition and Technology Group at Vanderbilt
LGRS	Large Group Resource Sessions

Chapter One: Introduction

1.1 Introduction

The research reported in this document looks specifically at the use of online learning tools to support learners participating in a new Problem Based Learning (PBL) curriculum at the Nelson R. Mandela School of Medicine (henceforth referred to as "Medical School"), University of KwaZulu-Natal.

The Medical School has an interesting history in so far as it was the first medical school, during the apartheid years, in South Africa to target black African medical students. This was done in order to give access to people who would otherwise not be admitted to a medical school. To date it still adheres to this principle and its student demographics are broadly representative of the population demographics of the province who have a range of educational, language and cultural backgrounds. However, this selection of students has posed educational challenges for the faculty and much research has been done to ensure that the diversity of the student base does not adversely affect the learning and quality of graduates. Of particular relevance to this study is the preceding research conducted by Mars, Amory, Meyerowitz and Murrell who started off looking at the use of Computer Based Education, with a particular interest in the way cultural and educational background could influence the adoption of technology in teaching. (Amory, Mars and Meyerowitz, 1999; Murrell, 2001; Murrell and Meyerowitz, 2004). The introduction of the Internet led to a change in the way computers are used in education at the Medical School (McLean and Murrell, 2002).

At the time this research began, web supported learning was a relatively new phenomenon at the Medical School coinciding with the change of curriculum from a didactic and instructivist paradigm to PBL. The research reflected in the paper by McLean and Murrell (2002) was research conducted by 'early adopters' (Rogers, 2003) of the Internet as a technological intervention, this research project attempts to stand back from the involvement of innovation and reflect on the process as an outsider.

1.2 Objectives

There is currently great support for PBL in medical education (Camp, 1996; Schmidt, 1998) and the Internet, with its associated communication and delivery options, is sometimes lauded as 'revolutionary' as it opens new doors in educational processes (McLean and Murrell, 2002). However, although the Internet is seen as a tool that can enhance the experience of learners exposed to a PBL curriculum, concern has been raised over the implementation of PBL learning, and the use of technology in supporting it (Zemsky and Massy, 2004). Locally there appears to have been

rumblings amongst Medical School learners about the technology and its use as well as a general unease over the implementation of PBL at the Medical School (personal observation). This denotes a marked difference in what was being reported by the published research by McLean and Murrell, (2002) and it appeared necessary to investigate the issue further. This research specifically targets the question: "How well does the Web based learning environment, as it is employed at the Medical School, support the learners in the new PBL curriculum?".

In order to answer this question, a broad understanding of the differences between the 'old' instructivist method of teaching and the 'newer' PBL orientation needed to be analysed, and in turn put into the context of the Medical School with a review of how it was being implemented and supported by the web based learning environment. In particular it was important to ask:

- How do the Medical School staff and learners use the tools in the Web based learning management system to support the PBL philosophy?
- What are the opinions of the learners about the use of the system to support their learning?
- What are the opinions of the learners about the use of Computer Mediated Communication (CMC) tools to support their learning?

Should the research come up with new views, it was hoped that recommendations could be made to the Medical School course facilitators to enhance learners' experiences.

Chapter Two: Literature Review

2.1. Introduction

The change in educational philosophy at the Medical School involved a paradigm shift from an instructivist methodology to a constructivist approach. This required a radical change in the philosophical understanding of knowledge from a logical positivist attitude clinging to the concept of a 'universal truth' that is absolute and must be adhered to by the learner to an acceptance of the assumption that knowledge is 'constructed' by the learner based on previous knowledge and world views (Camp, 1996). Taking into consideration the general principle that one teaches the way one was taught (Felder, 1993) it can be argued that this change required a great leap for some facilitators in the Medical School. This leap forward is described briefly in highlighting the most influential paradigms that form a continuum from instructivist to radical constructivist educational paradigms.

Wilson and Cole (1996) give a time line of change in status of instructional psychology as:

1960 – 1975	1976 – 1988	1989 – present
Behaviourist (Instructivist)	Moves toward cognitive mainstream	Follows mainstream towards constructivist

Although it is usually argued that the educational philosophies form a continuum, others claim that there is place for both behaviourist and constructivist methods depending on the skills, knowledge and outcomes being addressed (Cronje, 2000).

2.2. Instructivist educational paradigm

The instructivist model is based on behaviourist theories of learning. This theory views learning as being exhibited by a change in behaviour (Good and Brophy, 1990). The process is instilled by a series of desired stimulus-response behaviours that are extrinsically motivated and reinforced by reward and punishment in a process known as operant conditioning (Hannafin and Rieber, 1989). Additionally, behaviourists view the brain as a 'black box' whose contents can be determined or observed by quantitative means (Good and Brophy, 1990).

Generally behavioural approaches include the mastery strategy of breaking down the material into small learning units that can be independently assessed and 'mastered'. It is often argued that this methodology encourages rote learning and memorisation, supported by drill and practice exercises (Adams, 2003). In academic terms this type

of learning can be said to support a 'regurgitation' of information in response to a question in a rote learning format.

Behavioural principles of learning are firmly established in some educational settings and can be considered useful for explaining some human behaviour, they are however limited in scope. For example, behaviourists do not pay much attention to internal mental processes and intrinsic motivation – they do not have explanations for self-directed learning as recommended by the proponents and theories behind PBL. Furthermore, it is argued that they do not lend themselves to transfer of knowledge to new and unique settings and do not foster concepts of life long self-directed learning (Hannafin and Rieber, 1989). Nonetheless, some researchers are of the opinion that behavioural characteristics of design do not pose problems if intended learning outcomes are the learning of vast amounts of factual information or low-level skills (Winn, 1993).

2.2.1. Methods used to support instructivist educational paradigms.

According to Hannafin and Rieber (1989), behavioural models of education would include objective specification, empirical testing, self-pacing, immediate feedback, controlled sequencing, small step-size, low error rates, prompting and confirmation. They explain that objective specifications are behaviours that should be exhibited by learners once they have mastered the task, the learning being controlled and sequenced in small steps by the instructor and the learners being subjected to regular empirical tests to ensure immediate feedback on mastery levels.

Typically, in a university setting this method is applied in a lecture situation that may or may not be supported by small group tutorials. The lecturer is the 'expert', and the 'dispenser of knowledge' (Resta, 2002) while the learner is perceived as the 'black box' that needs to be filled with information, often prompting critics to refer to the 'sage on the stage' method of delivery.

2.2.2. Technology used to support instructivist educational paradigms.

Computer delivered interventions to support instructivist learning include drill and practice exercises, multiple choice questions and answers, and artificial intelligent coaching mechanisms. Typically learners would work at computers on their own and master the skills required, only being permitted to move to the next level once mastery has been exhibited.

Computer based testing is often applied and is favourably looked upon as it alleviates the tedium of marking for the instructors, eliminates bias in marking strategies and can give quick and accurate feedback to the learners. However in real terms computer based testing can realistically only apply to multiple choice type questions and their variants such as drag and drop matching and fill in the blanks. Much of this

can be done in paper format and need not tie up scarce computer resources for the testing period. However, it must be noted that in medical education the exorbitant cost of printing high quality colour graphics that may be used in such a test can be used as a motivating factor to deliver the test via a computer network.

2.2.3. Criticism of instructivist paradigm.

Critics of this system claim that this method is characterised by the view that learning is:

- hard and tedious,
- based on a deficit model of the student which requires remedy, that the student must fit the system and not the system be changed to fit the student,
- perceived as a process of information transfer and reception with the emphasis on reproduction rather than production of knowledge,
- a solitary endeavour,
- facilitated by breaking content into small isolated and decontextualised units, and
- a linear process

(Resta, 2002: 16-17).

2.3. Cognitivist educational paradigm

In many ways the cognitivist paradigm can be said to straddle the divide between instructivist and constructivist education. Cognitivists differ from behaviouralists in that they argue that learning cannot be measured solely on a change in behaviour, but should also include changes in mental modelling of information, with an emphasis on information selection, perception, processing, and retrieval (Hannafin and Rieber, 1989: 94). Cognitive abilities are said to be about the structuring of mental processes, culminating in sophisticated thinking patterns that may or may not be observable. They are similar to behaviouralists in that they believe in an 'external' reality, the knowledge of which can be demonstrated, measured and assessed. More radical cognitivists see knowledge as a socially mediated but individual representation of external reality.

Jean Piaget is considered by many to be the founder of cognitivist educational theory. Whilst his research focused primarily on the intellectual growth and biological development of children and adolescents, he is equally acknowledged for his theory of cognitive structures in the development of knowledge (Bhattacharya and Han, 2001). These cognitive structures go through processes of adaptation, assimilation and accommodation as the person encounters new external events. This is explained by Bhattacharya and Han (2001) who state that humans possess mental structures that they use to make sense of the world. Interactions with external events are assimilated into the existing mental models, but if these events can not be accommodated then the mental model would be adapted to formulate a new

structure. This process has been taken up by the cognitive dissonance theorists such as Festinger who argue that "there is a tendency for individuals to seek consistency among their cognitions ... When there is an inconsistency between attitudes or behaviours ... dissonance occurs and ...something must change to eliminate the dissonance" (Kearsley, 2006: paragraph 1).

A branch of cognitivism, termed metacognition, was initially defined by Flavell, and refers to one's knowledge, control and monitoring of one's own cognition (Hsiao, undated). This metacognition includes thoughts about what is known and what is unknown, the ability to plot a way forward to get the missing information and knowledge, the best strategies to use to learn the information, the ability to identify errors and reflection on corrective strategies if necessary. Essentially it involves a means of making instinctive heuristic learning methods visible and modifiable.

2.3.1. Methods used to support cognitivist educational paradigms.

Different instructional methods would be used by a cognitivist educator depending on the perceived stage of cognitive development. Young adults, such as those attending undergraduate medical schools, would be presumed to be at a level where they could use formal operations defined by Bhattacharya and Han (2001) as the use of symbols related to abstract concepts. Accordingly they should be able to "think about multiple variables in systematic ways, ... formulate hypotheses, and think about abstract relationships and concepts" (Wood, Smith and Grossniklaus, 2001: 5-6). Cognitivist educators would assist students in identifying metacognition strategies that best match the discipline being studied and the individual's learning style.

Probably the most common form of cognitivist education environments can be found within cognitive apprenticeship. Taking its name from the traditional apprentice model, the process includes:

1. Modelling – where the expert carries out a task so that the novice can observe and build a conceptual model of the processes that are required to accomplish the task.
2. Coaching – where the novice attempts the task and the expert offers hints, feedback, modelling and reminders.
3. Articulation – where the novice articulates the knowledge, reasoning or problem-solving processes used in order to reveal the metacognitive strategies employed.
4. Reflection – on personal activities and knowledge as well as comparative reflection comparing one's own methodology with that of other novices or the expert
5. Exploration – taking the current skills and knowledge, and finding if they fit with other examples and disciplines.

Adapted from Conway (1997).

2.3.2. Technology used to support cognitivist educational paradigms.

Cognitivist educators recommend the use of tools that amplify, extend or enhance human capacities for work (Kozma, 1987). These can take the form of calculators, notebooks and dictionaries (Tobin and Dawson, 1992), or, with more specific interest to this study, the computer. Unlike other media, the computer is said to be able to transform, translate, calculate, sort, order, integrate and infer information (Kozma, 1987). Various general software applications can be used to facilitate these processes including general software such as word processors, databases, spreadsheets, email and others such as mind mapping software for graphical representation of concepts and hierarchies.

2.3.3. Criticism of cognitivist paradigm.

Criticism of the cognitivist paradigm generally centres around the application of the paradigm rather than with the concepts raised. For instance, Huitt and Hummel (cited by Bhattacharya and Han, 2001) claim there is usually an over estimation of student abilities in that few "high school graduates in industrialised countries obtain formal operations; many people do not think formally during adulthood".

Some people claim that it is difficult to apply this paradigm in situations where there is an extended audience as it requires individual user orientation, extra resources and effort (Tsapatsoulis, 2005). Radical constructivists would argue that the paradigm still rests too heavily on a positivist concept of reality and relies on a 'sage on the stage' delivery instead of a facilitatory 'guide on the side'.

2.4. Constructivist educational paradigm

A contrasting approach to education is given by Resta (2002: 19-21) where it is argued that learning

- is a natural and social process,
- is an active (not passive) process in which knowledge is produced rather than reproduced,
- can be linear or non-linear,
- is integrative and contextualised, and
- should be based on a strength model of student abilities, interest and culture.

Although not explicitly stated by Resta, this summarises a constructivist approach to learning that emerged from a variety of paradigms put forward by psychologists such as Dewey, Bruner, Piaget, von Glasersfeld and Vygotsky (Adams, 2003). Differences between these theoreticians occur when some place more importance on individual cognitive structuring and others on the socio-cultural influences on learning (Fosnot, 1996; Steffe and Gale, 1995).

According to Dalgarno (2001: 184) there are three broad principles that define the constructivist paradigm:

- Individual's construction of knowledge

  The fundamental principle attributed to Kant and later adopted by Dewey states that individuals construct knowledge from experiences, which naturally differ from person to person. In this regard, the move from cognitivism to constructivism is seen as a philosophical shift than a new psychological movement (Dalgarno, 2001). Dalgarno argues that constructivism rejects the cognitivist view that there is some objectively correct knowledge representation. Instead, constructivism advocates for individually constructed knowledge representations (Dalgarno, 2001) so that there is no single 'correct' representation of knowledge (von Glasersfeld, 1984). Learning rather becomes a result of personal meaningful interpretations of knowledge, building on individual experiences. Hence Adams (2003) sees constructivist learning as an interpretive (internally constructed), evolutionary (developmental) and socially mediated process by active learners who interact with the physical and social worlds. Constructivists believe that meaning-making ventures happen with cultural tools and symbols, as well as through cooperative social activity, discourse and debate. It is for that reason that constructivism entails the introduction of new ideas or cultural tools where necessary and the provision of support and guidance for the learners to make sense of these for themselves. Teaching from this perspective is also a learning process for the teacher (Driver, Asoko, Leach, Mortimer, and Scott, 1994).

- Individual's experience

  Along with the view that knowledge is not an external objective reality, but an interpretation of the world, the constructivist recognises the importance of prior experience and learning.

- Social context

  Vygotsky (1978) argued that learning occurs within a social context, and that meaning is made of the world within the social discourse and use of the tools within that social group. He also coined the term Zone of Proximal Development (ZPD) which is "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (*ibid*: 86). The emphasis being placed not so much on what you can do, but on what you can achieve with others, and that knowledge construction occurs best within an environment that allows collaboration (Reeves and Hedberg, 2003).

According to Fosnot (1996: 10), "rather than behaviours or skills being the goal of instruction, concept development and deep understanding [should be] the foci.." and assessment of learning within a constructivist paradigm should reflect this.

2.4.1. Methods used to support constructivist educational paradigms.

Course designs that foster constructivist educational principles include

- Creation of real-world environments that employ the context in which learning is relevant,
- Provision for multiple representations of reality to avoid oversimplification and represent the natural complexity of the real world,
- Focus on realistic approaches to solving real-world problems using authentic tasks such as real-world settings or case-based learning instead of predetermined sequences of instruction,
- The educator takes the role of a coach and analyser of strategies used to solve these problems and encourages thoughtful reflection on experience,
- A stress on the conceptual interrelatedness, providing multiple representations or perspectives of the content,
- Negotiating instructional goals and objectives rather than imposing them,
- Self evaluation and analysis, and
- Collaborative work, self and peer assessment supporting the collaborative construction of knowledge through social negotiation, not competition among learners for recognition.

(Johanssen, 1991; Reeves and Hedberg, 2003)

Most of these elements are found in various strategies such as Situated Learning, Anchored Instruction and Problem Based Learning.

Situated Learning

Collins (1988) defines Situated Learning as the notion of learning in contexts that reflect the way the knowledge and skills will be useful in real life. It places its emphasis on the significance of real life contexts in learning (Bransford, Sherwood, Hasselbring, Kinzer and Williams, 1992) and the activities should be a normal function in the context and culture in which they occur (Lave, cited in Brown, Collins and Duguid, 1989; Bednar, Cunnigham, Duffy and Perry, 1995).

The role of facilitators of situated learning is to ensure that learning tasks take place in an authentic environment in which learners can become immersed. According to Brown *et al* (1989) this involves: 1) Providing authentic contexts that reflect the way knowledge will be used in real life; 2) Providing authentic activities; 3) Providing access to expert performances and the modelling of processes; 4) Providing multiple roles and perspectives; 5) Supporting collaborative construction of knowledge;

6) Promoting reflection to enable abstractions to be formed; 7) Promoting articulation to enable implicit knowledge to be made explicit; 8) Providing coaching and scaffolding by the educator at critical times; and 9) Providing authentic assessment of learning within the tasks. Furthermore, tasks should be assigned in such a way that learners become involved in a 'community of practice' which embodies the beliefs and behaviours to be acquired. Lave and Wenger (1991) explain that as learning and involvement in the culture increase, the participant moves from the role of observer to fully functioning agent.

Anchored Instruction

Anchored instruction, developed by the Cognition and Technology Group at Vanderbilt (CTGV – 1993), addresses the problem of what they say Alfred Whitehead termed 'inert knowledge'. Inert knowledge is information that can be recalled when asked to do so, but is not used in problem solving even though it is relevant. They recommend that the learner and instructor create a learning environment (LE) that encourages exploration which revolves around an anchor; for example, a video clip that contains a complex problem. The aim is to share and encounter the same opportunities and problems as the 'expert'. As explained by CTGV (1993: np):

> "The design of these anchors was quite different from the design of videos that were typically used in education. Our goal was to create interesting, realistic contexts that encouraged the active construction of knowledge by learners. Our anchors were stories rather than lectures and were designed to be explored by the students and teachers. By placing the learner in an authentic LE, students were able to develop mental models of their experiences that related to real life situations".

Problem Based Learning

Problem based learning was first introduced by McMaster University in Canada in their medical education curriculum. According to the Samford University Center for Problem-Based Learning (2005: np) it was designed to alleviate "medical faculty and student frustration with the traditional lectures and challenging clinical experiences.. [as] [i]mparting and absorbing the immense amount of content inherent in a medical education was becoming more unrealistic and improbable".

Barrows and Tamblyn (1980) suggest that a problem serves as a focus or stimulus for the application of problem solving or reasoning skills, including information search or study of knowledge required to understand the mechanisms responsible for the problem and how it might be resolved. Additionally, Savery and Duffy (1995) indicate that PBL provides opportunities for learners to discuss the problem, to hypothesise, and to identify the relevant issues to be learnt through reflection. Thus PBL augurs well with diagnosing patient problems and then recommending treatment.

PBL is self-directed learning involving cognitive apprenticeship, and works well in a constructivist framework since the learner solves problems in relevant contexts and employs prior knowledge or schema (Savery and Duffy, 1995). Learners are involved actively in the construction of knowledge, and learning results from the process of working towards the understanding or resolution of a problem encountered first in the learning process (Kaufman, 1995).

The underlying rationale of PBL states that learners quickly develop a holistic view of the entire learning process and are continually made aware of the relevance of the individual studied subject disciplines to the problem at hand (Barrows and Tamblyn, 1980). It can thus be argued that PBL orientates learners towards meaning-making rather than fact-collecting, and that the dynamics of group work and independent investigation result in learners achieving higher levels of comprehension, developing more learning skills and more social skills (Schmidt, 1993).

2.4.2. Technology used to support constructivist educational paradigms.

There was not much place for constructivist education in the older Computer Based Training stand-alone programs except for times when they were used as part of an authentic task (e.g. using a spreadsheet to calculate or record measurements) or as a catalyst for an authentic task (e.g. display a problem via the system). However the advent of the Internet and email has greatly enhanced the capacity of Information and Communication Technology (ICT) in education as it provides a shared platform and communication links to a number of people and resources.

The web as a learning resource.

The web abounds with an enormous amount of information that is available at the click of a mouse button. Dalgarno (2001) states that constructivist tutorials offer opportunities to learners to follow and also to choose instructional sequences and materials using hypertexts and hypermedia. The learners would need to be selective and ensure that the material is sound, which is one of the higher learning tasks required in constructivist education. Web tutorials might include assessment tasks and discovery learning environments. However, there is also a cautionary note that learners sometimes report they 'get lost in hyperspace' (Dalgarno, 2001) and can suffer from 'information overload'.

As many libraries now have their catalogue systems online and journals are increasingly allowing readers to view their publications (even if only the abstracts) online, learners are able to access a much wider range of material than was previously available. An article in *The Times of Zambia* online (Mtonga, 2006: np) points out that the expense of medical education resources is high, but becomes increasingly so in "Third World countries where medical textbooks, journals and

teaching resources are unavailable and can only be sourced at great cost using expensive foreign currencies, bank charges, packing and freight costs". Mtonga (2006) goes on to say that the advances of medical science happen at "the speed of lightning" whilst "the University of Zambia Medical Library has so many old books it would easily pass for a museum of ancient medical literature" but thanks to the advent of a new high-speed internet connection "[g]etting information has never been made so easy ..[and] medical students can now access the very latest data". South Africa faces similar concerns although not to the same extent as Zambia.

Course facilitators can also use the web to store relevant information and in comparison with the older systems this does not require much computer expertise. Similarly, learners can create web sites to share their knowledge creation with peers and order their knowledge according to their own schema.

Computer Mediated Communication (CMC).

Although, technically, CMC describes the ways computer systems and networks are used to transfer, store and retrieve information (Berge, 1995) - with a particular emphasis on communication - it is now generally used to describe the use of computer conferencing options that transcend geographical and/or time barriers such as web video conferencing, chat sessions, email and discussion boards. According to Berge (*ibid*) these are examples of 'virtual social spaces' where language is used to communicate ideas and where learners engage in socio-cognitive language-based transactions such as generalising, hypothesising and inferring. Used correctly, online conversation can link social and cognitive goals through building group coherence, sharing information, refining communication skills and the provision of feedback (*ibid*).

Berge (1995) warns about different learning styles and notes that independence may be a hindrance to those learners who need more structure, and not all learners can express themselves well in writing. Davis and Denning (1998) state that isolation of individuals from face-to-face encounters might hide ignorance and deficiencies in knowledge, social roles or other disabilities. However, it could be argued that face-to-face encounters can disadvantage shy students, students with speech impediments, and those who prefer to take time to think about responses before participating in discussions. An additional advantage for educators using online discussions is that transcripts of these conversations can be analysed for the frequency of interaction, content of discussion and quality of expression and thinking allowing a range of assessment and diagnostic tools to be applied.

Online learning management systems.

There are a number of commercial and open source management systems available to help create online learning environments; for example WebCT, Blackboard, and

Moodle. Typically these applications allow for the management of students (registrations and tracking), course content, shared workspace (or online submission of assignments), communication options (including bulletin boards, chat rooms and email) and, sometimes, online testing.

A choice of online learning management systems is often dictated by a combination of cost of ownership (as opposed to initial set up cost, although this can be a factor) and the tools and flexibility available in the application[1]. Generally the system should support the educational paradigm used by the institution and allow flexibility so that individual modifications can be made for specific courses, lecturers and learning needs.

2.4.3. Criticisms of constructivist online learning paradigm.

Generally, criticisms of the constructivist learning paradigm rest in the concept propagated by radical constructivists that there is no such thing as objectively correct knowledge representation. More moderate thinkers state that there is a place for both objective instruction and constructivist knowledge creation, depending on the level of skills required (Ertmer and Newby, 1993).

According to The National Teaching and Learning Forum (2001: np) "[w]hat is frequently lacking, however, is a firm understanding of what knowledge construction really is, its relationship to course content, and how instructors should go about teaching it."

2.5. The argument to move medical education from an instructivist paradigm to a constructivist paradigm

The reasons given for moving the Medical School curriculum from a lecture based instructivist paradigm to a PBL curriculum are documented by Murrell (2001) and in particular she points out that the older system was "overly biased in favour of tertiary care medicine" (Ross and Ross, 1989 cited by Murrell, 2001: 73) when the South African government and health ministry were placing an emphasis on the need for primary health care. The new curriculum was intended to redress the problems raised by Ross and Ross (*ibid*) who claimed that the didactic curriculum lacked relevance and tended to produce doctors unfamiliar with problem solving and continuing education techniques.

The South African Qualifications Authority (SAQA, 1995) identified the following list of critical cross-field outcomes for education and training: 1) Identify and solve problems

[1] For a list of different online learning management systems and their features see http://www.edutools.info/static.jsp?pj=8&page=HOWTO#compare [Accessed on 12 April, 2006).

in which responses display that responsible decisions using critical and creative thinking have been made; 2) Work effectively with others as members of a team, group, organisation or community; 3) Organise and manage oneself and one's activities responsibly and effectively; 4) Collect, analyse, organise and critically evaluate information; 5) Communicate effectively using visual, mathematical and/or language skills in the modes of oral and/or written presentation; and 6) Use science and technology effectively and critically, showing responsibility towards the environment and health of others; demonstrate an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation. Also, individuals must be made aware of the importance of: a) Reflecting on and exploring a variety of strategies to learn more effectively; b) Participating as responsible citizens in the life of local, national and global communities; c) Being culturally and aesthetically sensitive across a range of social contexts; d) Exploring education and career opportunities; and e) Developing entrepreneurial opportunities.

SAQA clearly places the emphasis on a learning experience that:

- continually engages learners in both individual and team activities that explore important phenomena,
- uses multiple media and technologies for creating products that embody results of learners' explorations, and
- calls for learners to explain their work and products to other audiences.

(SAQA, 1995)

Medical School is legally obliged to meet the requirements laid down by SAQA. Additionally, there is a likelihood that undergraduate students will, in future, be located in hospitals around the province which will require distributive support of the learning and communication options that were not necessary in the older curriculum. According to Murrell (2001: 74) "distributive processing, telematics, collaborative and situated learning, and CMC facilities ... [are therefore] vital for the educational process".

2.6. The application of a Web based learning environment in medical education.

Computers are now seen as an essential tool in medical education. In a survey of medical schools in the United Kingdom 17 of 21 respondents to a questionnaire stated they were using, or were about to use, computer based systems in their undergraduate courses (Cook, 2001 cited by Roberts, Lawson, Newble and Self, 2003).

In the United States it is becoming increasingly common for medical schools to set a basic requirement of personal ownership of computers for their students, for example the website for University of California San Diago prospective students states:

> "UCSD School of Medicine ... requires computer ownership for all entering students. If at all possible, **students are urged to have a laptop computer with a wireless network interface card**".
>
> (UCSD, 2005: original emphasis).

2.6.1. Examples of WBLEs at other institutions.

The use of Web Based Learning Environments is becoming the norm for most higher educational institutions in the industrialised world, and medical education is no exception. Only a few examples will be raised in order to position the Nelson R. Mandela School of Medicine alongside the experience of other well known institutions. Although there is much interest and a huge amount of money being spent in these innovations, it is important to note that these developments have not been without difficulties and controversy.

Harvard Medical School:
The Harvard Medical School, like the Nelson R. Mandela school of Medicine, introduced computer aided technologies in the 1980s. This was done to "ensure that medical students developed competency in the use of 'information-processing devices' in order to facilitate patient care" (Kerfoot, Masser and Hafler, 2005: 380). These authors state that the ad hoc nature of the early innovation was felt to be of limited benefit as there was a dearth of suitable software and poor integration into the curriculum. The more recent developments of intranet and internet connectivity are, however, being used extensively. Intranets at Harvard Medical School are being used to link faculty and students to technology-based services and digital libraries. A WBLE is "used to streamline course administration" (*ibid*: 380), and the 'my courses' portal claims to offer a "one-stop internet web portal" (Harvard Medical School, 2006). According to the article there are more educational programmes available than were in the 1980s and these are said to be of better quality.

Kerfoot *et al* (2005) report that, more recently, plasma screens connected to the internet have been brought into tutorial rooms at Harvard so students can consult resources while engaging with peers and facilitators in a Problem Based Learning environment. In this article they express some concern about the introduction of plasma screens in tutorials as they felt that "information does not necessarily equal knowledge" and too much time was spent searching for the information at the expense of interrogation and assimilation (Kerfoot *et al*, 2005: 387).

Other developments at Harvard include the use of mobile devices connected to university resources for more senior students (AvantGo, 2002), as well as iPod delivery of lecture information (Tinkel, 2006). Meredith (2005) quotes Dr John Halamka, Chief Information Officer and Associated Dean of the Medical School as saying that "Harvard Medical School is a completely digital world. Everything revolves around the Web".

University of Sheffield and University of Edinburgh:
The University of Sheffield is using what they term their own Networked Learning Environment to support a curriculum database, outcome objectives for 91 core clinical problems, communications systems including online forums for year groups, the delivery of learning materials, multiple choice formative assessment, and electronic portfolios for summative assessment purposes (Roberts *et al*, 2003). Similarly, the University of Edinburgh has developed its own system for use in medical education (Ellaway, 2005).

Both of these systems are similar to the stated use of web based learning at the Nelson R. Mandela School of Medicine (McLean and Murrell, 2002), except for the use of electronic portfolios and summative assessment where the Medical School does not use electronic portfolios.

Some warnings from other institutions:
In a study of the use of computers at the China Medical College, Liaw (2002: 137-138) states "users are sometimes unwilling to accept and use available technologies, and express less than enthusiastic response to new technology, even if the technology may increase their productivity". Liaw (2002) goes on to claim that the use of computers appears to be limited due to the users' "fear of computers, resistance to new technology, perceived difficulty of use, not understanding the importance of technology, and lack of motivation".

2.6.2. Application of a WBLE at the Medical School.

In 2001 the Nelson R. Mandela School of Medicine changed from a traditional medical curriculum to one based on a student centred approach called Problem Based Learning. Simultaneously, online learning was introduced using WebCT as the online learning management system. According to McLean and Murrell (2002) initial staff training on the use of WebCT took place over four days and included an overview of the educational elements in a constructivist environment, the communication options available in the software and various other facilities such as the digital image database and ways in which a course could be structured. This training was underscored by earlier research (Amory and Mars, 1994; Amory, Mars and Meyerowitiz, 1999; Murrell, 2001; and Murrell and Meyerowitz, 2004) which pointed out that computer assisted education at the Medical School was feasible if consideration was taken of the complex multi-cultural, multi-linguistic and different educational backgrounds of the students.

The new Problem Based Learning curriculum was structured around six themes per year and it was intended that the resources in WebCT would be developed as the themes were explored. Students in subsequent years would have access to the resources developed in previous years. Each year's students were to be divided into small groups who would identify the learning goals, resources and other materials

necessary for each theme. Learning would be supported by a few formal lectures per week with the main focus of learning being self directed and negotiated in the group fora using online resources, library and laboratory facilities.

The value that WebCT and CMC could bring to the new curriculum would be based on its ability to

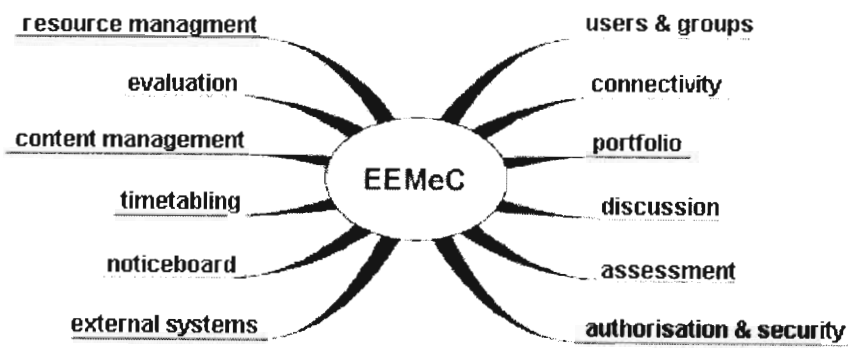
- allow for flexibility and convenience, any where any time learning,
- promote collaborative learning through communication and sharing of information sources, and
- extend the co-ordination of resources available to the students via internet, databases and other computer stored and delivered materials such as video skills instructions.

Students who were reluctant to participate in face-to-face encounters could be encouraged to participate online as they would have more time to consider their questions and answers. This would also allow time for further reading to influence their responses.

The Medical School has a 100 PC LAN available to undergraduate students, but students with their own computers and internet connectivity from home or remote medical facilities would also be able to access the site. The WebCT server, located on the Durban (Howard College) campus (approximately 3 kilometers from the Medical School), serviced four campuses – Durban, Medical School, Edgewood, and Pietermartizburg. The communication link between the Medical School and the server was via radio link with a bandwidth limited to 4MB, which could have technical implications for videos, high quality images and proprietary software presentations such as Power Point™.

2.7. Evaluating WBLE

In her thesis Ellaway (2005) uses a number of different metaphors to interrogate the online learning system at Edinburgh, not all of which are applicable to this research. However, she does represent the essential tools in a WBLE as follows[2]:



Redrawn from Ellaway (2005: 45)

[2] EEMeC is the acronym they have coined for the Edinburgh Electronic Medical Curriculum

In considering an application to support the management of online learning it is important that all the features mentioned in Ellaway's diagram be included but generally these are now de facto standards in most systems. It is the way Medical School educators use these tools in WebCT that are of central interest in this research.

In addition to the features mentioned above by Ellaway (2005) the evaluation of a web based learning environment should take cognisance of educational theory as well as theory related to concepts of human computer interaction. Only by combining the pedagogical imperatives and ensuring that these are presented using sound human computer interaction principles will the site help facilitate learning. The programs used to manage these systems may make it easier to facilitate one form of learning over another e.g. instructivist drill and practice exercises in stand alone computers versus a networked communication portal for constructivist educational environment. However, it should be noted that it is not necessarily the tool that dictates the methodology but the way the tool is used by the instructional designers and course developers. Of the list of areas that Reeves and Hedberg (2003: 190-198) state should be considered in the evaluation, the following are highlighted with additional comments from other sources.

- **Epistemology**: The nature of the subject matter and the views of prominent medical teaching practitioners should be examined and combined with the knowledge of experts in online instructional methods. The focus should be "on learners and their tasks, not just the content to be taught" (Henke, 2001). Particular attention should be given as to how knowledge is acquired and generated within the field, and a balanced view between instructivist and constructivist philosophies should be reached.

- **Structure**: which looks at how the tool is developed and modified to support the learning, noting that "the transfer of existing course material, as is, to [the web] without considering using the medium's capabilities" is considered a "critical" mistake (Henke, 2001: 6). He advises developers of WBLE to replicate the best of the classroom, improve on it, and take advantage of the Web capabilities (*ibid*).

- **Learner control**: referring to the ease of use, the users' understanding of how to navigate and use the various options, and how effectively it fosters user choice within the system.

- **Contextual orientation**: referring in particular to the abstract and simplified manner in which information is presented and knowledge generated, remembering that Problem Based Learning is said to work best with unstructured problems, but that this does not mean scaffolding should be ignored to the point of chaos.

- **Motivation**: Comparing intrinsic and extrinsic motivation, especially noting that if the system "fails to support [the users and their needs] in crucial ways, the promise of technology is subverted before it can begin to be fulfilled" (Henke, 2001: 6).

- **Individual differences**: Does the structure of the environment allow for (and even encourage) individual differences in learning style and prior knowledge?

- **Collaboration**: Does the structure of the WBLE encourage collaboration particularly as programs that have been designed to promote work in small groups benefit the learners both instructionally and socially (Johnson and Johnson, 1989).

- **Cultural sensitivity**: Learning environments should accommodate cultural diversity including music, beliefs, location, language and ethnic background.

- **Role of 'instructor'**: Technology offers the 'instructor' the opportunity to individualise the learning experience, placing the learner in the centre. The traditional role of 'instructor' has changed from an authoritarian provider of knowledge to a resource whom may be consulted by students but also learns with students (CTGV, 1993).

2.8. Conclusion

The literature reviewed here shows how education has moved from the instructivist paradigm of old to a constructivist paradigm that can be applied in Problem Based Learning. It also highlights the ways in which this paradigm can and should be supported in a WBLE. Taking into account these views, this research attempts to understand the Medical School students' experience of WebCT as it has been set up to support their learning. The analysis of these results will interpret the findings in terms of the PBL educational paradigm and make recommendations to the faculty where shortcomings are identified.

Chapter Three: Research Methodology

3.1. Introduction

Educational research, and particularly research into the use of educational technology, has undergone some severe criticism in the last decade. Reeves and Hedberg (2003: 3) state "the field of evaluation has evolved into a contentious one with many competing models and several conflicting paradigms". The conflict is generally stirred by the various researchers' philosophical paradigms related to views of reality, probability and reliability. Those that adhere to a logical positivist view tend towards the use of experimental statistical models of research whilst radical constructivists attempt to understand others' views of the world as far as possible whilst recognising that this understanding at best can be an approximation and does not necessarily translate to absolutes for other groups although it may help others in understanding disparate views of the experience.

3.2. The research paradigms

The research paradigms outlined by Reeves and Hedberg (2003) range on a continuum with one end calling for the absolute measurement and predictive statistical analysis requirements of the logical positivists and the other end represented by the constructivist perspective that evaluation can only represent individuals' construction of the environment in which they find themselves (Reeves and Hedberg, 2003). Between the two extremes lie more pragmatic approaches such as those described by Scriven (1993, cited by Reeves and Hedberg, 2003: 28) who argues that evaluations should "yield judgments about what has value and worth", and Eisner (1985, cited by Reeves and Hedberg, 2003) who calls for a connoisseur approach to judge what is good in education.

Reeves and Hedberg (2003) outline four paradigms along this continuum: the "Analytic-Empirical-Positivist-Quantitative Paradigm", the "Constructivist-Hermeneutic-Interpretivist-Qualitative Paradigm", the "Critical Theory-Neomarxist-Postmodern-Praxis Paradigm", and the "Eclectic-Mixed Methods-Pragmatic Paradigm". The first paradigm reflects the beliefs of the logical positivists who wish to investigate according to a "mechanistic, deterministic" view of reality with a view to define, predict, control and explain physical phenomena by measuring variables and analysing the relationship between them with descriptive and inferential statistics (Reeves and Hedberg, 2003). According to these authors this paradigm has held dominance in education technology research as "most members of the tenured generation of educational psychology and instructional technology ...were schooled in positivist, quantitative methods, and as a result they tend to teach these same approaches. In addition, they may be unfamiliar with or uncomfortable with alternative paradigms" (*ibid*: 30). It is further argued that this paradigm is unsuitable

for educational research as "it is almost impossible to hold constant all factors in the design, much less those in the instruction. The list of study limitations often exceeds the list of study questions" (Carey and Dick, cited by Reeves and Hedberg, 2003: 31).

The second paradigm outlined by Reeves and Hedberg (2003) is seen as an "alternative" to the positivist approach. Here the constructivist element of the title refers to "the belief that humans individually and collectively construct reality", the hermeneutics reflecting a need to analyse "the curriculum in its broadest sense and instructional programs ... in a more focused sense, including attempts to expose the values underlying these phenomena" (Reeves and Hedberg, 2003: 32), with the interpretivist aspect stressing the need to contextualise the analysis "presenting the interpretations of many, sometimes competing, groups ... interested in the evaluation's outcomes". Finally Reeves and Hedberg (2003: 32) state the qualitative element places "the emphasis on the human being as the primary evaluation instrument, rejecting the mathematical modelling of phenomena". In this paradigm they claim human observation and immersion in the context is preferred over classical experimental modelling.

The third paradigm that Reeves and Hedberg (2003) call a 'Critical Theory-Neomarxist-Postmodern-Praxis Paradigm' is not relevant to this research as there is no intention of investigating the curriculum and power models within the setting. The curriculum decision is taken as given, and this research merely tries to identify if the use of the web-based learning management system supports students' learning.

In an attempt to address the discordance between the various paradigms, Reeves and Hedberg (2003: 3) argue for "a pragmatic perspective for evaluating interactive learning systems in which the primary aim of evaluation is the collection of information to support day-to-day decision making". The aim of this research falls directly into the parameter of supporting day-to-day decision making by investigating a case study in a specific setting. It is also clear that a purely quantitative study, looking at the number of students who log into the system, the pages visited, etc. will not elicit the information required to determine students' attitudes towards the online learning environment, or assist in making judgements about the quality of the intervention. The pragmatic approach of selecting a mixture of both quantitative and qualitative investigatory procedures should lead to a more insightful understanding. For this reason this research uses the 'Eclectic-Mixed Methods-Pragmatic Paradigm'.

3.3. Methodology and methods

In this study the definitions of 'method' and 'methodology' are taken from Cohen and Manion (1987). According to them a method is drawn from a range of approaches to gather data which will be used as a basis for inference and interpretation, whilst a methodology describes the process of applying research methods. Reeves and

Hedberg (2003: 272) state that "research methods are tools, and tools should only be selected once goals and tasks are clear".

3.3.1. Methodology.

It is the role of methodology to assist in the understanding, in the broadest possible terms, not the products of inquiry, but the process itself (Cohen and Manion, 1987: 43). The methods and methodology should be strongly influenced by the research goals (Reeves and Hedberg, 2003). Reeves and Hedberg (*ibid*) outline six major research goals; theoretical, predictive, interpretivist, postmodern, development, and action.

Reeves and Hedberg (2003: 265) warn that "major misunderstandings exist about the differences between basic and applied research". For them basic research is aimed at "extending fundamental understanding within a scientific field" while applied research is "aimed at solving problems that confront an individual, a group, or society at large" (*ibid*: 265). They point out that some people argue in favour of "applied research, focused upon direct and clear implications for practice" (*ibid*: 266). For Reeves and Hedberg, the research conducted here falls within the ambit of "action research".

> "Researchers with action goals are focused on a particular program, product, or method, usually in an applied setting, for the purpose of describing it, improving it, or estimating its effectiveness and worth."
> (Reeves and Hedberg, 2003: 272)

Orrill, Hannafin and Glazer (2004), on the other hand, refer to research similar to the research reported in this document as "application research", where

> "[a]pplication researchers focus on how the tools work in a particular setting. Rather than attempting to derive principles, application researchers often try to answer practical questions about the use or implementation of an innovation."
> (Orrill, Hannafin and Glazer, 2004: 336)

The nature of application research is "focused on how people interact with and learn from an innovation [and is] often concerned with innovation in use in a particular setting" (Orrill *et al*, 2004: 337). The problem definition revolves around "the user's experience [and is] typically concerned with supporting decision-making regarding adoption and adaptation." Research questions are categorised according to user benefits, practicality, return of investment, and usability and worth. The target audience(s) for the research tend to be policy makers, evaluators, decision makers and practitioners (*ibid*: 337). Orrill *et al* argue that the goals of such research are typically concerned with "whether innovations are effective and worthwhile in a given context" (*ibid*: 340), and research usually takes the form of case studies.

Case studies

The purpose of a case study is to "probe deeply" and to "analyse intensively the multifarious phenomena that constitute the life cycle of the unit" with a view of establishing "generalisations about the wider population to which that unit belongs" (Cohen and Manion, 1987: 120). There are strengths and weaknesses in this type of research. On the one hand, a case study allows an intensive and in-depth study within a limited space of time (Imenda and Muyangwa, 1996: 30) and can be of particular value where the research aims at providing practitioners with better or alternative ways of doing things in similar contexts (Hitchcock and Hughes, 1995: 322). On the other hand it should be noted that the results of a single case cannot be generalised and can only be used as evidence (Stenhouse, 1985: 267). Most importantly a case study should be directed to improving the capacity of those who are studied (*ibid*: 269).

3.3.2. Methods

The methods applied in research are usually selected according to the research paradigm and object to be researched. Typically, qualitative methods are used in case studies (Reeves, 2000: 24) and among the most commonly used qualitative methods are observations and interviews (Myers, 1997). These may include questionnaires, informal and in-depth interviews, focus group interviews and classroom observations. This information may be sourced from students who use the systems, teaching staff, and people who have an indirect link with the system (Percival and Ellington, 1984: 119).

a. Questionnaires:

Questionnaires are characteristically a list of open-ended and closed questions given to a selected group so that information can be gathered for statistical analysis and are usually, but not exclusively, quantitative in nature. Reeves and Hedberg (2003) warn that questionnaires should be reviewed carefully to make sure that the salient issues are addressed and a trial run be conducted to iron out any problems such as confusing questions, ambiguity or misunderstandings.

For Percival and Ellington (1984) questionnaires and interviews of learners should allow them to give feedback regarding their experiences and their opinions of an instructional system which can be completed in open-ended questions. Furthermore according to Percival and Ellington (*ibid*) questionnaires relating to educational interventions should allow the researcher to measure attitudes which can be quantified using Likert scales, semantic differential techniques and objectives rating and comments.

b. Interviews:

Whilst questionnaires are simply a list of questions that can be answered on paper, interviews are a "two-person conversation initiated by the interviewer" (Cohen and Manion, 1987: 291). This "conversation with a purpose" (Dexter, cited in Merriam, 1998: 71) is more likely to illicit more personal aspects from the respondents, such as their thoughts, feelings and values, than would a less human method (Kitwood, cited by Cohen and Manion, 1987). It is thus important to generate a conversation in which respondents feel at ease and this is more easily established in a face-to-face situation than a telephonic or electronic interview (Witkin and Altschuld, 1995). Generally interviews are categorised as structured, semi-structured, unstructured and focused (Cohen and Manion, 1987; Savenye and Robinson, 2004).

Structured interviews are similar to some questionnaires in that the questions are often pre-set and they may have a fixed set of responses. They differ from questionnaires in that they are administered on a one-to-one basis, usually face-to-face and each interviewer should be directed by a preset 'interview guide' particularly if more than one researcher is conducting the interview. These guides may be explicit in a number of areas including how long should be spent on discussing each item, the order of the questions, prompts and probes that can be used to extract more detailed descriptions, and the manner in which the information is recorded (Stimson, Donoghoe, Fitch and Rhodes, 2001). This method of interview can be extremely useful when attempting to collect factual information across a broad range of respondents who may or may not have the same understanding of technical terms. The interviewer can explain and clarify terms and in some cases collect the data (e.g. medical test results), and a common format is used to record the data making it "easier to code, analyse and compare" (*ibid:* section 5.2). However, rigid adherence to the guides may prevent collection of unexpected but relevant information, and differences of interpretation of questions by interviewees may skew results (*ibid*).

Semi-structured interviews may use some questions that offer a fixed set of responses but leave one or more unrestricted responses open to respondents to discuss in their own words. These types of interviews are said to be much more flexible than a structured interview in that it allows the interviewer to alter the questioning sequence following up on points made by the respondents, and possibly overcoming tendencies for respondents to anticipate questions. There is also room for negotiation, discussion and expansion (Soriano, 1995) which affords the researcher an opportunity to respond to the interviewee's emerging worldview (Merriam, 1998). This allows for a non-threatening, in-depth probing of a topic and increased quality of data collection.

Unstructured interviews "get interviewees to offer their opinions, knowledge and experience freely" (Stimson *et al*, 2001: section 5.1). The topics, in range and depth and the responses are not limited to the preset structure of an interview guide (*ibid*).

According to Stimson *et al* (2001) the advantages of unstructured interviews are that "there are no restrictions on what can be discussed", they are flexible, allowing "interviewers to modify their line of enquiry" or "follow up on interesting responses and investigate underlying motives". However, the unstructured nature of these interviews may allow inexperienced interviewers to introduce bias, and can encourage respondents to talk about irrelevant and unimportant issues (*ibid*: np, section 5.1). Finally, Stimson *et al* (*ibid*: np, section 5.1) warn that "[a]s each interview tends to be unique it may be difficult to code and analyse the data".

Focused interviews Focused interviews are formal, pre-set and directive with structured questions, although they should have an exploratory purpose. The intention is to drawn out a respondent's subjective responses to a known situation in which the respondent has been involved and which has been analysed by the interviewer prior to the interview (Cohen and Manion, 1987).

Focus group interviews A focus group interview is "the systematic questioning of several individuals simultaneously in formal or informal settings" (Fontana and Frey, 1994: 364). They are usually made up of between six and twelve people (Queeney, 1995) with a facilitator usually guiding the discussion. Participants are not randomly selected but are made up of people who are well-informed, acute observers and have knowledge, interest, and understanding of the topic (*ibid*). Soriano (1995) explains that the participants in a focus group are selected such that their responses would represent the views of a broader but homogeneous sub-population.

It is the role of the interview facilitator to guide the discussion, explain the topic, and encourage participation. It is also the facilitator's responsibility to provide a detailed report of ideas, viewpoints and comments that emerged from the discussion (Queeney, 1995). Facilitator skills should include flexibility, objectivity, empathy, persuasiveness and listening. In addition the facilitator should be able to balance the directive interviewer role with the role of a moderator (Merton cited by Fontana and Frey, 1994). Focus group interviews can be structured, semi-structured or unstructured and generally elicits qualitative data (Fontana and Frey, 1994).

Advantages of these types of interviews are said to be that they are inexpensive to conduct, data rich, flexible, stimulating to respondents, elaborative as well as allowing the researcher to get individual responses (Fontana and Frey, 1994). Disadvantages of focus group interviews can include the difficulty in keeping one respondent or a small group of respondents from dominating the group and the possibility of recalcitrant respondents who have to be encouraged to participate (Merton cited by Fontana and Frey, 1994). The interviewer would need group management skills to prevent a group culture interfering with individual expression of thoughts and ideas.

c. Observations:

Observing people using the system can provide "useful measures of the implementation of interactive learning systems" and the process is "relatively unobtrusive" (Reeves and Hedberg, 2003: 186). Observations are, however, time consuming, labour intensive and according to Reeves and Hedberg they require "carefully designed protocols to provide useful data" (*ibid*: 186). However, less formal observations may also be useful, e.g. noting the eye movements of respondents in a focus group may show certain respondent's seeking peer approval before contributing to the discussion. These types of observations can be recorded on transcripts and used in the analysis if necessary. In the study of Human Computer Interaction, observations are often used as a method of finding out how various tools are used in an authentic setting.

General advantages of these methods

Witkin and Altschuld (1995) and Queeney (1995) state that interviews enable respondents to feel at ease and free to give candid opinions without being exposed to criticism; they provide the interviewer with the opportunity to engage in additional conversation and gain further unexpected data, and makes it possible for the interviewer to observe and record non-verbal behaviours, and finally reveal thoughts, feels and actions of participants.

General disadvantages of these methods

Soriano (1995) points out that interviews take time, can have extensive subjective bias in both the structure and manner in which questions are asked as well as in the coding of answers. Bias is defined by Cohen and Manion (1987) as a systematic or persistent tendency to make errors in the same direction, or, to overstate or understate the true value of an attribute in a manner that can severely jeopardise the validity of a study. Other forms of bias can occur when respondents give 'socially desirable' responses to please the interviewer or omit relevant information to hide something. Furthermore, the spoken or written work always has a residue of ambiguity, no matter how carefully the question is worded and the answers reported and coded (Fontana and Frey, 1994).

3.4. Data management and analysis

Gay (1987) suggests that a research plan must include a description of the techniques used to analyse data and that researchers should give an account of themselves in the research and its interpretation. It is best if the researcher is able to establish a critical awareness of their organisational abilities, approach and self-representation, trust and rapport, mistakes, misconceptions and surprises, data collection and recording, data coding and organisation (Altheide and Johnston, 1994) as these factors play a significant role in the interpretation of data. Denzin (1994) refers to interpretations as 'story-telling', where a constructivist story stresses

emergent designs and emergent understandings, and an interpretative text would tend to emphasise socially constructed realities, local generalisations, interpretative resources, inter-subjectivity, practical reasoning and ordinary talk (Holstein and Gubrium, cited by Denzin, 1994).

Huberman and Miles (1994:) define data management as "the operations needed for a systematic, coherent process of data collection, storage and retrieval". These authors believe that these operations ensure "high quality, accessible data; documentation of just what analyses have been carried out; and retention of data and associated analyses after the study is complete". Analysis involves discovering and deriving patterns in the data, sorting what the data are about, and what kind of things can be said about them (Hitchcock and Hughes, 1995). In particular Hitchcock and Hughes (1995: 295) state that "assessing analytic processes in qualitative research is interpretative, idiosyncratic, and so context-dependent as to be infinitely variable".

These comments informed the analysis of research data collected here. The analysis focussed upon the reality and interpretation that each participant made of the WBLE and participant corroboration as well as personal reflection and introspection were used as indicators of authenticity of the research process. Each step was explained and clarification of instructions was included and participants' understanding and agreement was ensured. Taking the learners' voices as the most important aspect of the data collection and analysis legitimised this research further.

It is with this in mind that Pitman and Maxwell (1992) recommend that a methods discussion include a description of the evaluator's analytical framework. They along with Hitchcock and Hughes (1995) suggest that data should be catalogued and combed for the purposes of identifying and listing themes, patterns, topics and identifying or constructing categories. These processes would require the implementation of the constant comparative method, described by Lincoln and Guba (cited by Maykut and Morehouse, 1994). Researchers using this method would analyse written transcripts of and written answers for salient themes to identify units of meaning and recurrence of those units would be noted by underlining and highlighting the term or statement. Each new unit of meaning would then be compared to other units of meaning, remaining conscious of the use of language particularly when it is not a universal first language. Similar units are subsequently identified by similar exponents by means of a 'look-alike' or 'feel-alike' basis, and rule for inclusion for that provisional category is derived. Pitman and Maxwell (1992) advise using labels and codes for units of data. Modern computer programs such as NVivo™ assist in this analysis and coding process.

3.5. Research ethics

The medical dictum of "first do no harm" is an essential component of research ethics dealing with human and other living beings, but it is insufficient. All research

conducted should benefit the participants of the research in some form of reciprocity where there is tangible benefit for all. This can be done by making the research findings available to the respondents and attempting to influence further developments so that participants' concerns are addressed. All participation should be purely voluntary and participation may be withdrawn at any time without determinant to the participant. Each participant should be afforded the opportunity to give formal consent without which the research should not be undertaken. Confidentiality should be respected (Pitman and Maxwell, 1992) and there should be no way that a reader of the report findings could identify individual responses and unduly advantage or disadvantage them. Finally, there is very little qualitative research that is without bias, be it pre-meditated and conscious or the result of subtle influences and largely subconscious. Researchers should explore their own point of views and make these explicit as far as possible.

In this research permission was sought from faculty, lecturers and learners in the Medical School (see Appendix A and B). Confidentiality was maintained by coding questionnaires and transcripts in such a way that no-one reading the original transcripts would be able to identify individual's responses and no names are recorded in the report. Finally, original documents will be destroyed after legal dates make it permissible.

Reciprocity is upheld through the publication of this document and once completed its inclusion in the library will ensure that all participants are free to access it.

3.6. Conclusion

The research conducted here clearly fits within the definition of application research given by Orrill, Hannafin and Glazer (2004). It takes the form of a case study with the researcher placed outside of the area of activity, although not necessarily without bias. Note was taken of prior research in this area and is recorded in the literature review, but informal observations by the researcher lent a more critical view of the proceedings than were reported in published articles. Questionnaires and interviews were selected as methods for collecting qualitative data, which was then collated and analysed as described in the next chapter.

Chapter Four: Data Collection and Analysis

4.1. Introduction

Bearing in mind the type of research conducted here, and that researcher bias may influence the analysis of data, this section of the report will use the first person pronoun to describe activities of the researcher. Where ever possible bias or personal readings will be noted, in addition by accepting the constructivist view that knowledge is formulated from previous experience, dialogue with peers and more knowledgeable experienced people, it is necessary to highlight my background (previous experience) in order for the reader to be aware of possible biases that I may bring to the process.

4.2. Researcher's background

Having initially qualified as a teacher I have worked as a classroom teacher in South African high schools, and later as an educational technologist at a historically black university in one of South Africa's apartheid "homelands". More recently I completed the course work requirements of a master's degree, where WebCT and constructivist educational principles were used in all courses. Of particular interest to me during the courses were the advantages brought about by collaboration and peer review exercises. In the later stages of the course work I was assigned to an internship at the Medical School where I worked under the supervision of a Medical School staff member who was "year co-ordinator" for first and second year students. It should also be noted that this staff member was closely involved with the use of WebCT and the new curriculum.

It was during this internship that my interest grew in the way WebCT was being used at the Medical School and I noted some anomalies between the stated "new curriculum" objectives and its implementation, which was reflected in the use of the WBLE. In particular I was concerned with the use of the communication tools available and noted there was little space for the student groups to share information and few knowledge creation tools such as mind maps and individually created resources. In these initial observations it appeared that WebCT was being used for the delivery of lecture notes; the loading of high quality coloured graphics and links to external web sites of interest. It was the emphasis on content delivery rather than the processes of knowledge creation that concerned me. These observations are purely anecdotal but as they informed my inquiry it is necessary to report them here but further research was required to substantiate them.

4.3. Ethical considerations

Permission to undertake this study was sought from the faculty as an initial step (see Appendix A) and once it was granted permission of all participants including staff members and learners was requested (see Appendix B). I agreed to treat participant responses confidentially in order to protect their identities and further agreed to share my finding with them, either directly or indirectly through publication of this report.

4.4. Population sample and size

The medical school takes in approximately 200 students each year. Only first and second year students were asked to participate in the study as they were the only groups who had experienced the PBL curriculum, thus giving a total of 400 potential student participants. Staff members involved with the WBLE were also asked to contribute and three of them agreed to be interviewed (one was the year co-ordinator and the other two were group facilitators).

4.5. Data collection

Data collection took the form of observations, questionnaires, focus groups and interviews. Each of these instruments and the data gathered is presented below.

4.5.1. Researcher Observations

Permission was granted by the Year Co-ordinator for me to observe her work as she was the person who used the WebCT system the most. These general observations informed the development of the questionnaire and subsequent interviews.

Site maintenance:
It appeared that the Year Co-ordinator, a full time academic, was the only person maintaining the site. This included the registration of students on the system, the uploading of information and messages posted on the bulletin board. These activities were undertaken in addition to a full teaching, research and publishing workload.

If other staff members wanted files uploaded they would bring them to the Year Co-ordinator. If students required further information they would post a message on the bulletin board which was invariably answered by the Year Co-ordinator.

Quality of documents uploaded:
On many occasions the quality of documentation uploaded could have been improved. For instance if a subject specialist brought a poor quality photocopy of material this would simply be scanned and uploaded with little attempt made to improve the quality of the image. This is understandable given the process in place

and workload of the person doing the tasks, but at the same time it undermined the quality of the site.

Site Optimization:
There was no attempt made to reduce the size of files and ensure optimum use of band width. Word documents and power point presentations were uploaded as delivered to the Year Co-ordinator and no attempt was made to reduce the size of the document or convert to PDF format to ensure cross platform compatibility or reduction of file size. Again, given the Year Co-ordinator's workload this was understandable but it did lead to some problems with the system including incompatible file formats and system crashes when file sizes were too large.

Use of Bulletin boards:
The bulletin boards were mainly used for the advertising of administrative functions e.g. change in times of Large Group Resource Sessions (LGRS). Students used it predominantly for advertising their social and political events. On a few occasions it was used by the students to seek clarity of procedural issues. The only staff member who responded to the students' queries was the Year Co-ordinator.

It was my view that the potential of an online learning environment was being severely limited by the reliance on one person, namely the Year Co-ordinator, to perform all the maintenance, uploading and communication functions, particularly as she was not a technical expert. Not only was this additional workload too much for one person it also meant that others involved in the education process had not fully integrated the use of an online learning resource into their teaching practice.

The questionnaire (Appendix C) was designed to verify these initial observations as well as to help me understand more fully the students' experiences and expectations of the site.

4.5.2. The questionnaire survey

The questionnaire (Appendix C), given to 1st and 2nd year Medical School students, was designed to assess participants' perceptions and opinions related to the use of the system. The first draft of the questionnaire was reviewed by a recognised expert in online learning, and also by the 1st and 2nd year Medical School year co-ordinator.

Of the four hundred questionnaires handed out, 205 completed questionnaires were returned. That was a return rate of 51% made up of 105 returns from 1st year students and 100 from 2nd year students. The 195 questionnaires that were returned blank were identified as "spoilt" and are not included in the analysis. Where only some questions were returned blank the results are classified as "missing" or "omitted", and included in the number of returns. Initially the responses were analysed by year of study.

Use of WebCT (Question 1)

The first question was designed to establish frequency of use of WebCT as a whole. It was understood that this would not elicit information on the quality of use but would indicate if students were able to use the system and if they found some value in accessing it as they are unlikely to use a tool that has no perceived value. As indicated in Figure 1, there was little difference in the frequency of use between 1st and 2nd year students except that 1st year students were slightly more frequent users. Here it can be seen that the majority of students would use the system weekly with only a few students using it less frequently. It was also interesting to note that there was no student who never used the system indicating the system was accessible to all respondents.

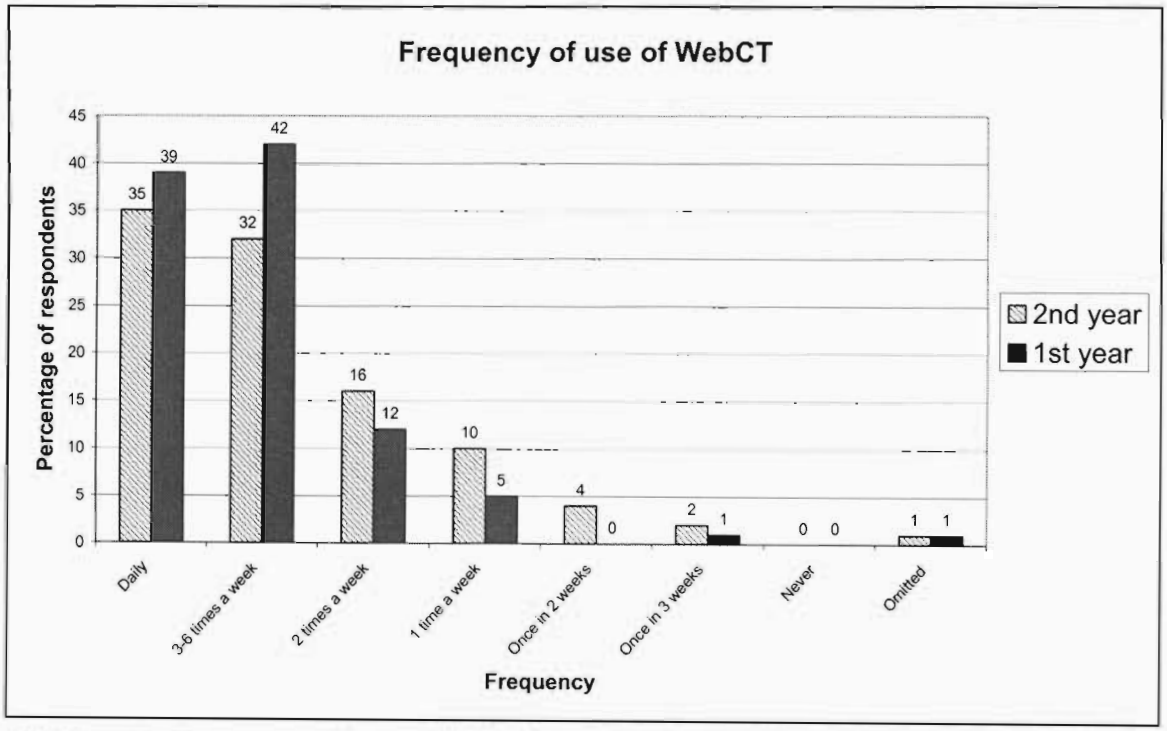


Figure 1: Frequency of use of WebCT tools as a percentage of respondents by year of study (n=205)

Suit learning needs (Question 3)

In response to the question of how well WebCT suited the students' learning needs the majority of respondents expressed a positive match. As shown in Figure 2 the 1st year students were more generous in awarding an "excellent" than second year students, possibly because they were not yet as critically aware of their own needs as 2nd year students with their additional year's experience.

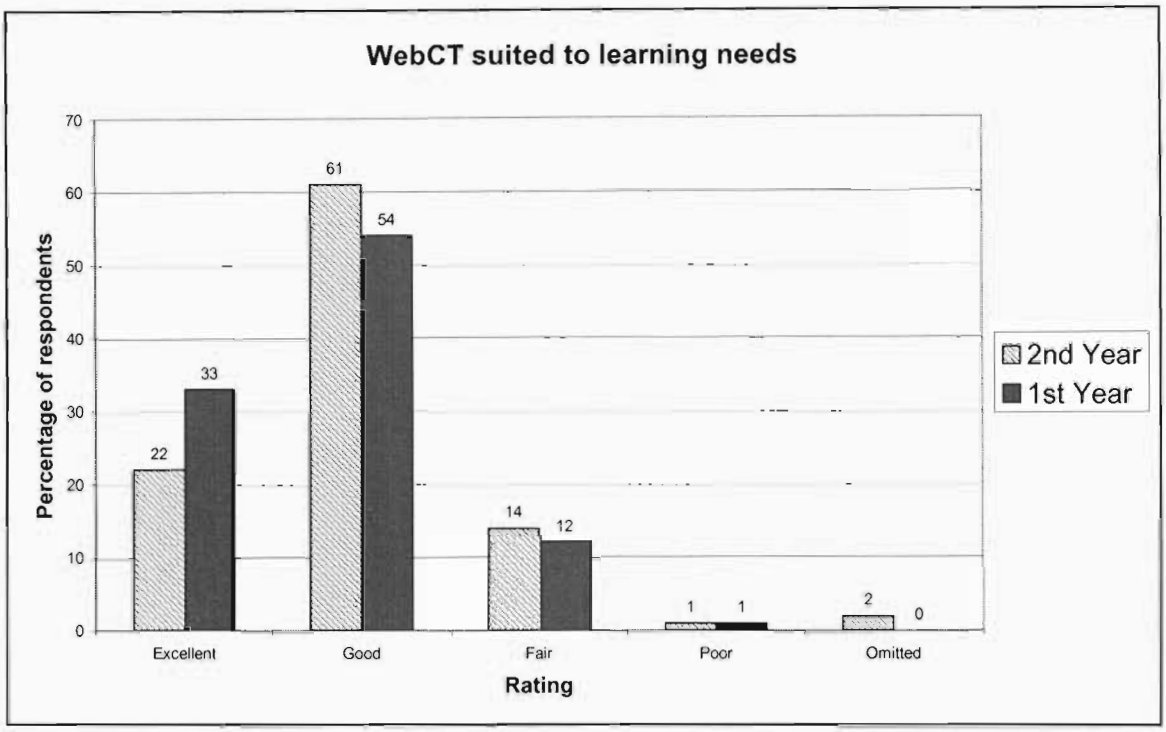


Figure 2: Perceived match between students' learning needs and WebCT. (n=205)

In explaining their answers (Question 4), many of the respondents mentioned using WebCT to access information (see text in bold, emphasis added) as meeting their learning needs. Some of these responses were:

- *I do find it suitable because it helps me get the relevant **information** I need.*
- *I get the relevant **information** that I need from WebCT*
- *Resource/course **content** at LGRS are put onto WebCT, which can be easily accessed.**
- *There is a lot of **information** from our lecture during LGRS*
- *There is easy access to **notes**'*
- *The **notes** are very clearly explained*
- *Provides easy and accessible **information**. Read notices directly from the net.**
- *WebCT is useful for getting lecture **notes** ....*
- *I find **notes** from WebCT, and self-assessment answers ....*
- *Helps us ...find **information**, e.g. for skills for our learning goals and objectives for the theme.*
- ***Protocols** for skills and LGRS **notes***
- *I get enough **information** to get me by. If I need extra, I know where to go; useful websites are helpful*
- *Able to access **notes** quickly and easily; kept up to date with continuous alterations to timetables etc. ... quick access to important **information**.**
- *Contains essentials, e.g. lecture **notes**, ...*
- *... has all the **information** we need.*
- *It is good because most of the **information** we need is available.*
- *... we are able to get lecturer **notes**.*
- *All **information** related to my academics is always available.*

Frequent mention of the ease of access was expressed as a positive element of WebCT (see for instance those marked with * above), as well as one student who commented "... *[I] can still access it everywhere, even outside RSA*". .

Less frequently, WebCT as a source of information was reported as a negative.

- *Not all LGRS notes are placed on the net; skills notes are not always placed on time.*
- *The course content is not always relevant material*
- *..lectures and protocols get uploaded very late ....*

Similarly only a few respondents mentioned the use of communication options, for example:

- *Helps us to communicate with lecturers and students*
- *Closes the gap between students and staff*
- *Provides communication between curriculum organisers and students.*

One student gave what I considered a more insightful comment by stating:

- *Though limited with regard to resources, it serves as a guideline for as to whether [sic] I am on the right path towards my learning goals.*

Given my bias towards constructivist principles I think it is important to note that it is not clear if students were aware that there are learning needs other than those involved with information transfer and timetable directives. It was hoped that this would become clear in the analysis of the stated use of WebCT tools and later in their judgements of the tools (Section B of the questionnaire).

Use of Tools (Question 2)

The initial analysis of tools usage between 1st and 2nd year students showed a similar pattern with only a small variation in percentage of student usage of the various tools as demonstrated in Figures 3 and 4. The most popular tools related to course content, self assessment tools, access to other web sites and the bulletin board. Unsurprisingly, as these students were all on the same campus and frequent timetable changes were communicated through the bulletin board, the least likely to be used were the chat and calendar options.

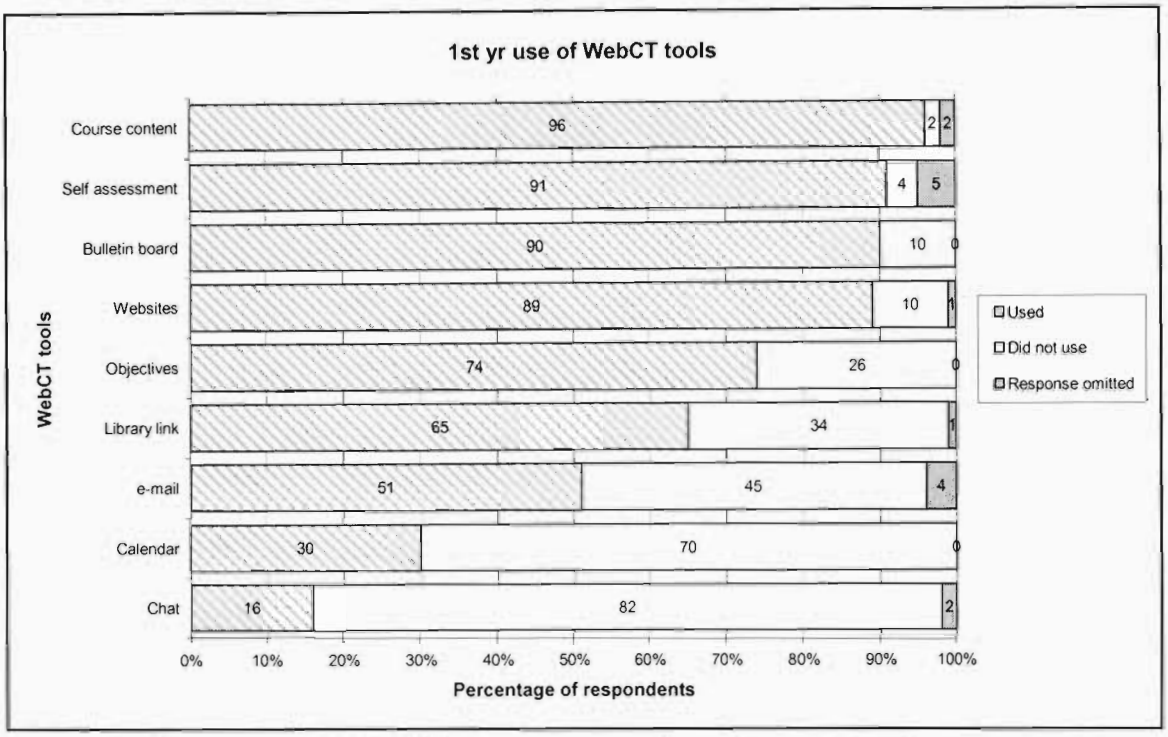


Figure 3: 1st year use of WebCT tools as a percentage of respondents

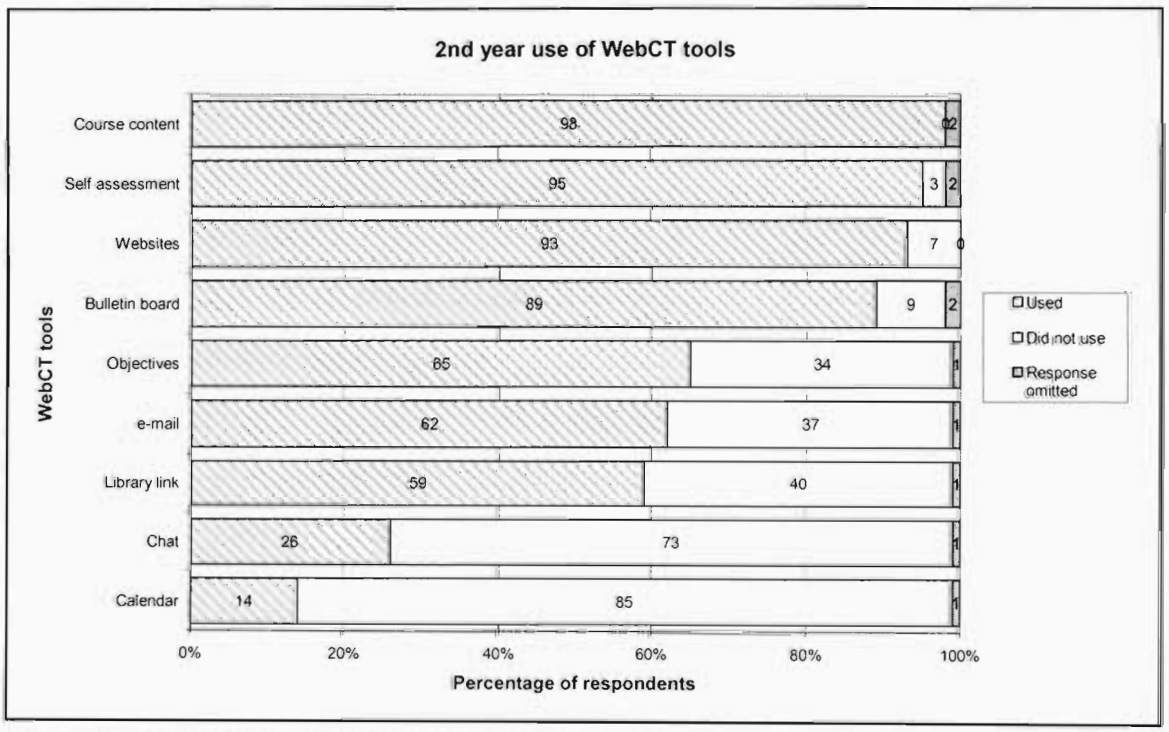


Figure 4: 2nd year use of WebCT tools as a percentage of respondents

More informative is an analysis of frequency of use where students indicate how frequently they use the tools, displayed in Figures 4 and 5. For instance in Figure 5 it is clear 81% of 1st year students use the course content tools frequently but only 50% make frequent use of self assessment. In this analysis the bulletin board is more frequently used than the self assessment options but used less frequently than the course content by both groups of students.

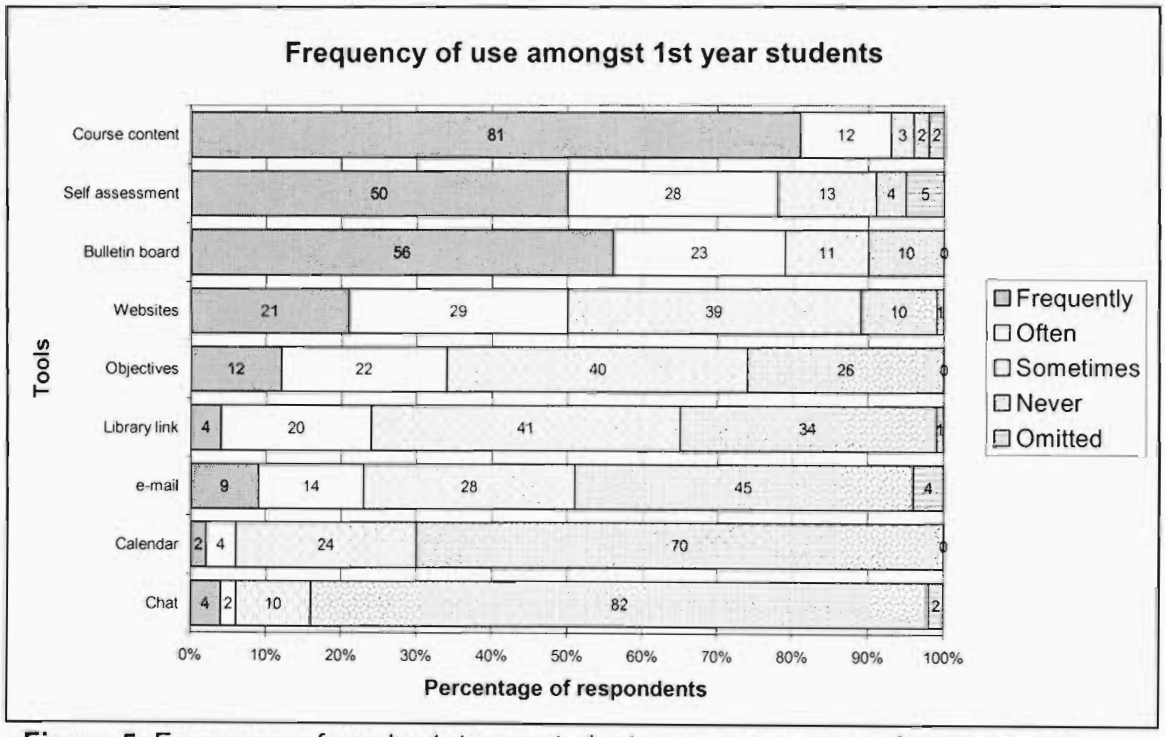


Figure 5: Frequency of use by 1st year students as a percentage of respondents

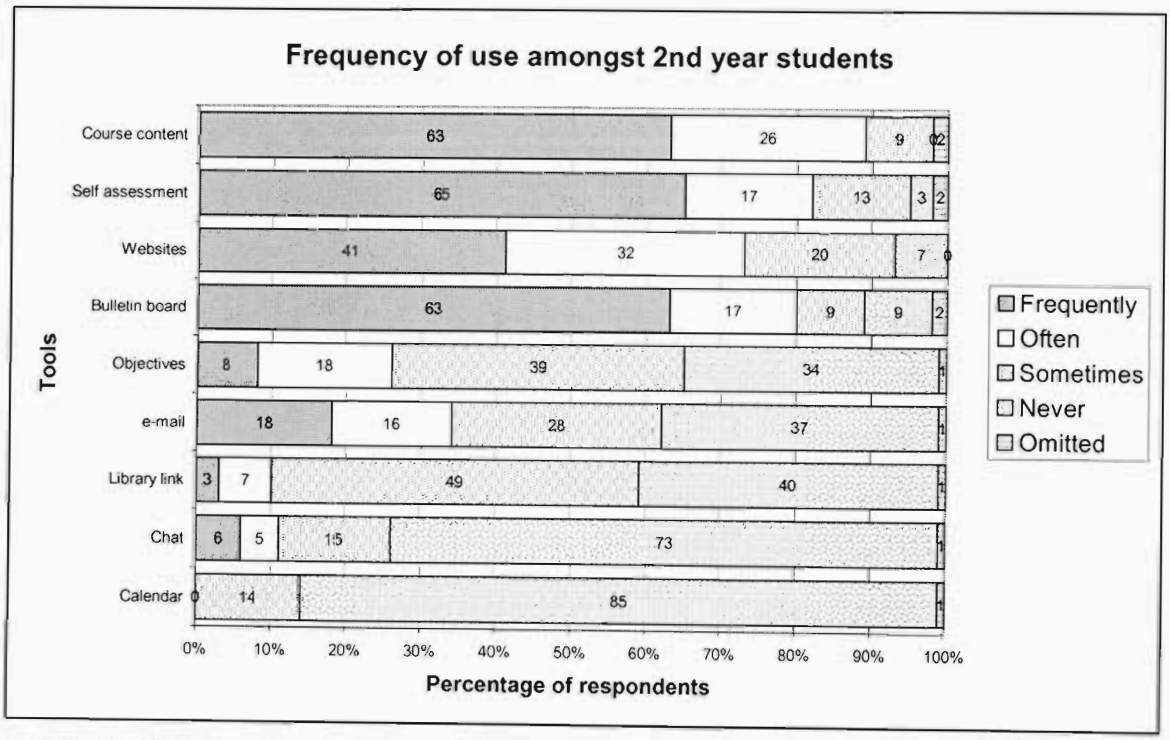


Figure 6: Frequency of use by 2nd year students as a percentage of respondents

Clearly, and as a match with their response to WebCT meeting their learning needs, respondents are making use of the system to access content, and bulletin board messages with only infrequent use of other tools. However, it should be noted that the bulletin board is used predominantly for the passing of directives from the Course Co-ordinator to students and social announcements (McLean and Murrell, 2002). Furthermore, there are no group-work structures set up in WebCT or access to tools that allow the submission of student work for peer review. Thus students appear to be using the tools predominantly for accessing content and are either unaware of other facilities that support constructivist learning and problem solving, or they place no value in such activities. This required further interrogation.

Problems experienced with WebCT (Question 5)

Having background knowledge of some of the technical problems[3] associated with WebCT delivery to the Medical School, it was surprising so few students responded to this question. Here respondents raised three issues, organisation of information, infrequent updates which were organisational problems and only a few technological problems were commented on. (Note that each comment is designated with a Y1 or Y2 symbol to indicate the year of study of the respondent).

Comments on organisation included:

- *All the messages from the students are mixed with academic stuff, which I feel should be on a separate site.* [Y1]
- *There are notices for last year's mixed with ours; so it takes my valuable time away to look for recent notices.* [Y1]
- *... sometimes the links are not valid.* [Y1]
- *Non-functional library link.* [Y2]
- *Irrelevent stuff (too much non-academic stuff) wastes time.* [Y2]

The frequency of updates was mentioned by several students, for example:

- *Notes not on.* [Y1]
- *In theme 1,4 it took two weeks for me to get 1,4 in my WebCT; so that's very long.* [Y1]
- *Loading of notes takes long.* [Y2]
- *Last minute notices/information uploaded.* [Y2]

It is presumed that the following responses are related to technological failure but they could also be attributed to maintenance updates such as registering students on the courses.

- *Sometimes it is difficult to log on.* [Y1]
- *It is usually difficult at the beginning of a new theme to log onto WebCT – denied access.* [Y1]
- *Internet crash (particularly at "crunch times").* [Y2]
- *Access from home.* [Y2]

[3] Technical problem were related to bandwidth and frequent server crashes due to excessive request for large data streams.

Other problems that could be related to technology included:

- *Time wasted on document formatting.* [Y2]
- *Access to PowerPoint presentations.* [Y2]
- *Forgetting password.* [Y2]
- *Printing.* [Y2]

One student stated there was a "*shortage of computers*". [Y2]

WebCT support of active learning (Question 6)

It is not clear if respondents were able to distinguish between the concept of active and passive learning. Some respondents stated they used the site to search for additional information:

- *It helps in searching for information in relevant areas.* [Y1]
- *Information I get from Web is helpful to me, and it makes my studies easier.* [Y1]
- *Websites.* [Y2]

Others simply referred to accessing lecture notes and other procedural information:

- *Academic notes from lectures make my day easy.* [Y1]
- *Notes are relevant.* [Y1]
- *I get notes in WebCT that I couldn't write during lectures.* [Y1]
- *I only download skills protocols from WebCT.* [Y1]
- *All the relevant LGRS notes and skills protocols are posted onto WebCT; other relevant information is also displayed; Websites are advised; thus, all of these contribute positively and assist me as a student.* [Y1]
- *Provides information.* [Y2]
- *Notes and Assessment.* [Y2]

However, some students felt that the system:

- *Allows for better planning.* [Y2]
- *Enriching.* [Y2]
- *Motivating.* [Y2]

How WebCT supports collaboration (Question 7)

Again, it was not clear if the students understood the question: Some respondents made specific reference to communication tools:

- *It is easier to communicate requests and responses.* [Y1]
- *Through the chat session.* [Y1]
- *Communication is made easy.* [Y1]
- *Learners air views/voice out opinions.* [Y2]
- *Talk to fellow learners.* [Y2]
- *Learner – to – learner communication.* [Y2]

More general comments were:

- *By providing space for notices.* [Y1]
- *Well.* [Y1]
- *OK.* [Y2]

A final example shows a complete lack of understanding of the concept of collaboration:

- *Whatever we learn in LGRS correlate with what we get from WebCT.* [Y1]
- *Individual study rate.* [Y2]

As the majority of answers were so general and demonstrate a lack of understanding it could be deduced that little bi-directional communication and negotiation of learning takes place on the site.

WebCT support of learning styles/preferences (Question 8)

The majority of respondents left this question blank, but where responses were given many referred to information and data resources:

- *The useful websites within web help me through the learning.* [Y1]
- *By using useful websites I am able to get the information that I personally need.* [Y1]
- *The Internet links make my researching a lot easier.* [Y1]
- *It guides me what to study and supply me with information.* [Y1]

One student commented on support for use of additional senses, and another indicates a preference for print based material:

- *Stimulates me to use more than one sense. Colour and pictures, especially on PowerPoint slides stimulate interest and learning.* [Y1]
- *I like using books; so, WebCT provides references to useful books in the library.* [Y1]

The need for self assessment is another theme that is raised regardless of the question and can therefore be interpreted as being important to the respondents.

- *Self-assessment components are useful in evaluating my progress.* [Y1]

Choice and convenience were raised by some respondents:

- *Gives choices.* [Y2]
- *Convenient.* [Y2]
- *Anywhere/anytime information provision.* [Y2]

Critically, one respondent stated:

- *It doesn't support it.* [Y1]

And another pleads for assistance:

- *Some department must intervene.* [Y2]

WebCT support of facilitator-learner interaction (Question 9)

Some of the respondents were adamant that there was no facilitator-learner interaction:

- *It doesn't.* [Y1]
- *It doesn't; not that I have seen.* [Y1]
- *Very rarely.* [Y2]
- *It doesn't.* [Y2]
- *Never.* [Y2]

Others clearly felt that it did, showing they appreciated the efforts of the Year co-ordinator:

- *Communication between facilitator and learner is provided.* [Y1]
- *Allows us to e-mail facilitators with any problems we may have.* [Y1]
- *e-mailing is an adequate facility provided by WebCT for facilitator/learner interaction.* [Y1]
- *email.* [Y2]
- *Free to comment.* [Y2]

Whilst others made this clear as they felt there was only interaction between themselves and the Year Co-ordinator

- *Only with co-ordinator.* [Y2]
- *With curriculum head only.* [Y2]
- *Most facilitators don't use it.* [Y2]

Again some felt that the provision of information on the site equates to interaction.

- *By supplying the information we are supposed to study through the Web.* [Y1]
- *Concepts are reinforced on WebCT.* [Y1]
- *Loading of notes takes long.* [Y2]

WebCT support of assessment (Question 10)

Generally responses to this question were positive in so far as some students used the information loaded onto WebCT:

- *Giving answers to each assessment.* [Y1]
- *Answers.* [Y2]
- *FAQ's*[4]*; Quizzes.* [Y1]
- *By providing answers following an assessment.* [Y1]
- *There are some quiz questions to help us see if we are progressing well or not.* [Y1]
- *Well, the self-assessments are there to be done.* [Y1]
- *It provides answers to weekly assessment.* [Y1]
- *By giving the answers or obtaining the assessment answers through the Web.* [Y1]
- *References.* [Y2]

[4] FAQs is taken to mean Frequently Asked Questions

- *SAT[5] is a good gauge.* [Y1]
- *Web Links.* [Y2]

However others seemed unaware of these options

- *I'm not sure.* [Y1]
- *Not applicable.* [Y1]
- *It doesn't.* [Y2]
- *Never.* [Y2]
- *Not at all.* [Y2]
- *Not sure.* [Y2]

During the research process the answers to the weekly assessments were replaced with a list of references for the sections being tested. The learners resented this move and felt that the self assessment options in WebCT had lost its value. Some of the answers from second year students reflected this:

- *Provision of answers stopped.* [Y2]
- *Self-assessment [has] become irrelevant, [has] lost its value.* [Y2]
- *Should give answers [rather] than references.* [Y2]

Others appeared to be using what was available but wanted additional or more timely resources such as:

- *Need to have more quizzes.* [Y2]
- *Assessment questions insufficient.* [Y2]
- *Not for every module.* [Y2]
- *Need to have more quizzes.* [Y2]
- *Should not upload stuff a day before a test.* [Y2]

WebCT resources used to develop problem-solving skills (Question 11)

Problem solving was also perceived as a process of information retrieval and there did not seem to be an idea that problems could be solved by other means e.g. communication with peers, mind maps, negotiated meanings by means of FAQs, or collectively calling on expert opinion in a discussion forum.

- *Websites and resources.* [Y1]
- *Websites.* [Y2]
- *Useful Websites and resources.* [Y1]
- *Resources.* [Y2]
- *Useful websites.* [Y1]

Even less insight was demonstrated by students who saw self assessment as a problem solving technique as this is only a diagnostic tool to check ones own knowledge.

- *Self-assessment.* [Y1]

[5] SAT in the questionnaire responses is taken to mean Self Assessment Tests.

- *SAT.* [Y1]
- *Self Assessment.* [Y2]
- *Case assessment.* [Y2]

Many respondents (24) from both years stated:
- *None.* [Y1 & Y2].

This could be indicative of a greater understanding of the issues related to problem solving, but more information about respondents perceptions would have been useful.

WebCT resources to develop interpersonal co-operation skills (Question 12)

Only a few of the respondents connected this to communication and sharing of information and group work, other areas were not explored at all.

- *The bulletin and e-mail.* [Y1 & Y2]
- *Communication.* [Y1 & Y2]
- *Chat.* [Y2]
- *Through Group work.* [Y2]

Others interpreted the question as self development
- *Self-assessment and the notices from the Department.* [Y1]
- *Self-assessments.* [Y1]

The others either failed to respond or recognised that there was little use made of WebCT tools to facilitate these skills.
- *None.* [Y1 & Y2]
- *Not applicable.* [Y1 & Y2]

One respondent clearly thought this was a trick question or did not wish to add additional information simply stated:
- *A variety.* [Y2]

WebCT resources used to develop group/team work skills (Question 13)

A few respondents identified communication tools as ways they could use WebCT to develop group/team work skills.
- *e-Mail.* [Y1 & Y2]
- *Communication.* [Y1 & Y2]
- *Bulletin board.* [Y2]
- *Bulletin board attachments.* [Y2]

However, disturbingly two respondents also saw self-assessment being used for the same purpose and another thought websites were the correct tool to use.

- *Self-assessments.* [Y1]
- *Websites.* [Y2]

It was difficult to interpret differences between the responses of "none" and "not applicable" as those that responded "none" could have been stating that there are no tools in WebCT to develop these skills whilst those who responded "not applicable" could have meant the same thing or that it was not applicable to the course in general.

- *None.* [Y1 & Y2]
- *Not applicable.* [Y1 & Y2]

One student did not think that WebCT supported this at all stating:

- *WebCT is more individualistic.* [Y2]

WebCT resources used for self assessment? (Question 14)

The majority of the respondents pointed to the Self-Assessment Multiple Choice Questions and Answers that were posted on the site:

- *Self-assessment questions.* [Y1 & Y2]
- *FAQ's.* [Y1 & Y2]
- *Weekly self-assessment questions.* [Y1]
- *Quiz question; self-assessment questions and answers.* [Y1]
- *Self-assessment.* [Y1]
- *SAT.* [Y1]
- *Tests.* [Y2]

A couple of respondents were highly critical of the way this was being used stating:

- *Highly poor self-assessment.* [Y2]
- *Self-assessment answers no longer useful.* [Y2]

Others stated they did not use the option, that there was no self-assessment option and the ubiquitous "not applicable".

- *I do not answer the self-assessment questions.* [Y1]
- *None.* [Y1]
- *Not applicable.* [Y1]

One student stated:

- *Don't understand questions.* [Y2]

It is not clear if this respondent was referring to the questionnaire or the questions used in the Self Assessment options.

WebCT resources used for peer assessment (Question 15)

Peer assessment is confused with self-assessment by some of the respondents (unless they use the self-assessment in conjunction with other students).

- *Self-assessment questions.* [Y1]
- *Weekly self-assessment questions.* [Y1]
- *SAT.* [Y1]

Others stated they used some of the communication options:

- *Bulletin board.* [Y2]

One did not understand the concept of peer assessment:

- *Question's meaning not clear.* [Y2]

Others stated the usual "none" or "not applicable"

- *None.* [Y1]
- *Not applicable.* [Y1]

WebCT resources used to develop self-directed learning skills (Question 16)

Here, respondents saw access to other websites, communication and self assessment tools as means of developing self-directed learning.

- *Websites.* [Y1 & Y2]
- *Useful Websites.* [Y1]
- *Communication.* [Y1]
- *SAT.* [Y1]

Others stated specific content sections:

- *Theme objectives.* [Y2]
- *Hints and information.* [Y2]
- *Library links.* [Y2]
- *Quiz.* [Y2]
- *Notes.* [Y2]

Others simply stated:

- *All.* [Y2]

Belief that full use is made of WebCT resources to maximise learning (Question 17)

Several respondents simply answered "yes", but others were more informative mostly pointing to information retrieval.

- *Yes, information is relevant to academic work.* [Y1]

- *WebCT complements learning.* [Y2]
- *Provides course content.* [Y2]
- *Objectives and Self-assessment.* [Y2]
- *Websites.* [Y2]
- *Yes, if I visit WebCT I find the information that is also in my courses.* [Y1]
- *Yes, because we get notes about previous lectures on WebCT; self-assessment answers, and more important messages.* [Y1]
- *Yes, it has most of the summary of the large group resources.* [Y1]
- *Yes, the information given is guiding me for what I must study.* [Y1]

Most informative was the respondent who mentioned notes, protocols, web links and answers to questions.

- *Yes, all relevant notices, notes, protocols, PowerPoint presentations are made available on WebCT. Certain websites and links are advised to assist with research. Our relevant questions posted on WebCT are answered. We are kept well-informed.* [Y1]

Those that felt that it was not being used to its full potential pointed to some "missing" information and the time it takes to have the information posted.

- *No, they could put physiology notes on WebCT but they don't; instead, much time is wasted taking notes down from laminated boards.* [Y1]
- *Yes, although not full use; WebCT use could be increased if we were able to get the relevant information on time.* [Y1]
- *Detailed direction is lacking.* [Y2]
- *Notes late.* [Y2]
- *Information delay.* [Y2]
- *Inefficient regarding notes.* [Y2]
- *More self-assessment necessary.* [Y2]
- *Needed information not provided sometimes.* [Y2]
- *Need for updating.* [Y2]

Others felt that better use could be made if facilitators and subject experts were more involved.

- *Feedback and other concerns not answered.* [Y2]
- *Inefficient because of very few users.* [Y2]
- *Not all lecturers use it.* [Y2]
- *Organisers not using it to the fullest.* [Y2]

Organisation of information on the site was also raised:

- *Need to filter junk mail.* [Y2]

Additional one student pointed to technical problems:

- *Loading time too long.* [Y2]

Suggestions for improvement of WebCT courses (Question 18)

Improvements suggested by respondents matched the concerns raised in the previous question including the necessity to delete "non-academic" communications as well as previous years' communication.

- *Student notices about non-academic stuff should be done away with.* [Y1]
- *Eradication of last year's notices.* [Y1]

Another respondent saw a means of re-organising the structure by suggesting:

- *Each lecturer should have own link.* [Y2]

This suggestion was echoed by the respondents who stated:

- *Need to communicate with experts for help.* [Y2]
- *Lecturers should be trained in the use of WebCT.* [Y2]
- *Lecturers should be responsible for uploading own notes.* [Y2]
- *Involve more people to serve our needs.* [Y2]

They also suggested more detailed notes and early access to allow for preparation

- *We should have notes put on WebCT for each case.* [Y1]
- *The LGRS notes should be made available before the LGRS so that we can read up and have intelligent questions to ask. Also so that we can fill in what the lecturer is saying instead of copying their PowerPoint presentations.* [Y1]
- *Relevant notes, course contents, skills protocols should be posted early on during a theme, if possible before a new theme commences. LGRS contents should also be posted promptly.* [Y1]
- *Include much more notes to facilitate learning. We have a lack of this.* [Y1]
- *Preparation time not afforded.* [Y2]
- *Allow for preparation time by uploading notes early.* [Y2]
- *Notes before lecture.* [Y2]
- *Put up self-assessment on time.* [Y2]
- *Put up notices on time.* [Y2]

Finally on a very practical point one respondent suggested:

- *Format files for less expensive printing.* [Y2]

Questionnaire Section B

Section B of the questionnaire was designed to investigate how the various tools and options available on the WebCT site matched student perceptions of importance. The first set of columns give an indication of how the tools are used at present and the second set of columns indicate how much importance students attach to these features.

The following tables (Table 1 and Table 2) show the ratings from students in first and second year. Both tables have been sorted in order of perceived importance with the

items deemed most important at the end of the table. Attention is drawn to certain items of interest; where there is an obvious mismatch of importance and how well this is perceived to be done the items are highlighted in dark grey; where there is a match the rows have been highlighted in light grey.

Questionnaire Number	Tool or skill	Poor	Satisfactory	Good	Very good	Omitted	Not Aware	Not important	Important	V Important	Omitted
8	Enthusiasm	19	25	26	7	28	27	21	24	10	23
14	Colours	17	29	20	24	15	9	19	33	22	22
9	Chat	20	28	19	18	20	27	21	24	23	10
15	Senses	25	26	18	19	17	18	9	26	24	28
6	Accessible	19	16	30	35	5	6	11	26	25	37
12	Manage	22	21	23	22	17	16	25	27	25	12
18	Empowerment	19	32	26	12	16	18	22	22	27	16
13	Promptness	30	37	14	9	15	6	21	34	33	11
11	Q feedback	26	28	16	20	15	9	22	24	37	13
19	Font	12	19	28	32	14	10	14	24	39	18
7	Styles	10	16	19	35	25	18	16	19	40	12
20	Never lost	16	30	18	16	25	21	24	12	40	8
5	Peer Feedback not possible	20	22	15	43	5	16	15	26	41	7
17	**Glossary/dictionary**	**11**	**27**	**22**	**38**	**7**	**5**	**8**	**25**	**47**	**20**
4	Peer conversation	9	20	19	32	25	7	19	17	51	11
2	Supports communication	8	14	21	55	7	4	14	30	52	5
10	Quiz	34	27	18	7	19	5	18	21	52	9
16	Theme objectives	28	22	21	19	15	11	15	16	52	11
3	Facilitator communication	14	31	18	34	8	11	16	10	54	14
1	Skills to use WebCT	11	20	21	44	9	12	10	18	57	8

Table 1: Year 1 student responses to Section B of the Questionnaire (n=105)

The validity of this instrument amongst the first year students needs to be questioned. Item 17 (highlighted in bold in Table 1) is of particular concern in that the students state the Glossary/dictionary facility is of high importance and this is done well. Observations of the system show there is no such facility used in WebCT and the Year Co-ordinated indicated that it was not feasible to introduce it asking "who will manage it, update it and check the information?". Question 5 also proved to be problematic; it was phrased as a negative in order to change the pattern of the questions but on review it appears that it is difficult to rate a negative.

Item 16, theme objectives, were consistently created for all themes taken from the curriculum guidelines and were similar for both first and second year students. It is strange that the one item whose quality I would not question (and supported by the second year students in the Table 2 below) was reported here as poor. Another mismatch with my particular biased concern, and challenged by the second year

student responses, is the view that communication options in the system are generally well done.

Most students, however, state they have the skills to use the system which is rated as an important feature, and most other items are rated as "satisfactory".

Questionnaire Number	Tool or skill	Poor	Satisfactory	Good	Very good	Omitted	Not Aware	Not important	Important	V Important	Omitted
18	Empowerment	30	23	19	10	18	21	20	19	25	15
9	Chat	25	23	12	20	20	18	19	19	28	16
14	Colours	16	27	21	23	13	18	21	16	31	14
15	Senses	22	27	15	20	16	16	16	17	33	18
5	Peer Feedback not possible	23	20	21	17	19	14	16	15	36	19
8	Enthusiasm	20	26	19	23	12	13	15	23	36	13
11	Question feedback	33	24	10	15	18	17	11	17	38	17
4	Peer conversation	11	24	20	34	11	12	21	18	39	10
12	Manage	16	23	23	21	17	15	13	19	39	14
10	Quiz	35	20	14	14	17	15	13	16	41	15
19	Font	8	19	21	39	13	12	10	21	42	15
7	Styles	13	20	16	30	21	8	14	15	43	20
13	Promptness	32	28	17	11	12	15	13	16	43	13
16	Theme objectives	16	16	18	37	13	12	15	14	46	13
17	Glossary/dictionary	31	20	12	22	15	14	9	17	46	14
1	Skills to use WebCT	13	17	26	32	12	3	11	23	49	14
3	Facilitator communication	17	20	24	23	16	9	15	14	49	13
2	Supports communication	4	11	27	29	29	3	11	27	50	9
20	Never lost	10	27	12	38	13	10	10	15	51	14
6	Accessible	3	10	6	78	3	5	10	7	66	12

Table 2: Year 2 student responses to Section B of the Questionnaire (n=110)

Second year student responses appear to be more reliable than first year responses, as they do not praise facilities that are not available [but I could be viewing it this way because in general they support my bias]. Here the students see the Glossary/dictionary (item 17) as important but report that it is poorly done. Item 5 remains problematic but insignificant as it is not scored highly in any of the categories. The mismatched scores for items 11, 10 and 13 agree with statements made in Section A of the questionnaire. However, students do show that they appreciate the availability ("accessibility", item 6) of the system, they feel that they can navigate their way successfully. Additionally, most students feel they have sufficient skills to use the system.

Questionnaire conclusions.

It became clear from the responses to the questionnaire that students were predominantly using WebCT for information retrieval and easy access to LGRS

notes. Whilst the example from Zambia in the literature review (see page 11) gives a good reason to use the internet for information retrieval, it is also important to note the concern raised by Kerfoot *et al* (2005: 387) that "information does not necessarily equal knowledge" and too much time can be spent on information gathering rather than knowledge creation (see page 15). In analysing the questionnaire responses there appeared to be little awareness of how the technology could facilitate this process of knowledge creation.

4.5.3. Interviews with students

Interviews with students were set up to verify the findings of the questionnaires and interrogate certain aspects further. The first interview took the form of an unstructured focus group discussion and was attended by 14 students, 6 second years and 8 first year students. In this focus group it was clear that certain participants were expected to take a leadership role and others were either reluctant to comment or looked to the leader for approval of any statements made.

Generally the feelings expressed here supported the findings of the questionnaires:

- Technological difficulties were experienced when there were login problems resulting in delays in the start of a new theme. Also students stated that they often did not know how to use the quiz sections of the system and thus many of them did not use the self assessment options.
- Delays in the uploading of information was another strongly expressed complaint. The students claimed that it was problematic that not all staff members participated in the online forums or the uploading of their own material. According to them this caused delays which they said resulted in confusion in the use of the material. Continual reminders were required to encourage staff members to make the information available online.
- Bulletin boards were another area of complaint. Students stated that they would like to have old information cleared and a separation of student social discussions and information from the year co-ordinator.

Students did, however, state that if these issues were addressed and more attention was given to training them in the use of WebCT they would find the WBLE useful and it would add value to their studies.

This focus group interview was followed by a more structured interview with six first year learners. However the findings did not add any new issue nor did they differ much from those already discussed so further interviews were not conducted.

4.5.4. Interview with staff members and group leader

There appeared to be reluctance among staff members to participate in an interview process. Three members of staff (of an unknown total) agreed to be interviewed, the Year Co-ordinator as observed during the daily work process and two other group facilitators. However, only one group facilitator met the appointment and the other remained un-contactable thereafter. Additionally this facilitator also asked that the interview take place with the group leader (a student who takes on the role of co-ordinating the group activities).

There is no obvious reason for this reluctance but several options could be raised. For instance, it could be interpreted as a resistance to being interrogated by an outsider, or as a result of an insecurity about the role they played as facilitators in the new curriculum and their familiarity with WebCT in particular. It could also be partly assigned to research fatigue within the Medical School or as research inexperience on my part.

In addition it is interesting to note that in response to all the questions the facilitator responded from a student perspective, there was no interrogation of staff roles.

Facilitator: questions and answers

Q: How were tools of WBLE supporting learning
A: The learners were given access to the tool and were able to get the resources they need for learning

Q: Were CMC tools appropriately used?
A: Yes, by most of the learners although some do not use it at all. These are the students that experience problems with WebCT

Q: What practical and social interactions occurred in medical education?
A: The learners are placed in groups so they interact with one another and they raise their concerns with relevant staff members.

Q: Is there evidence of preparation and experience necessary for technology to enhance rather than interfere in the processes of the course?
A: Some students need intervention from experienced IT people; others got help from their peers. Group effort is encouraged by staff.

Q: Did lecturers/faciltators play the role of overseeing the processes of group interaction e.g. organizing learner groups, activities, communication and consultations?
A: Organizing learner groups was done by one person (staff member). Activities are organized by facilitators or student group co-ordinator

Communication and consultations were meant to take place through WebCT but there was often difficulties as learners reported that they did not get responses and had to bring their questions back to the group face to face sessions.

Q: How were learners helped to integrate new and old information, present ideas in various forms; provided with organized learning material; to become self-regulated through learning strategies like summarizing and questioning?

A: Make notes from group discussions that are then posted on WebCT Preparing for group discussions

Student group leader: questions and answers

Q: Is there evidence of a contribution of instructional technology towards a shift from a behaviourist to a constructivist framework? [Asks for clarity] ... e.g. movement from school type learning to learning about real life situations?

A: Students do their work and produce group results that show their understanding. Not all are willing participants but they get motivation from others.

Q: What determines effectiveness of a WBLE?

A: Training for staff is necessary as staff not technically equipped

Q: How were tutorials conducted? Did they involve use of hypertext/hypermedia?

A: No, students discussed things in groups with facilitating students leading the groups.

Q: Was the online community encouraged? How/When/How often?

A: Yes, students were always reminded to go online although they were not penalized if the were not keen. It appeared they were mainly using the self-assessment quizzes and not the communication tools.
Was not clear if discussion were monitored in any way.

Q: Is knowledge/information relevant to learners' prevailing situations? i..e does it allow them to obtain new knowledge by themselves.

A: There is always an attempt to give the learners the relevant information, although students raise concerns through WebCT.

The interview with the group facilitator and student group leader was recorded and then analysed to see if any new information could be added to that already gleaned from the students. Most importantly there seemed to be a dichotomy in expectations between students and facilitators. Students appeared to expect facilitators to be

expert subject matter consultants whilst the proponents of the "new curriculum" felt that the facilitators should simply overview the process of knowledge creation and ensure the groups were functioning. It would be difficult for any one person to be an expert in all the themes in a specific year particularly as these themes were multidisciplinary in nature, however, they could be expected to point the students to the relevant areas where information could be gathered. It appears that it was this information gathering that took precedence and other areas of knowledge creation were ignored by both students and facilitators.

Particular note should be taken of the student group leader's response that "*Training for staff is necessary as staff not technically equipped*". This response clearly indicates that in the view of the participant staff members do not participate but align this with lack of technical skills rather than a lack on inclination.

More generally, it appears that all stakeholders saw the role of WBLE to be primarily a means of distributing information and that for many staff members this was extraneous to their other work. For instance, when the Year Co-ordinator was asked about how WebCT was used by facilitators' to develop team work and encourage peer review it was explained "We don't have this in the curriculum to any great extent". A similar response was given when the same person was asked about the use of the glossary tool in WebCT; "Who will manage it, update it and check the information?". There is clearly a need to include more staff in the development and daily use of the system.

4.6. Conclusion

It was clear that from the students perspective information sources were of paramount importance and they would have preferred more communication with a variety of staff members. Staff, in general, were not clear about the role the technology could play in changing the educational paradigm and they were not committed to using the technology where it could further add to their work load. These issues are explored in more detail in Chapter 5.

Chapter Five: Conclusions and Recommendations

5.1. Introduction

At the beginning of this research I had the naive view that data collection would be an easy process, however, the staff members and to a lesser extent the students showed a remarkably strong ethos of passive resistance to participating in the research. In hindsight this should have been expected, but ultimately it did not invalidate the study as in itself it raises issues that need to be addressed. In particular, the concept of 'research fatigue', whereby students are often asked to contribute to investigations but seldom see the results of such investigations or gain substantial benefit from them, could be a problem. It also highlighted how resistant staff members can be to ideas that do not fit neatly within their own ideological, philosophical and pedagogical framework. For many staff members these basic premises have been challenged in both the change of curriculum and the introduction of computers as a tool to mediate learning.

The purpose of this investigation was to look at the ways in which WebCT was being used to support the new PBL curriculum. There was never any intention of investigating the new curriculum and its implementation. However, as the two were introduced at the same time there was some overlap and some of the difficulties in exploring this topic could have been because of the dual change load that was being experienced by staff.

In investigating the use of WebCT at the Medical School it was important to balance the potential of the application against its use, as well as to consider the needs of both the staff and students.

5.2. WebCT as a tool

All tools are created with a function in mind, however the effective use of the tool is in the hands of the users; in this case the users are the Medical School staff and learners. However, before analysing how a tool is used, it is important to understand if it has the necessary functionality for the task at hand.

Ellaway (2005) maintains that an online learning management system should have, or cater for, resource management, evaluation, content management, timetabling, noticeboard, external systems, users and groups, connectivity, portfolio, discussion, assessment as well as authorisation and security. Each one is accommodated by WebCT as a program. However, not all are used by the system administrators at the Medical School; in particular, timetabling (except for notices to students about change of times and venues in the discussion forum), user groups and portfolios. It should also be noted that the WebCT program did not seamlessly communicate with

the University's registration system and therefore there could be delays between a student registering and gaining access to the WBLE.

5.3. Use of WebCT by students

The findings reported here do not differ radically from the report by McLean and Murrell (2002), in so far as students are able to use the system, find it useful to gather information and make use of the communication tools for student events and to receive and send messages between themselves and the Year Co-ordinator. However, the findings do differ on more qualitative analysis of student satisfaction with the use of the system as a whole.

In general, problems were associated with:

- logging-in, during which access would be denied resulting in delays in accessing information related to a new theme,
- delays in the uploading of information,
- disappointment in not finding everything promised on the site,
- disorganisation of material loaded and confusion when material from previous years was combined with current work, and
- difficulties with the quiz options.

The difference in reporting can be attributed to two elements; the first being a more sophisticated, and therefore critical, user group, and secondly the qualitative nature of this study opposed to the more quantitative nature of that conducted by McLean and Murrell (2002).

5.4. Pedagogical use of WebCT at the Medical School

Returning to the pedagogical imperatives of a successful implementation of web based learning as outlined by Reeves and Hedberg (2003) and others (reported on page 18 of the literature review) it is easier to see areas that can be improved.

Epistemology: Contrary to Henke's (2001) advice, the information available to students on the system is purely instructive in nature and little attempt has been made to assist students analyse how knowledge is acquired and generated. More attention to the sharing of information and discussion of topics by groups and their facilitators could be made. Additional features such as mind maps could foster this activity.

Structure: Again Henke's (2001: 6) warning that "the transfer of existing course material, as is, to [the web] without considering using the medium's capabilities" is considered a "critical" mistake is ignored, but more damning is that what is submitted

does not "replicate the best of the classroom environment"; it is simply additional information or summaries of what was said. No attempt has been made to take advantage of the extra functionalities offered by the medium including group discussions and portfolio submissions or to improve on instructivist material.

Learner control: Students are allowed some control over the system particularly in terms of when they access the system, how often they use it and in the posting of general messages. However many students commented that they would like to have more intensive training which would allow them to feel more in control and less dependent on others for help.

Contextual orientation: There is little evidence of scaffolding taking place in the learning system with notes and references 'dumped' amongst previous years work. Although PBL should take advantage of 'unstructured problems' the material used to make sense of this should be suitably ordered to allow students to make the best possible use of it. Furthermore, it would be useful if the 'unstructured problem' given to students was presented online and allowed to form the basis for the students to order their own material in the form of mind maps, questions and answers as well as portfolio presentations.

Motivation: Students reported high intrinsic motivation for using the system, in particular, for downloading LGRS lecture notes and self assessment options. However, using Henke's (2001) analogy, the promise of these tools was 'subverted' by uploading delays, the questionable quality of some of the material, little technical forethought in the file structures and the resulting problems with use.

Individual differences: There appears to be no deliberate attempt to allow for individual differences in learning style and prior knowledge.

Collaboration: Collaboration is not actively encouraged and is also limited by the way the system is set up as there are no group supported activities.

Cultural sensitivity: There is no visible attempt to ensure cross cultural sensitivities or backgrounds although none of the material viewed was culturally offensive. The Zulu course offered online was simply a transference of an existing course required as part of being able to communicate with potential patients.

Role of 'instructor': The role of the 'instructor' was not changed to accommodate a learner centred approach except, possibly, by the Year Co-ordinator. If anything the majority of the Medical School teaching staff used it in such a way as to entrench the authoritarian didactic mode of instruction and to distance themselves even further from the students.

5.5. Recommendations

Zemsky and Massy (2004: 52) state that "[f]or the most part, faculty who make e-learning a part of their teaching do so by having the electronics simplify tasks, not by fundamentally changing how the subject is taught". This is supported by Amory's claim that technology is used to match pedagogical ideologies rather than revolutionise the educational methodology (Amory, 2006). In this way the Medical School is no different from other schools both within and external to the University.

Major and Palmer (2006) believe that in the past academic staff were thought to be good teachers if they were experts in their field. However, they claim that this myth is now being challenged and universities are putting greater emphasis on the improvement of teaching by the creation of teaching and learning centres and funding for teaching initiatives. In their analysis Major and Palmer (2006) state there are three levels of knowledge required to be a good teacher; subject matter knowledge, pedagogical knowledge and pedagogical content knowledge. Shulman (cited by Major and Palmer, 2006: 621) describes pedagogical content knowledge as:

> "the most regularly taught topics in one's subject area, the most useful forms of representation of those ideas, the most powerful analogies, illustrations, examples, explanations, and demonstrations — in a word, the ways of representing and formulating the subject that make it comprehensible to others"
>
> Shulman cited by Major and Palmer (2006: 621)

According to these authors, if educators are to teach in a way that is different to the way they were taught and change their pedagogical content knowledge, they require interventions that are more than simply reading and talking about new ideas; "teachers learn through studying, by doing and reflecting, by collaborating with other teachers, by looking closely at students and their work, and by sharing what they see" (Major and Palmer, 2006: 621).

To change the way technology is used would require a radical shift in the way this pedagogical content knowledge is represented and understood by both educators and students at the institution. Moving from a didactic mode to an institutionally imposed PBL curriculum does not necessarily ensure a change in teaching practice and it is my unsubstantiated suspicion that staff members at this institution have used this change to further distance themselves from their students instead of creating a closer learning community. Of great concern is the perceived reluctance of staff members, in general, to make use of the tool to enhance the learning environment.

Medical educators face a number of tasks, they are generally employed by both the provincial medical sector and the University; they are required to fulfil clinical, research and teaching duties. Additionally many of these staff members have their own medical practices. Teaching and learning becomes a small component of their myriad responsibilities that can be contained in a 55 minute lecture period and short tutorials. This subservient role of teaching is distressing and needs to be addressed,

possibly in the manner described by Major and Palmer (2006). Educators need to be challenged about the perceptions of their roles, there needs to be institutional interventions including faculty development workshops and good practice workshops, monetary support for the development of classroom resources, conference attendance and research activities. Staff should be given the freedom to try things that may not work and encouraged to share their experiences with peer groups. There should be support for the creation of collaborative efforts in developing new teaching methods. Most importantly teaching staff need to be challenged on their views of knowledge, knowledge creation, academic roles, students, pedagogy and instructional interventions.

References

Adams, A. M. (2003). "Issues and Innovations in Nursing Education. Pedagogical Underpinnings of Computer-Based Learning". *Journal of Advanced Nursing*. 46(1), pp 5-12.

Altheide, D.L. and Johnson, J. M. (1994). "Criteria for assessing interpretive validity in qualitative research". In: Denzin, N. K. and Lincoln, Y. S. (eds.) *Handbook of qualitative research*. California: SAGE Publications. pp 485 – 499.

Amory, A. (2006). "It's not about the tool, it's about the ideology". Paper presented at the NADEOSA 10th Anniversary Conference, 23-24 August 2006, CSIR Convention Centre, Pretoria.

Amory, A. and Mars, M. (1994). "Evaluation of efficacy of multimedia leraning: project development and strategies". In: Alexander, P.M. (ed), *Papers delivered a the international conference on Computer-Assisted Education and Training in Developing Countries*. Pretoria: University of South Africa, pp 1-6.

Amory, A., Mars, M. and Meyerowitz, J., (1999). "Evaluation of efficacy of multimedia learning: project development and strategies". *South African Journal of Education*, 19(1) pp 11-8.

AvantGo, (2002). "Harvard Medical Students learn and work through mobile solutions". Available online at http://www.avantgo.com/products/customers/demos/harvard/harvard_casestudy.pdf [Accessed on 05 July 2006].

Barrows, H.S. and Tamblyn, R.M. (1980). *Problem-Based Learning: An Approach to* Medical Education. NY: Springer Publishing Company.

Bednar, A.K., Cunningham, D., Duffy, T.M. and Perry, J.P. (1995). "Theory into practice: How do we link?" In: Anglin, G.J. (Ed.), *Instructional Technology: Past, present and future*. (2nd ed., pp 100-111), Englewood, CO: Libraries Unlimited, Inc.

Berge, Z. (1995). "Computer-mediated communication and the on-line classroom in distance education: From marks in the sand to computer conferencing via optics". In: Berge, Z. and Collins, M. (eds.), *Computer-mediated communication and the on-line classroom*. Cresskill, New Jersey: Hampton Press.

Bhattacharya, K. and Han, S. (2001). "Piaget and cognitive development". In: Orey, M. (ed.), *Emerging perspectives on learning, teaching, and technology*. Available online at http://www.coe.uga.edu/epltt/Piaget.htm [Accessed on 03 July 2006].

Bransford, J.D., Sherwood, R.D., Hasselbring, T.S., Kinzer, C.K., & Williams, S.M. (1992). "Anchored instruction: Why we need it and how technology can help". In Nix, and Spiro, R. (Eds.), *Cognition, education, and multimedia* (p. 121-140). Hillsade, NJ: Erlbaum.

Brown, J.S., Collins, A. and Duguid, S. (1989). "Situated cognition and culture of learning". *Educational Researcher*, 18(1), pp 32-42.

Camp, G. (1996). "Problem-based learning: A paradigm shift or a passing fad?" *Medical Education Online*. Available online at http://www.med-ed-online.org/f0000003.htm [Accessed on April 03, 2006].

Cognition and Technology Group at Vanderbilt, (March 1993). "Anchored instruction and situated cognition revisited". *Educational Technology*, 33(3), pp 52-70.

Cohen, L. and Manion, L. (1987). *Research Methods in Education.* (2nd Ed.*)*. London: Croon Helm.

Collins, A. (1988). *Cognitive apprenticeship and instructional technology.* (Technical Report 6899): BBN Labs Inc., Cambridge, MA.

Conway, J. (1997) "Education technology's effect on models of instruction". Available online at http://copland.udel.edu/~jconway/EDST666.HTM. [Accessed on 04 July 2006).

Cronje, J. (2000). "Paradigm Lost: Toward integrating objectivism and constructivism". ITForum paper 48. Available online at http://itech1.coe.uga.edu/itforum/paper48/paper48.htm. [Accessed on 28 March 2007].

Dalgarno, B. (2001). "Interpretations of Constructivism and Consequences for Computer Assisted Learning". *British Journal of Educational Technology.* 32(2), pp 183-194.

Davis, M. and Denning, K. (1998). "Learning in Virtual Space: Potential and Pitfalls in Electronic Communication". Papers from the 28th Annual SCUTREA Conference Research, Teaching and Learning: *Making Connections in the Education of Adults.* Available online at http://www.leeds.ac.uk/educol/documents/000000712.htm. [Accessed on 18 September 2006].

Denzin, N.K. (1994). "The art and politics of interpretation". In: Denzin, N. K. and Lincoln, Y. S. (eds.) *Handbook of qualitative research.* California: SAGE Publications. pp 500 – 515.

Driver, R., Asoko, H., Leach, J., Mortimer, E., and Scott, P. (1994). "Constructing Scientific Knowledge in the Classroom". *Educational Researcher.* October 1994, (5-12).

Ellaway, R.H. (2005). *Evaluating a virtual learning environment in medical education.* PhD thesis, The University of Edinburgh. Available online at http://www.era.lib.ed.ac.uk/dspace/bitstream/1842/885/1/Ellaway_thesis.pdf Last accessed on 04 September 2006.

Ertmer, P.A. and Newby, T.J., (1993). "Behaviourism, cognitivism and constructivism: comparing critical features from an instructional design perspective". *Performance Improvement Quarterly*, 6(4), p.5—70.

Felder, R. (1993). "Reaching the Second Tier: Learning and Teaching Styles in College Science Education". *Journal of Science Teaching*, 23(5), pp 286-290. Available online at http://www.ncsu.edu/felder-public/Papers/Secondtier.html [Accessed on April 03, 2006].

Fontana, A. and Frey, J. H. (1994). "Interviewing". In Denzin, N. K. and Lincoln, Y. S. (eds.) *Handbook of Qualitative Research.* London: SAGE Publications.

Fosnot, C. (1996). "Constructivism: A Psychological theory of learning". In: Fosnot, C. (ed.) *Constructivism: Theory, perspectives, and practice* (pp 17-39). NJ: Lawrence Erlbaum Associates, Inc.

Gay, L.R. (1987). *Educational research: competencies for analysis and application.* Third Edition. Columbus: Merrill Publishing Company.

Good, T. L. and Brophy, J. E. (1990). *Educational psychology: A realistic approach.* (4th ed.). White Plains NY: Longman.

Hannafin, M. J. and Rieber, L. P. (1989). "Psychological Foundations of Instructional Design for Emerging Computer-Based Instructional Technologies: Part I". *Educational Technology, Research and Development*, 37(2), pp 91-101.

Harvard Medical School, (2006) "MyCourses" Online learning portal for Harvard Medical School, available online at http://mycourses.med.harvard.edu/default.asp. [Accessed on 05 July 2006].

Henke, H., (2001). "Evaluating web-based instructional design". Available online at http://www.chartula.com/evalwbi.pdf. [Accessed 28 August 2006].

Hitchcock, G. and Hughes, D. (1995). *Research and the teacher: a qualitative introduction to school-based research*. Second Edition. London: Routledge.

Hsiao, J.W.D.L, (undated) "Computer-supported collaborative learning". Available online at http://www.edb.utexas.edu/csclstudent/Dhsiao/theories.html [Accessed on 05 April 2006].

Huberman, A. M. and Miles, M. B. (1994). "Data management and analysis methods". In: Denzin, N. K. and Lincoln, Y. S. (eds.) *Handbook of qualitative research*. California: SAGE Publications. pp 428 – 444.

Imenda, S.N. and Muyangwa, M.M. (1996). *Introduction to research in education and behavioural sciences*. Umtata: University of Transkei

Johanssen, D. (1991). "Objectivism vs. Constructivism". *Educational Technology Research and Development*, 39(3), pp 5-14.

Johnson, D.W. and Johnson, R.T. (1989). *Cooperation and competition: theory and research*. Edina, MN: Interaction Book Company.

Kaufman, D.M. (1995). "Preparing faculty as tutors in problem-based learning". In: Wright, W.A. and Associates (eds). *Teaching Improvement Practices: Successful Strategies for Higher Education*. pp 101-125, Bolton, M.A., Anker Publishing Company, Inc.

Kearsley, G., (2006). "Cognitive Dissonance (L. Festinger)". Available online at http://tip.psychology.org/festinge.html [Accessed on 24 November 2006].

Kerfoot, B.P., Masser, B.A. and Hafler, J.P. (2005). "Influence of new educational technology on problem-based learning at Harvard Medical School". *Medical Education*. (39). Blackwell Publishing led. pp 380-387.

Kozma, R.B. (1987). "The implications of cognitive psychology for Computer-Based Learning Tools". *Educational Technology*. November.

Lave, J. and Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation*. Cambridge, UK: Cambridge University Press.

Liaw, S-S. (2002). "Understanding user perceptions of www environments". *Journal of Computer Assisted Learning*. 18, pp 137-148.

Major, C.H. and Palmer, B. (2006). "Reshaping teaching and learning: the transformation of faculty pedagogical content knowledge". *Higher Education*. (51) pp 619-647.

Maykut, P. and Morehouse, R. (1994). *Beginning qualitative research: a philosophical and practical guide*. London: The Falmer Press.

McLean, M. and Murrell, K. (2002). "WebCT: integrating computer-mediated communication and resource delivery into a new problem-based curriculum". *Journal of Audiovisual Media in Medicine*. 25(1) pp 8-15.

Meredith, L. (2005) "Havard Medical School modernizes IT infrastructure", SearchDataCenter.com. Available online at http://searchdatacenter.techtarget.com/originalContent/0,289142,sid80_gci1123914,00.html. [Access on 05 July 2006].

Merriam, S.B. (1998). *Qualitative research and case study applications in education.* San Francisco: Jossey-Bass Publishers.

Mtonga, R.E. (2006) "Zambia: E-Medicine, a new resource for Zambian students". *The Times of Zambia (Ndola).* Available online at http://fr.allafrica.com/stories/200603140061.html. [Accessed on 03 April, 2006].

Murrell, K. (2001). *Computer assisted education: design, development and evaluation.* Unpublished Masters thesis, University of Natal.

Murrell, K. and Meyerowitz, J. (2004). "Student demographics as a predictor of use of an educational software program". *South African Journal of Education.* 24(1). pp 42-48.

Myers, M. D. (1997). "Qualitative research in information systems". *MIS Quarterly* (21:2), 241-242, June. MISQ Discovery, archival version, Available online at http://www.qual.auckland.ac.nz/ [Accessed on 21 May, 2000].

Orrill, C.H., Hannafin, M.J. and Glazer, E.M. (2004). "Disciplined inquiry and the study of emerging technology". In: Jonassen, D.H. (ed) *Handbook of research on educational communications and technology.* 2nd ed. Lawerence Erlbaum Associates, Mahwah New Jersey. pp 335-353.

Percival, F. and Ellington, H. (1984). *A handbook of educational technology.* London: Kogan Page

Pitman, M. A. and Maxwell, J. A. (1992). "Qualitative approaches to evaluation: models and methods". In: LeCompte, M.D., Millroy, W.L. and Preissle, J. (eds.). *The handbook of qualitative research in education.* New York: Academic Press Inc. pp 729 - 770

Queeney, D.S. (1995). *Assessing needs in continuing education: an essential tool for quality improvement.* San Francisco: Jossey-Bass.

Reeves, T.C. (2000). "Socially responsible educational technology research". *Educational Technology.* November-December.

Reeves, T.C. and Hedberg, J. (2003). *Interactive learning Systems Evaluation.* New Jersey, Englewood Cliffs.

Resta, P. (ed.), (2002). *Information and communication technologies in teacher education: a planning guide.* Paris, UNESCO. Available online at http://unesdoc.unesco.org/images/0012/001295/129533e.pdf [Accessed on 14 April, 2005].

Roberts, C., Lawson, M., Newble, D. and Self, A. (2003). "Managing the learning environment in undergraduate medical education: the Sheffield approach". *Medical Teacher*, 25(3), pp 282-286.

Rogers, E.M. (2003). *Diffusion of Innovations* (5th ed). NY: Free Press.

Samford University Center for Problem-Based Learning (2005), *PBL Background: Origins.* Available online at http://www.samford.edu/pbl/history.html. [Accessed on 07 April, 2006].

Savenye, W.C. and Robinson, R.S. (2004). "Qualitative research issues and methods: an introduction for educational technologists". In: Jonassen, D.H. (ed) *Handbook of research on educational communications and technology.* 2nd ed. Lawerence Erlbaum Associates, Mahwah New Jersey. pp 1045-1071.

Savery, J. R. and Duffy, T. M. (1995). *Problem Based Learning: An instructional model and its Constructivist Framework.* Available online at http://tiger.coe.missouri.edu/~jonassen/courses/CLE/index.html. [Accessed on 21 November, 2002].

Schmidt, H. G. (1993). "Foundations of problem-based learning: Some explanatory notes". *Medical Education* (27). pp 422-432.

Schmidt, H.G. (1998). "Problem-based learning: does it prepare medical students to become better doctors?" *The Medical Journal of Australia.* 168 pp 429-430. Available online at http://www.mja.com.au/public/issues/may4/schmidt/schmidt.html. [Accessed on April 03, 2006].

Soriano, F.I. (1995). *Conducting needs assessment: a multidisciplinary approach.* Thousand Oaks: Sage Publications.

South African Qualifications Authority (1995). Available [Online] http://www.saqa.org.za/ [accessed on 21 December, 2000).

Steffe, L. and Gale, J. (eds.) (1995). *Constructivism in education.* NJ., Lawrence Erlbaum Associates, Inc.

Stenhouse, L. (1985). "A note on case study and educational practice". In Burgess, R.G. (ed.). *Field methods in the study of education.* London: The Falmer Press.

Stimson, G.V., Donoghoe, M.C. Fitch, C. and Rhodes, T.J. (2001). "Rapid Assessment and Response Technical Guide", Version 1.0. World Health Organization: Department of Child and Adolescent Health and Development, and Department of HIV/AIDS, Geneva. Available online at http://www.who.int/docstore/hiv/Core/Chapter_9.4.html. [Accessed on 28 August, 2006.

The National Teaching and Learning Forum (2001). *Frequently Asked Questions on college and university teaching and learning.* Available online at http://www.ntlf.com/html/lib/faq/bl-ntlf.htm [Accessed on 18 April, 2006].

Tinkel, R. (2006). "Podcasting comes to med school curriculum" *WebWeekly: News from the Harvard Medical Community".* Available online at http://webweekly.hms.harvard.edu/archive/2006/0130/student_scene.html. [Accessed on 05 July, 2006].

Tobin, K. and Dawson, G. (1992). "Constraints to curriculum reform: teachers and the myths of schooling". *Educational Technology Research and Development*, 40(1), 81-92.

Tsapatsoulis, N. (2005) "The constructivist – Objectivist debate" Available online at http://www2.cs.ucy.ac.cy/~nicolast/courses/cs654/chapters/Chap04-08-01.htm [Accessed on 06 July, 2006].

UCSD (2005). "Computer ownership requirement for students entering UCSD School of Medicine in September 2005". Available online at http://meded.ucsd.edu/admissions/comp_ownership.html [Accessed on 18 April, 2006].

von Glasersfeld, E. (1984). "An introduction to radical constructivism". In P. Watzlawick (ed.), *The invented reality.* London, W.W: Naughton & Co.

Vygotsky, L.S. (1978). *Mind in society: the development of higher psychological processes.* MA: Harvard University Press.

Wilson, B.G. and Cole, P (1996) "Cognitive Teaching Models". To appear in: Jonassen, D.H. (Ed.) *Handbook of research in instructional technology*, NY: Scholastic Press. Available online at http://carbon.cudenver.edu/~bwilson/hndbkch.html. [Accessed on 03 July, 2006].

Winn, W. (1993). "Instructional design and situated learning: Paradox or partnership?" *Educational Technology*, 33(3), pp 16-21.

Witkin, B.R. and Altschuld, J.W. (1995). *Planning and conducting needs assessments. a practical guide.* Thousand Oaks: Sage Publications.

Wood, K.C., Smith, H. and Grossniklaus, D. (2001). "Piaget's Stages of Cognitive Development". In: Orey, M. (ed.), *Emerging perspectives on learning, teaching, and technology.* Available online at http://www.coe.uga.edu/epltt/Piaget.htm [Accessed on 03 July 2006].

Zemsky, R. and Massy, W.F. (2004). *Thwarted innovation: what happened to e-learning and why.* The Learning Alliance for Higher Education, University of Pennsylvania. Available online at http://www.irhe.upenn.edu/Docs/Jun2004/ThwartedInnovation.pdf. [Accessed 03 July 2006].

Appendices

Appendix A: Ethical approval application

INFORMATION TECHNOLOGY DIVISION
ITEd, Faculty of Human Sciences
University of Natal, Durban

RESEARCH APPLICATION FOR ETHICAL APPROVAL:
(Second Year Medical Student Elective Programme)

1) Name of student: _____ Student No. _____

2) Title of Study: _____

3) Description of research/evaluation: _____

4) Is the research protocol attached? _____

5) Will there be direct participant contact? **Yes / No**
If yes, explain: _____

6) Is the Questionnaire/Data Extraction Sheet attached? _____

7) Is the Informed Consent Information Sheet attached? _____

8) Will participant confidentiality be maintained? **Yes / No**
Explain: _____

9) I hereby certify that all the information provided above is correct and that it will apply throughout the conduct of proposed research. I will be responsible for safeguarding the confidentiality of human subjects involved.

10) Is this research/evaluation for degree purposes? **Yes / No** _____

11) Signature of Researcher: _____

Name of Supervisor: _____ Signature: _____

Name of Co-supervisor: _____ Signature: _____

For Official Use
APPROVED / NOT APPROVED
Signature: _____ Date: _____
REASON: _____

Appendix B: Participants' consent form

INFORMATION TECHNOLOGY DIVISION

ITEd, Faculty of Human Sciences

University of Natal, Durban

MEDICAL EDUCATION EVALUATION/RESEARCH CONSENT FORM

Participant

Evaluation and research into medical education is a necessary part of quality assurance. Various aspects of the MBChB programme such as student learning and development, as well as the learning environment need to be evaluated, from time-to-time. Curriculum organisers and developers would like to ensure that all students undertaking the MBChB programme being offered by the Nelson R. Mandela School of Medicine benefit equally (e.g. access to resources) and are comfortable within the institution. For the progress of individual students, it is also necessary to monitor the MBChB programme on a continuous basis in order to assist those who might be experiencing problems or difficulties coping with different aspects of the curriculum. To this end, you are requested to complete a questionnaire that will assist programme personnel in the evaluation of the curriculum and your interaction with parts thereof. Your responses are fed back to the curriculum designers for possible revision of different aspects of the course.

Some of the results of the evaluation might be published in education journals, or be used as part of a post graduate degree. Research is an important way in which an institute can publicise issues relating to its teaching programme. The results of its evaluation can be made available for others to view, comment on, or even implement. Such research evaluation also allows curriculum organisers to receive feedback about different aspects of the curriculum from others who might be able to provide constructive criticism.

While most of the evaluation will be anonymous, you are requested to submit your name, as participant. All information will be treated with the strictest confidence and will only be used by the Medical Faculty to your benefit. To confirm the understanding of the information given above and your agreement to co-operate, please sign the Consent Form below and return it to the curriculum organisers.

CONSENT FORM

I, _____ **(name), have been provided with information about the research/evaluation that will be undertaken during the year. I understand the information given to me and agree to participate. I understand that if I disagree to participate, my future studies at this institute will not be prejudiced in any way.**

Signature of participant _____ **Date** _____

Appendix C: Questionnaire

Questionnaire

INTRODUCTION

Evaluation and research into medical education is a necessary part of quality assurance. Since the new curriculum of the Nelson R. Mandela School of Medicine involves the use of a Web-based Learning Environment, WebCT, it is necessary to involve IT specialists and technicians in the checking of the smooth running of the technical aspects of the programme. Any learning environment needs to be evaluated, from time-to-time, to make sure that learners have all the necessary and relevant tools/resources for enhancing their learning. Such evaluation becomes more important after the introduction of new learning tools (those found in WebCT) in a programme. Furthermore, IT specialists and developers of WebCT would like to ensure that all students undertaking the MBChB programme benefit equally (e.g. access to resources) and are comfortable in their use of WebCT. For the progress of individual students, it is also necessary to monitor learners' progress on a continuous basis in order to assist those who may be experiencing problems or difficulties coping with different aspects of WebCT. To this end, you are requested to complete this questionnaire so as to assist IT specialists in improving your interaction with various parts of WebCT. Your responses will inform the Information Technology Division for possible revision of different aspects of the Web-based Learning Environment.

This questionnaire is divided into open-ended (Section A) and closed (section B) questions and has been designed to determine your perceptions and opinions related to Web-Based Learning Environments (WBLE). An example of a WBLE is WebCT, which can support Problem-Based Learning (PBL) through the Computer Mediated Communication (CMC) tools. This questionnaire is part of a research effort to evaluate the use of a WBLE at the University of Natal and in this case the use of WebCT at the Medical School.

INSTRUCTIONS

Answer all questions and indicate your responses by inserting a √ where predetermined options are provided in boxes associated with a question.

Please indicate your year of study:

1st year ☐

2nd year ☐

SECTION A

1. How often do you use WebCT?

Daily: ☐

Three-to-six times a week: ☐

Twice a week: ☐

Once a week: ☐

Once in two weeks: ☐

Once in three week: ☐

Never: ☐

2. **Rate how often you used the following WebCT resources.**

Resources	Never	Sometimes	Often	Frequently
Calendar:				
Library link:				
Objectives:				
Resource/Content:				
Websites:				
Chat:				
Bulletin Board:				
e-mail:				
Self-assessment:				
Other:				

3. **How well is WebCT suited to your learning needs?**

Excellent	Good	Fair	Poor

4. **Briefly explain your answer to question 3.**

_____

_____

_____

5. **What problems have you experienced with WebCT?**

_____

_____

_____

6. **How does WebCT support your active involvement in learning?**

_____

_____

_____

7. How does WebCT support collaboration?

8. How does WebCT support your unique learning style or preference?

9. How does WebCT support facilitator-learner interaction?

10. How does WebCT support assessment?

11. Which resources in WebCT did you use to develop problem-solving skills?

12. Which resources in WebCT did you use to develop interpersonal co-operation skills?

13. Which resources in WebCT did you use to develop group or team work skills?

14. Which resources in WebCT did you use for self-assessment?

15. Which resources in WebCT did you use for peer assessment?

16. Which resources in WebCT did you use to develop self-directed learning skills?

17. **Do you believe that your courses make full use of WebCT resources in order to maximize your learning? Please provide a detailed reply.**

Yes ☐

No ☐

_____

_____

_____

18. **Based on your learning needs, suggest ways of improving your WebCT courses. Please explain fully.**

_____

_____

_____

_____

_____

SECTION B

INSTRUCTIONS

Please answer all questions. For each statement in this section you need to **judge** the feature/utility of WebCT from poor to very good and **rate** the importance from 1 (not aware) to 4 (very important).

Responses:

1 – Poor – if feature is not available
2 – Satisfactory – if feature is partly available
3 – Good – if feature is available
4 – Very Good – if feature is very well implemented

Ratings:

1 – Not aware
2 – Not important
3 – Important
4 – Very Important

EXAMPLE:

Indicate your response about each statement by inserting a √ in the relevant boxes.

Statement	Responses				Ratings			
	1	2	3	4	1	2	3	4
I do not like the colours used in WebCT.	√							√

In this example the colours used in WebCT were inappropriate (1=poor) but this is an important feature that requires close attention (4=very important).

Please evaluate the statements on the next page

Statement	Responses				Ratings			
	1	2	3	4	1	2	3	4
Skills to use WebCT.								
WebCT supports easy communication among peers.								
WebCT promotes communicating with facilitators about course content.								
Conversation amongst person general, personal matters is easy and efficient through WebCT.								
Obtaining feedback with respect to course content from peers is not always possible in WebCT.								
WebCT is accessible at any hour of the day or night.								
WebCT can support different styles of learning.								
The design of the WebCT courses increases my enthusiasm for learning.								
A chat session promotes immediate exchange of ideas and instantaneous collaboration amongst learners.								
Availability of a quiz manager makes self-assessment possible.								
Based on test results, the quiz manager gives a short, immediate feedback to the learner.								
WebCT courses allow learners to manage their time more effectively.								
Peers and subject specialists always respond promptly to questions posted on the discussion board.								
Foreground and background colour combinations provide sufficient and appealing contrast.								
WebCT exploit learners' individual learning styles and preferences as the system promotes the use of more than one sense for learning.								
Overall theme objectives are always communicated through WebCT.								
Availability of a glossary or dictionary on WebCT is a valuable feature.								
WebCT is empowering as it gives me the opportunity to assess the work of my peers.								
Screen font size allows easy reading.								
I never feel lost or confused when navigating in WebCT.								

Thank you for your co-operation

The results will be made available to IT specialists and technicians for consideration.