

Dirty learning: Innovative teaching on the World Wide Web

A mini-dissertation

by

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Abstract

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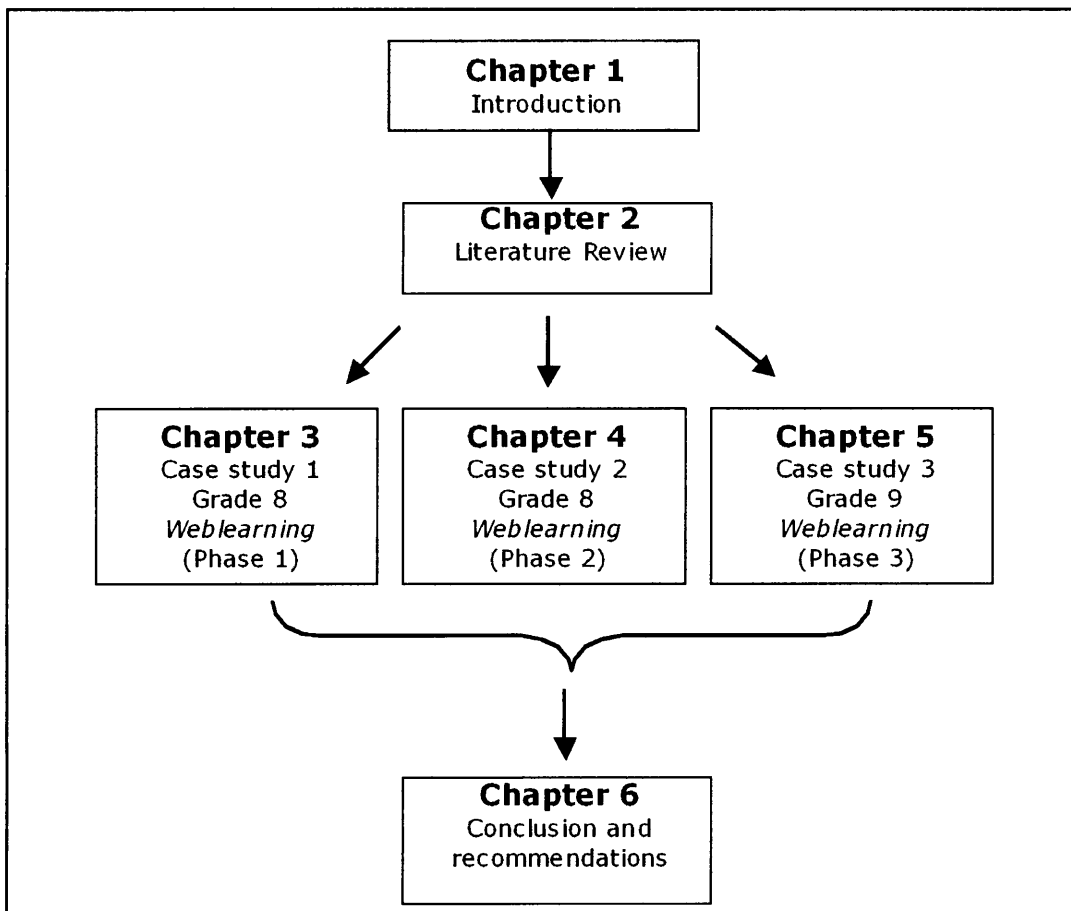
This essay presents the findings of an action research study done in partial fulfilment of a Master's degree in education. The essay records and explores 'dirty learning', an innovative approach to teaching on the World Wide Web. The essay proposes that if the Internet is to be used successfully as a medium for teaching in High Schools, then it is essential that educators adopt an innovative pedagogy when using the Internet. The main contribution of the study is to identify the roles played by various parties in an online learning environment and to suggest a model on which educators at a secondary level can structure future online learning environments.

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Chapter 1 Introduction



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1.1 Introduction to the study

In this essay I address the issues of technology, pedagogy and the development of an online course suitable for high school learners. I propose that if the Internet is to be used successfully as a medium for learning, then it is essential that educators adopt an innovative pedagogy when using this technology.

To illustrate the significance of applying appropriate pedagogies to online learning, I compare cognitive/constructivist pedagogy with behaviourist pedagogy. Using the terms 'dirty learning' and 'clean learning'¹, devised by Seymour Papert (1993), I demonstrate that dirty learning is a pedagogy that can be successfully employed in the creation of an online environment.

The essay is comprised of

- A literature review;
- Action research into three online learning environments that I created; and
- A conclusion.

In the literature review I argue that education has not yet responded systematically to the new technologies that have brought about the information age. After outlining two pedagogical approaches to educational technology, I introduce a model that describes the proposed pedagogy of an online learning environment.

I created three online learning environments in an attempt to teach high school learners and to implement the principles of dirty learning. In each case study I used an action research process to reflect on the development of the online learning environment. Using the findings from each case study, I developed a practical pedagogical model for designing online learning.

In the conclusion, I draw together the insights from the three case studies, develop a series of recommendations for the development of a dirty learning pedagogy in an online environment and apply this to the creation of a model for online learning.

¹ In Chapter 2.5 I elaborate on why I have adopted the terms 'clean' and 'dirty' to classify the two pedagogies.

1.2 Background to the Study

Seymour Papert (1993) tells a story about a group of doctors and teachers from the 19th century who has access to a time machine. These respective professionals use the time machine to visit their respective practices one hundred years into the future.

The Victorian doctors look around the modern surgery and observe a modern doctor treating his patients and barely recognise their common profession. All the practices and technologies they observe seem very foreign to their nineteenth century experience. They leave the surgery, concluding that they would not be able to practice medicine in the twentieth century.

The time travelling teachers walk into a classroom and observe a modern day colleague teaching a lesson. Immediately they recognise the room and the teacher's practice. They notice that there are a few strange technologies around the side of the classroom, but the teacher is not making much use of them and his educational practice seems very familiar. At the end of the lesson they congratulate their modern day teacher on a very good lesson, hop into their time machine and return to the nineteenth century quite convinced that they could teach in the twentieth century.

Papert (1993) uses this story to illustrate how educational practice, compared to medical practice, has remained fairly static over the past one hundred years. Technology, he observes, seems to have had little impact on how teachers go about their teaching.

The recent introduction of the Internet to Alexandra High School prompted me, as IT facilitator, to consider how Internet technology would impact my practice as I began to teach computer skills. The question that I faced was:

How to teach high school learners using Internet technology?

This essay is an account of how I introduced Internet technology into my teaching at Alexandra High School. It offers a set of case studies into *Weblearning*², an online learning environment that I created, and records how Internet technology affected my teaching practice.

² The URL www.weblearning.co.za is owned by myself and represents my interest in education and the Internet. I have also branded my online learning environments with the name *Weblearning*.

1.3 Research problem

Internet technology is certainly being used in schools. The vast range of educational Web sites available offers adequate proof that many schools have adopted the Web for teaching purposes. (Mioduser, Nachmias, Lahav and Oren, 2000). Of these educational Web sites, few are designed to offer opportunities for innovative learning that is suited to the Internet. The majority of educational Web sites demonstrate that the World Wide Web is essentially used to re-organise existing teaching material. Generally, innovative curricula and opportunities for quality learning seem sadly lacking in the majority of educational resources (Mioduser et al, 2000).

In the process of creating online learning materials, educators have missed a vital step. They have forgotten to consider pedagogically sound methods of learning and teaching in an online learning environment. Little thought has been given to how the Internet can be used to develop teaching and learning and to enhance the roles of all the participants in the educational process. The majority of teachers have created a learning environment and used it to automate the existing curricula (Staley and MacKenzie, 2000).

This problem leads to three central issues. The first is around the issue of technology – how do you use the Web for teaching and learning? The second is around the issue of pedagogy – what is an appropriate pedagogy for the knowledge age? The third is a combination of the two, and focuses on course design and asks – how do you design the optimal online learning environment? This is illustrated in table 1.1 that follows:

Problem	Issues
How do you teach high school learners using Internet technology?	▪ Technology - How do you use the Web for teaching and learning?
	• Pedagogy – What is an appropriate pedagogy for teaching on the Internet?
	▪ Course design - How do you design the optimal online learning environment?

Table 1.1 Research problem and issues

1.4 The purpose of this study

The broad purpose of this research is to contribute towards improving the quality of online education. The narrow purpose of this research is to evaluate the design, development and implementation of three online learning environments that I created. As a piece of action research, I am aiming at improving my teaching and learners' learning by systematically reflecting on and making changes to my practice.

1.5 Research method

The research method used is the action research cycle most commonly used by action researchers (Dick, 1993). Action research involves the educator inhabiting the dual roles of teacher and researcher. The research was designed, conducted and implemented by the creator of this resource and the objective of this research is to improve teaching in my own online classroom. I applied this action research cycle throughout the three different case studies. The learning environments developed in these case studies are subject to the processes pictured in figure 1.1.

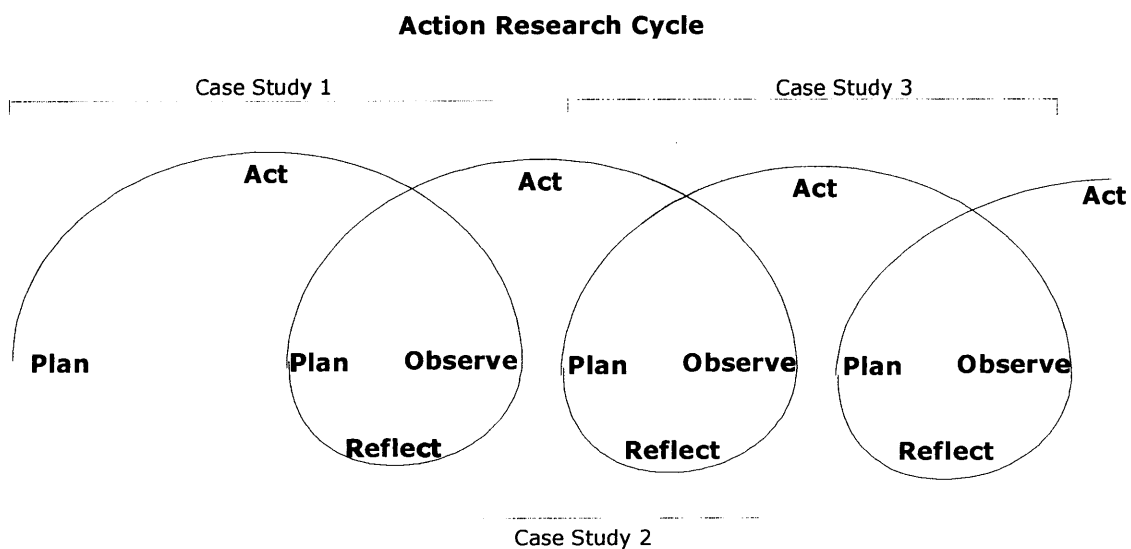


Figure 1.1 Action research cycle

1.5.1 Plan

In the phase labelled Plan, the background, rationale and assumptions that lie behind the development of the particular online learning environment are discussed.

1.5.2 Act

In the phase labelled Act, the case study moves into the 'action' stage of the action research cycle. Here I create and implement an online learning environment that attempts to execute the assumptions made in the planning phase. To help to describe the action taken, I use a framework that is informed by the theory of dirty learning (developed in the literature review). This framework consists of a record of the process of design, development, delivery and maintenance of the online learning environment. This is shown in Table 1.2.

Theory	Phase	Explanation of the phase
Dirty Learning	1) Design	During the design phase, I took my initial understanding of "dirty learning" and optimised this pedagogy for the World Wide Web. Objectives and course content were set at this stage.
	2) Development	During the development phase, I took the design, applied my instructional strategy and used my technical skills to bring the course to the screen to create an online learning environment.
	3) Delivery	During the delivery phase, the online learning environment was offered to the learners. As the online learning environment was accessed and used, the comments made by the learners using this resource and the observations made by myself were collected and recorded.
	4) Maintenance	During the maintenance phase, I facilitated learners' use of the resource, corrected any errors, uploaded learners' completed tasks and ensured that what was presented was clear and comprehensible.

Table 1.2 Summary of action taken in the process of creating an online learning environment (Framework adapted from Liaw, 2000).

1.5.3 Observe

In the phase labelled Observe, the comments made by the learners and the observations made by myself about the use of the online learning environment are recorded. The observation phase takes place during and after the use of the online learning environment. In the observation phase, insights developed by myself are collected and stored for the fourth phase.

1.5.4 Reflect

In the phase labelled Reflect, my reflections on the insights gained during this process are used to develop a collection of recommendations about pedagogy and technology in an online learning environment. The critical reflection phase is the last part of the action research cycle. It is in this phase that all the observations from the previous phases are synthesised into an appraisal of the particular online learning environment. The formative evaluation that emerges from the critical reflection phase is then put to use in planning and designing a second online learning environment. This cycle is then repeated through case study 2 (Chapter 4) and case study 3 (Chapter 5). A final synthesis of lessons learnt from these three action research cycles is used to offer a final set of conclusions and recommendations for the construction of an online learning environment (Chapter 6).

1.6 Value of the study

Much has been written about the need for and the use of a new approach to education in the knowledge age. The theoretical possibility of applying such an approach to computers has also been explored in great detail, especially at a tertiary and training level. Less, however, has been written about teaching and learning in a high school online environment and still less has been recorded on the process of actually implementing such a methodology in an online class with high school learners. This study should contribute to the development of a new pedagogy suitable for an online learning environment at secondary level.

Personally, this study, as a piece of action research, has allowed me to investigate my own practice in a new way and to examine more closely what learners actually learn online. I hope that a deeper understanding of learners, of the teacher-learning process, and of my role in the educational lives of learners will be developed. I also assume that my online teaching will benefit from this process.

1.7 Arrangement of chapters

This essay has six chapters:

Chapter 1 - Introduction

... provides an introduction and background to this essay. The chapter introduces the research problem and explains how the research will be conducted.

Chapter 2 - Literature Review

... discusses the research problem enunciated in chapter 1 and develops an appropriate pedagogy and model to describe an online learning environment.

Chapter 3 - Case Study 1

... uses the action research cycle to critically reflect on the design, development and implementation of the first online learning environment called Grade 8 *Weblearning*. I apply the findings of case study 1 to the model developed in the literature review.

Chapter 4 - Case Study 2

... uses the action research cycle to critically reflect on the design, development and implementation of the second online learning environment called Grade 8 *Weblearning*. I apply the findings of case study 2 to the model developed in case study 1.

Chapter 5 - Case Study 3

... uses the action research cycle to critically reflect on the design, development and implementation of the third online learning environment called Grade 9 *Weblearning*. I apply the findings of case study 3 to the model developed in case study 2.

Chapter 6 - Conclusion

... offers recommendations about pedagogy suitable for the design of an online learning environment. I use the model that has been developed to draw conclusions about the pedagogy of an online learning environment.

The chapters themselves are diagrammatically represented in figure 1.2 that follows.

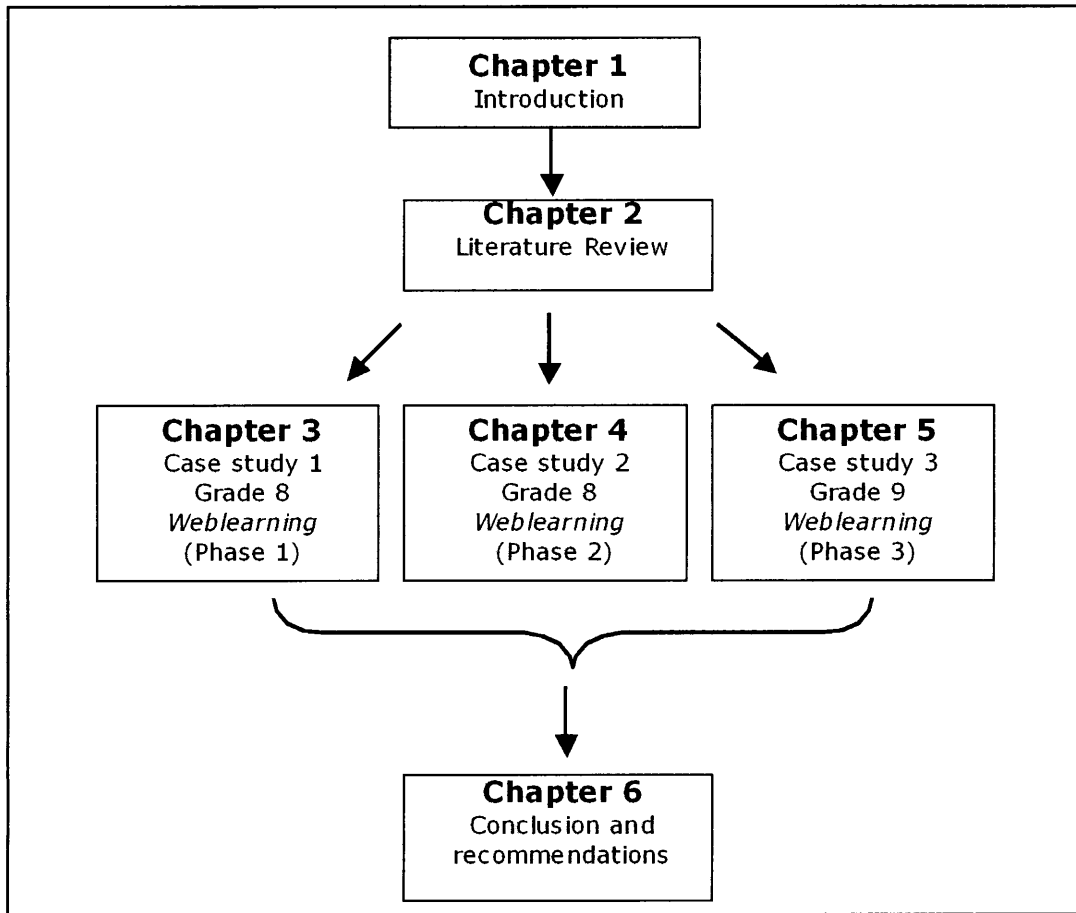


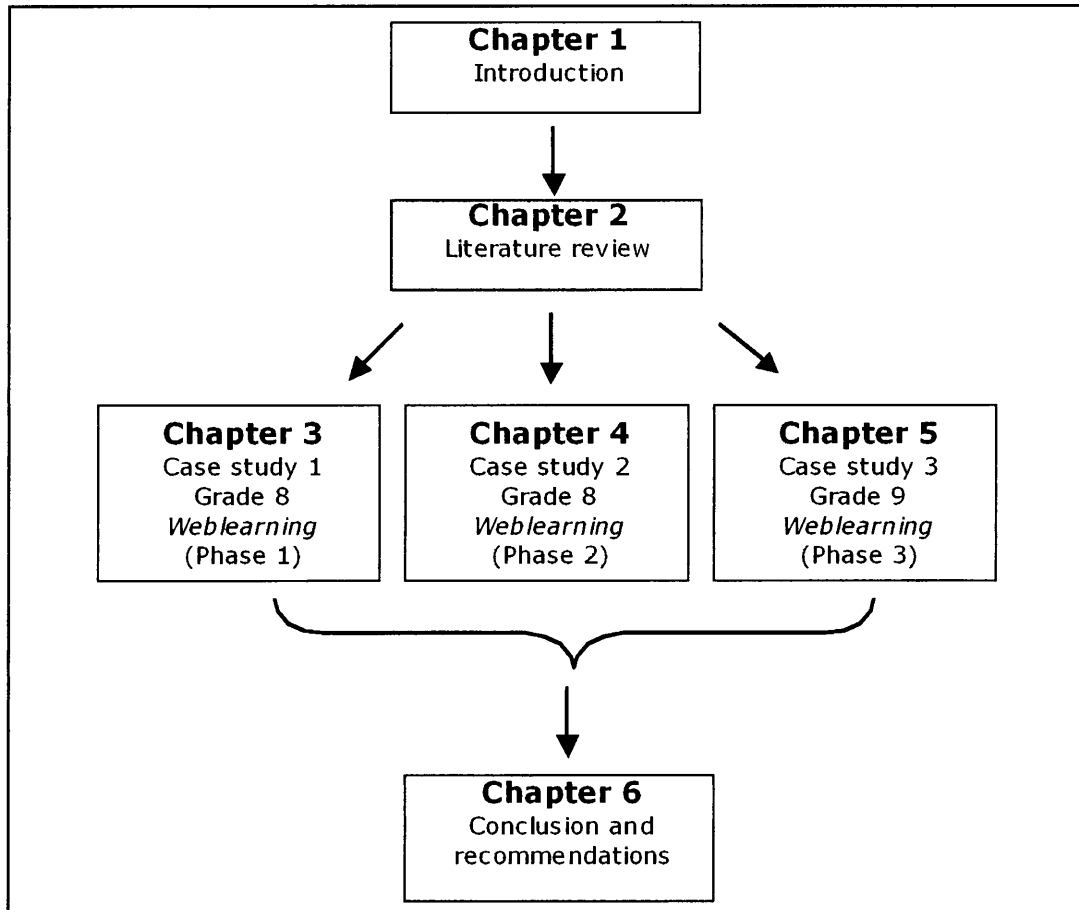
Figure 1.2 Diagrammatic representation of chapters 1 to 6

1.8 Summary

I intend to explore innovative approaches to learning on the World Wide Web through using action research to reflect on the design and development of three online learning environments. This chapter has provided a framework within which the problem is situated. Chapter 2 addresses the research question (see table 1.1) and contextualises the research.

Chapter 2

Literature Review



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2.1 Knowledge Age Forces

1991 has been labelled 'year one of the knowledge age' (Stewart, 1997 quoted by Trilling and Hood, 1999). In this year, U. S. spending on information technology (\$112 billion) exceeded spending on industrial age capital goods (\$ 107 billion) for the first time (Trilling and Hood, 1999). A decade has passed since we entered the knowledge age. In that time, educationalists have identified three knowledge age forces (Trilling and Hood, 1999) ³

- The need for knowledge age work skills;
- The development of advanced knowledge tools; and
- The development of knowledge age learning.

2.1.1 Knowledge Age Force # 1 - The need for knowledge age work skills

The workplace of the knowledge age is information-centred, requiring from workers the ability to perform knowledge age work skills. Employees in knowledge age organisations are required to manage knowledge tools (Trilling and Hood, 1999). Workers need to display knowledge work skills that go beyond the traditional (yet very essential) three R's. Organisations' survival in the knowledge age economy depends on their ability to capture data, filter useful intelligence, transform it into usable knowledge and disseminate and diffuse it rapidly to where it is needed throughout the organisation (Galbreath, 1999).

The following table provides a comparison between the industrial and knowledge age workplace, which highlights the different work skills required by workers in the knowledge age.

Industrial Age Workplace	Knowledge Age Workplace
Businesses produce products that change relatively infrequently.	Businesses must innovate and customise their products constantly.
Work is typically organised according to a strict division of labour controlled by steep hierarchies.	Hierarchical workplaces are not able to adapt to changing market conditions rapidly enough to survive. Authority has increasingly devolved to self-directed, interdisciplinary teams.
Individuals are expected to master relatively discrete and simple tasks that they perform repeatedly.	Workers are expected to be flexible, innovative, self-directed and able to solve problems collaboratively.
Individuals usually keep the same job for life.	Frequent job changes are common.

Table 2.1 The difference between industrial and knowledge age workplaces (Benton Foundation, 1996).

As the 21st century develops, it is likely that the tendency towards the service-based economy will continue (Galbreath, 1999). This tendency will result in further demands for knowledge age work skills.

2.1.2 Knowledge Age Force # 2 - The development of knowledge tools

Technology, in the 21st century, will continue to advance at a dizzy pace. Knowledge tools⁴ will offer knowledge age workers greater capacity to engage in knowledge work. These knowledge tools will offer the user the opportunity to help, enhance and even develop the essential skills of verbal and written communications, problem solving, information access and management, decision making, collaboration and teaming, visual production and the use of a variety of different technologies (Greening, 1988).

³ Knowledge age forces are the challenges that affect the fabric of society as it is substantially rewoven in this postmodern age. This rewoven is accompanied by new values, beliefs, needs and purposes to post modern society (Jonassen, 2000).

⁴ Knowledge tools are those technologies that transcend typical human cognitive limitations such as memory (Greening, 1998). The written word, for example, is the most familiar knowledge technology. It overcomes the limitations of human memory.

There are two broad types of knowledge tools: non-digital and digital. The essential characteristic of knowledge tools is that they are the technologies that house data. Non-digital data would include class lecture notes, research notes, course/class handouts and materials, books, magazines, analogue video and audiotapes. Digital data would include HTML pages, electronic presentations, electronic word processing documents, digital audio files, CD ROMs, third party informational databases, message boards, digital video and any other information sources in digital format (Galbreath, 2000).

Knowledge age workers will need to master an ever-increasing array of knowledge tools in order to perform their work in the knowledge age work place.

2.1.3 Knowledge Age Force # 3 - The development of knowledge age learning

The need for new knowledge work skills and the need to master knowledge tools is forcing education to re-examine the role that it will play as the knowledge age unfolds (Trilling and Hood, 1999). Learning in the knowledge age is being re-conceptualised as a constructive process whereby information is turned into knowledge by means of interpretation, by actively relating it to existing bodies of knowledge, by the generative creation of representations, and by processes of purposeful elaboration (Tam, 2000). With the continued growth of the knowledge age economy and the rapid development of knowledge technologies, it is likely that the demand for such a re-conceptualised education will grow in the 21st century (Galbreath, 2000).

The need for the development of a new form of knowledge age learning cannot be underestimated. Knowledge workers are going to have to learn how to deal with the massive influx of information in their working years. The focus of education is going to have to change from how much you know to how much you can learn. Employees are going to have to know how to find, organise, manage and leverage information for knowledge and decision making (Galbreath, 2000).

2.1.4 Conclusion

The first decade of the knowledge age has been marked by constant and accelerated change (Gilbrath, 1998). With the demands of a highly competitive global economy, the need for knowledge age workers who are skilled for such an environment and the constant development of knowledge tools, it is not surprising that the world is

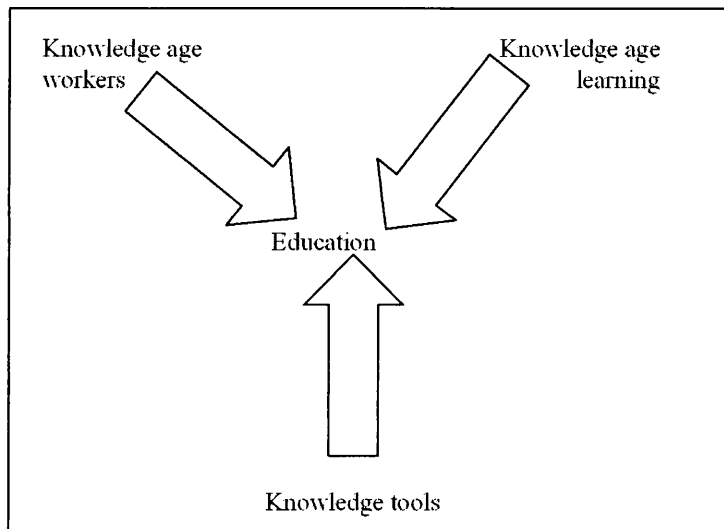


Figure 2.1 Three knowledge age forces (Trilling and Hood, 1999).

changing faster than textbooks and lesson plans can keep pace (Ryder, 1996). I propose that the combined pressure of these three knowledge age forces (Figure 2.1) will redefine education in the knowledge age.

2.2 The Internet as the technology of the knowledge age

The Internet's position as the technology of the knowledge age is premised on the following two arguments.

1. The Internet offers itself as a tool of the knowledge age. It allows users the opportunity to access, create and communicate a phenomenal wealth of data, information and knowledge stored in a myriad of computers worldwide (Trentin, 1999).
2. The Internet has enabled the transition from modern to post-modern, no less than the printing press enabled the transition from pre-modern to modern (Ryder, 1996).

2.2.1 The Internet as a tool

The Internet offers users access to, participation in and publication of knowledge. Knowledge consists primarily of cultural resources that people can store and retrieve on demand, as the need for it arises (McClintock, 1999). People can use the Internet's capacity to present and manipulate information and to acquire ideas. They can use the computer-mediated communication capacity of the Internet to express their thoughts across verbal, visual, auditory, and kinetic modalities. The Internet

also offers the user the possibility for participating in the creation of knowledge with its publication capacity (McClintock, 1999).

This tool of the knowledge age offers users three broad services that are represented graphically in figure 2.2.

- Access to data and information;
- Computer mediated communication; and
- An unlimited publication environment.

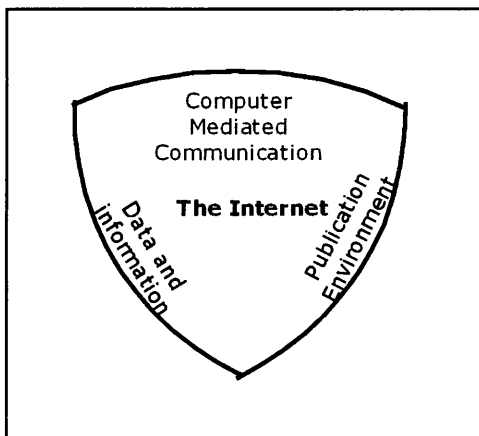


Figure 2.2 Three services offered by the Internet (adapted from Mioduser et al, 2000).

2.2.1.1 Access to data and information

Generating, transmitting, storing, processing and retrieving information is at the heart of knowledge production. The Internet offers the possibility of access to online libraries, databases, journals, museums and other public information repositories.

2.2.1.2 Computer mediated communication

E-mail, group conferencing and Internet relay chat are examples of computer-mediated communication. The Internet offers a powerful interaction medium that enables learners to communicate with peers, workers to communicate with their co-workers and management and teachers to communicate with experts.

2.2.1.3 Publication environment

The Internet offers users the real possibility of contributing towards public information repositories. Anyone who would like to is able to publish his or her own

thoughts. This has enlarged the size of the Internet enormously. The publication capacity of the Internet can support learners' creativity and initiative, allowing them to generate and publish their own educational endeavours without mediators and with minimal technical assistance.

2.2.2 The Internet enables the transition from modern to post-modern

Written, especially printed, media have long had a privileged place in 'the house of intellect' because they were easy to store and retrieve to suit the needs of users (McClintock, 1999). Work in media other than print has been awkward, both to store and to retrieve. Without random accessibility, ideas become esoteric, hermetic, and then lost in the flux of time (McClintock, 1999). The medium of print has, however, yielded significant ground to the storage and retrieval capacities of the computer (Chou, McClintock, Moretti & Nix, 1993). The computer subjects a far wider range of communications to the full rule of random access, changing the repertoire of resources that people can store and retrieve effectively and use on demand to serve the needs of disciplined thought and inquiry (McClintock, 1999).

The Internet is challenging print for its exclusive position in the 'house of intellect' and is becoming the dominant technology of the knowledge age. This movement away from print as 'the house of intellect' is part of a broader historical trend. Prior to the invention of movable type, the manuscript was an instrument of power. Written knowledge was available to the literate few: the priests and princes who controlled access to manuscripts and who had the skills to make use of the technology. Manuscripts were guarded, protected and generally inaccessible (Ryder, 1996). With the invention of the printing press, formal knowledge broke free from church to broad dissemination. Archived knowledge was no longer restricted to monks, priests and courtiers. The power of print technology was in the hands of an emerging ruling class. Knowledge in the modern period took on a one-to-many relationship (Ryder, 1996).

The post-modern period promises yet greater dissemination of knowledge marked by many-to-many relationships (Ryder, 1996). The digitisation of our culture is providing users with access to a breadth of intellectual and cultural resources far greater than ever before; it is providing new, sophisticated and customisable tools for inquiry and investigation; it is enabling modes of interaction, communication, and

collaboration not formerly possible (Reibel and Wood, 1999). The Internet is facilitating this dissemination of knowledge.

2.2.3 Conclusion

The World Wide Web came into existence in year one (1991) of the knowledge age. The coincidence of economic data and technological innovation neatly reinforces the contention that the Internet lies at the centre of the knowledge age. Two factors have contributed towards the adoption of the Internet as the technology of the knowledge age. Firstly, its versatility as a technological tool has convinced users of its worth. People rely increasingly on the Internet for training, information, data and its ability to communicate. Secondly, the Internet contains the ability to change our understanding and conception of knowledge in this postmodern period. This new technology is a part of the historical development of knowledge. The Internet will ensure knowledge enjoys greater dissemination that is marked by many-to-many relationships.

2.3 What does Internet technology offer education?

Many who have recognised the need for a knowledge age education, have turned to the Internet for answers. They have had a glimpse of a 'wired' classroom where the Internet offers teachers and learners the ability to access data and information, to communicate via the Internet's computer-mediated communication facilities, and to participate in the publication of work.

2.3.1 The Internet's educational potential

Those who are positive about the possibilities of technology have adopted the Internet as a tool for knowledge age education. These educational technologists believe that the Internet offers teachers and learners a new way of thinking about teaching, learning and knowing. These possibilities are represented in figure 2.3 below.

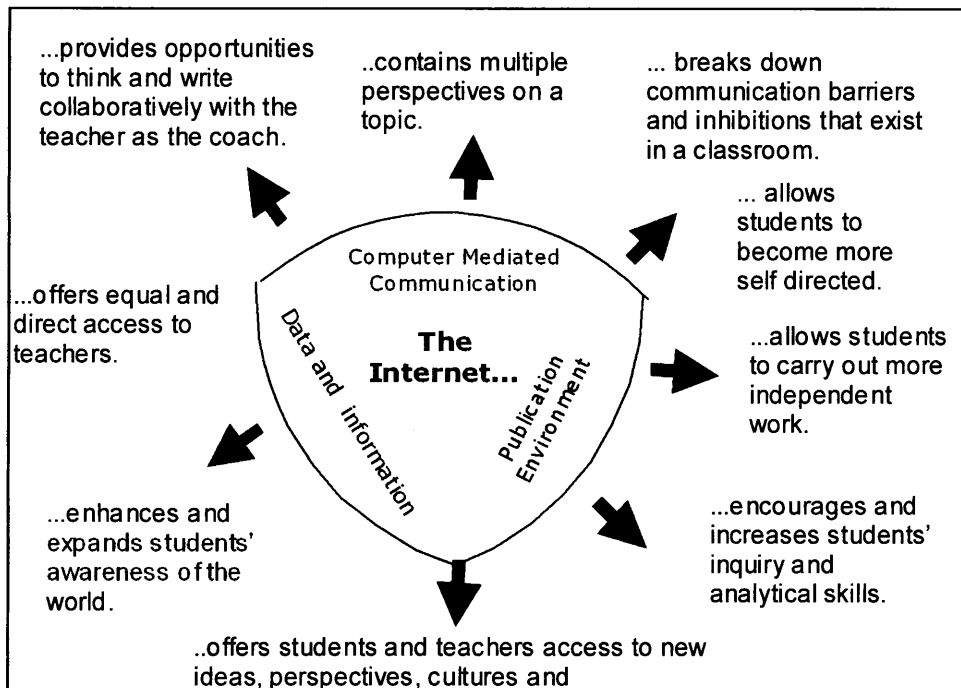


Figure 2.3 What the Internet offers education (Based on Moiduser, 2000; Harasim, 1995).

Harmon and Jones (1999) see the Web as the most significant development in educational and communications technology of their lifetime. Owston (1997) believes that nothing before has captured the imagination and interest of educators simultaneously more than the World Wide Web. Harasim, Hiltz, Teles and Turoff (1995) argue that computer networks introduce new options to transform teaching and learning relationships and outcomes. The Internet contains a number of advantages that previous educational technologies have not been able to offer:

- The Internet can reach an unlimited number of people almost simultaneously (Rossenberg, 2001, 30);
- People can participate in coursework at a time and place which fits into their increasingly busy lifestyles (Rossenberg, 2000, 30);
- Learning is not limited to the two or three hour class but can be extended indefinitely (Shotsberger, 2000);
- The technology offers learners frequent opportunities to experience new and different teaching styles (Gillever, Randall & Pok, 1999);

- The Internet has created an opportunity for educators to use technology-based tools to enable rich learning environments to be created for learners (Gillever et al, 1999);
- The Internet offers a cost effective way to deliver training or information (Rosenberg, 2000, 30); and
- The Internet as a technology could also offer learners access to information and data that is more up to date than any textbook could offer and that is comprehensive and interactive (Gillever et al, 1999).

These educational technologists believe that Internet technologies will have an enormous impact on education. Innovative educators, who have been the trailblazers in their fields, have reinforced this notion, as they have engaged with the technology and used it to create Web-based courses and computer curricula (Carr, Jonassen, Litzinger and Marra, 1998). Their publicly visible efforts have reinforced the idea that the Internet is an appropriate educational technology.

2.3.2 Educational technologies' failures

Other educational technologists disagree with the attention that the Internet has received from educationalists. This notion of the Internet as the panacea to educational problems has resulted in a feeling of 'déjà vu' amongst some in the educational technology field (Spitzer, 2001). These educational technologists claim that technology is the great siren song in education (Kearsley, 1998). They argue that technology by itself is not going to affect the process of knowing, learning and teaching. Technology is nothing more than a delivery infrastructure (Gilliver et al 1999). Those that are not enamoured with technology's ability to solve educational problems have chosen to emphasise pedagogy before technology. They point out that the World Wide Web does not guarantee learning any more than the presence of a library on a campus guarantees learning (Reeves, s.a.). They argue that the introduction of technological innovations into the classroom does not effect substantial change.

The history of educational technology supports their argument. There have been other technologies that were supposed to change the way we taught and learnt (Kaufman, 1998). Educational history is full of famous people who have made great claims for educational technology. In 1842, Josiah Bumstead is reputed to have said that the inventor or introducer of the blackboard deserved to be ranked among the

best contributors to learning and science, if not among the greatest benefactors of humankind (Daniel, s.a.). In 1940, Hoban claimed that the motion picture was the most revolutionary instrument introduced into education since the printing press (Daniel, s.a.). Similar accolades have been written about programmed learning, computers and television. None have been realised.

2.3.3 Technology must not supercede pedagogy

Israelite (2000) has an explanation for the repeated failure of learning technologies. He argues that learning technologies go through repeated 'cycles of failure' (Israelite, 2000 quoted by Rosenberg, 2001). A technology is developed and is then applied to solving educational problems. Expectations are raised that cannot be met. Many of the learning programmes that are developed are poorly designed and ineffective. The realisation grows that the use of the technology has been inadequate and under productive and the frustration and disappointment of unmet expectations is manifested in the abandonment of the technology. People return to tried and tested instructional techniques until the next great technology comes along, and the cycle is repeated (Rosenberg, 2001).

The reason for these repeated cycles of failure is that, in all technologies, the means of delivery, be they blackboards, motion pictures, programmed learning, computers, television or the Internet, are often confused with the consequences or the ends (Kaufman, 1998). By focussing primarily on the means of delivery, and not on the content and learning design of the materials that are delivered, the users of that technology assume that it is going to deliver a set of results that are worthy (Kaufman, 1998). This assumption is mistaken. There is nothing inherent in the technology that guarantees learning. The technology is merely an infrastructure that brings together media, tools, people, places and information, expanding the range of human capabilities (Ryder, 1997). It's the way in which this technology is used that makes for knowledge age education.

2.3.4 Conclusion

The Internet may be the most significant development in education and communications technology since the invention of the printing press. This technology may indeed offer the possibility of introducing educational innovations into the learning process. However, the Internet (and the printing press) is only a technology and no technology in itself is going to automatically provoke such a revolution in

education. Technology is only a vehicle, albeit a powerful one (Reeves, 1998). Those who use the technology require a pedagogical framework. Pedagogy should act as a guide for the educational use of the technology. Otherwise, the Internet is likely to join the list of failed educational technologies.

2.4 Begin with the pedagogy, not the technology

Before the Internet becomes fully entrenched as an educational technology, consideration needs to be given to the pedagogy used in the learning environment. Otherwise, educators will follow the pedagogical approach that they have always used to teach a classroom full of learners and try to apply it to an online environment.

Print technology spawned the development of a print-based pedagogy. In a print-based environment, the educator engages with the learner and the printed text and uses this engagement to transfer knowledge. The traditional teacher learner relationship is based on the limitations of print (Ryder, 1996). Internet technology now needs to develop an online pedagogy. This pedagogy should offer the possibility of a co-operative structure, where the Web could provide a resource-rich, activity-based learning environment and the teacher could serve as a guide, rather than a source of knowledge (Strommen, 1992).

Papert (1993) suggests that the computer can be used for three purposes:

1. Tutor;
2. Tutee; and
3. Tool.

I have turned these statements, and a model developed by Recesso (2001), into a model to assist with the development of an appropriate pedagogy suitable for the Internet (figure 2.4). At the centre of the model is the Internet. It contains all the attributes as described in figure 2.3. But, as this diagram shows, it is not Internet technology that determines the process of knowing, learning and teaching. It is the interaction between tutor (educator), tutee (learner) and tools that determines the pedagogy. The Internet simply facilitates such a meeting. Figure 2.4 introduces the model.

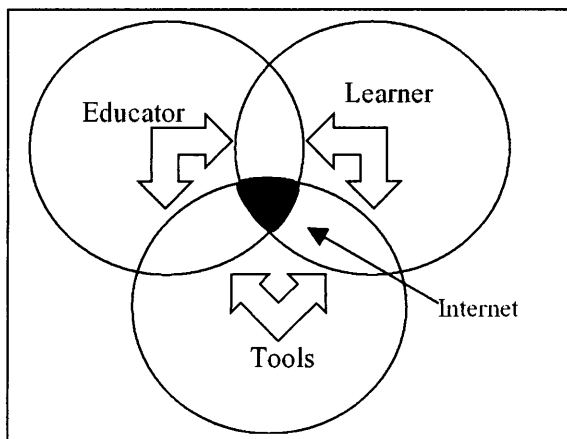


Figure 2.4 A model to develop an online pedagogy

2.4.1 The Internet and the educator

In an online environment the educator participates in two interrelated forms of interaction.

- The educator is responsible for the selection, organization and presentation of a body of knowledge.
- The educator is responsible for the development of skills, knowledge, attitudes and values within the learner.

The educator can use the Internet to deliver the specific body of knowledge to the learner. Alternatively, the educator can use the Internet to gauge the level of the learner and set appropriate learning tasks. This could involve linking the learner to resources that provide additional information and serve as windows for the future. The educator uses knowledge and computer-mediated communications tools of the Internet to accomplish these tasks. The challenge for the educator is to master the Internet so that the learner can use the technology seamlessly.

2.4.2 The Internet and the learner

In the online environment, the learner participates in two inter related forms of interactions.

- Learner – educator interactions

- Learner – content interactions

Learner – Educator interactions include those between the educator and groups of learners (i.e., one-to-many), the educator and individual learners (i.e., one-to-one), or among learners (i.e., many-to-many). These communication configurations reflect those found in a typical classroom. These same configurations are possible using computer mediated communication tools such as conferencing, e-mail and other collaborative tools.

The second, but less obvious form of Web-based interaction is that which occurs between learner and content. There are two general ways in which the learner can engage with the subject matter: the learner can attempt to accurately acquire knowledge presented via Web presentations or the learner can construct personal meaning by engaging in dialogue and reflection.

2.4.3 The Internet as tool

In the online environment, the Internet can be used as a tool.

- A cognitive tool to learn
- A presentation tool to teach

There is a strong temptation to address the rapidly changing expectations of the knowledge age by avidly embracing a new technology (Greening, 1998). Heppel (2000) cautions that before educational institutions rush out and invest all their efforts on the Internet, it must be remembered that the Internet as a technology is only a step on an evolving path of progress and not the epitome of progress itself. Technology by itself is not going to affect the process of knowing, teaching and learning. Technology is nothing more than a framework and a delivery infrastructure and will tolerate a variety of delivery styles (Gilliver et. al., 1999).

2.4.4 Conclusion

In the rush to put courses online, many educators have taken one step ahead for technology, yet two steps backwards for pedagogy (Modiuser et al, 2000). The excitement about the technological attributes of the Internet has meant that the processes of knowing, learning and teaching have been neglected. As with previous technological innovations, many educators who have adopted the Internet as their

teaching medium have assumed that the Internet is a 'magic box' and by placing a course on the Web, better learning is guaranteed (Reeves, s.a.). The above framework allows educators to view the technology within an educational context. This alone, will not prevent the Internet being seen as the source of all educational answers. But it does move our focus away from the Internet as technology.

2.5 Pedagogical approaches to educating with technology

The phenomenon of human learning has been studied for centuries and it is generally agreed that two main streams exist in learning research, namely learning as behaviour and learning as cognition (Virtual Campus, 1998). Within the field of instructional technology, there are two broad categories of general design methodologies that match these above-mentioned categories (Moonen, 2000). Although they have been given different titles by different academics, this researcher has chosen to call them the clean and dirty⁵ approaches to knowing, learning and teaching (Papert, 1993).

⁵ The 'clean' and 'dirty' approaches that deal with learning and computers are more commonly known as objectivist and constructivist frameworks. Within the literature about teaching and learning online, terms such as *constructivist*, *constructionist*, *objectivist*, *instructivist* or *behaviourist* are used to describe either of these broad frameworks. I have chosen to adopt Papert's classification of these frameworks. He labels the respective frameworks 'clean' and 'dirty' (Papert, 1993). Papert's classification of 'clean' and 'dirty' learning with computers has been criticised as giving 'a somewhat fuzzy feel for the differences between behavioural and constructivist visions for teaching and learning' (Overview of Cognitive Constructivism s.a.). Whilst this may be fair comment, I have decided to avoid using the behaviourist and constructivist classifications. The definitions of constructive learning are as diverse as the numbers of learning theories in existence today (Wijekumar, 2001) The discourse of academia could embroil me in the complex web of academic debate as to what is a constructivist or constructionist and which approach is a better approach. Another reason for not using the established names for these frameworks is because they are traditionally seen as opposites to each other and authors often speak of a 'pendulum' that swings from the one extreme to the other (Cronje, 2000). This debate detracts from the focus of the essay, which is to identify what constitutes a successful pedagogic approach to online education and not to identify the features and merits of an academic framework. By eschewing the 'objectivist' and 'constructivist' labels, I hope to distance myself from the debate.

2.5.1 The Clean Paradigm

The clean paradigm focuses on the technology itself. Historically, instructional technology has been used as a conveyor of information, communicator of knowledge, or educator of learners (Jonassen, s.a.). The earliest instructional technologists based their instructional models on the work of behaviourists such as B.F. Skinner. Skinner believed that learning is represented by changes in the learner's behaviour and teaching is a process of shaping that behaviour to match a predefined outcome (The Council for Museums, Archives and Libraries, s.a.). He argued that learning takes place through a mechanism of stimulus and response (McMahon, 1997). The teacher's role is to shape a series of stimulus-response events, which accumulate towards their intended learning goals.

The essence of this approach advocated by clean learning theorists is the decomposition of the problem situation into sub-problems after which the solution of each sub-problem, being downscaled in complexity, can be taught (Moonen, 2000). Subject matter is broken down into discrete steps that are learned in sequence to produce more complex knowledge (The Council for Museums, Archives and Libraries, s.a.). A basic assumption of the clean approach is that the problem situation is well defined and that there are clear goals for the project or product that the learner can attain (Moonen, 2000).

An examination of the assumptions held by clean learning theorists might offer a better understanding of the clean approach.

2.5.1.1 Clean assumptions about knowing

Proponents of the clean approach see the purpose of education as being the transfer of knowledge from archival sources and the brain of the teacher to the brain of the learner (Hiltz, Coppola, Rottern, Turoff & Benbunan-Fich, s.a.). This approach presumes that a body of objective knowledge can be delivered to learners through presentation and explanation. The learning theories that inform the clean approach have been taken from behaviourist theories (Conway, 1997). This clean paradigm is to be found in a common model in education, namely information transfer. (Staley and MacKenzie, 2000).

2.5.1.2 Clean assumptions about learning

Learning is viewed as the acquisition and accumulation of a finite set of skills and facts (Tam 2000). Learning, using information technologies, becomes a matter of finding what has been defined, remembering it and then reproducing it (Brown, 1997). Learning is something that comes with full databanks and through practice. It is a form of hide and seek (Brown, 1997). Learning is the transmission of information from one individual to another, a view in which reception, not construction, is key (SEDletter 1996).

2.5.1.3 Clean assumptions about teaching

The clean teacher's task is viewed as modifying the behaviour of learners by setting up situations to reinforce learners' behaviour when they exhibit desired responses (Conway, 1997). Clean theorists view learning as a sequence of stimulus and response actions from the learner. They reason that teachers could link together responses involving lower-level skills and create a learning 'chain' to teach higher-level skills (Conway, 1997). The teacher's task is to transmit a particular body of knowledge and make sure that learners learn them all in a step-by-step manner (Tam 2000).

2.5.2 The Dirty Paradigm

As opposed to the clean paradigm, where the technology is the focus, the dirty paradigm focuses its attention on the learner and the process of learning. This paradigm promotes the view that learning is an active process in which learners construct meaning, going beyond the information given and discovering principles for themselves (Staley and MacKenzie, 2000). The dirty approach to learning is based on the developmental perspectives of Jerome Bruner, Jean Piaget and Lev Vygotsky.

Bruner (1966) distinguishes between passive and active learning; between 'what we know' and 'what we do with what we know'. Bruner postulates that learning is an active process; during which learners construct new ideas based on their current understanding and perspectives. They do this by selecting, and then transforming information by organization, elaboration, scaffolding, and other cognitive strategies (Campbell, 1997). During this process, the instructor engages the learner in a conversation to help him/her build upon existing knowledge structures. Bruner recommends that curriculum be organized in a spiral so that this building process is facilitated and enhanced with each turn (Campbell, 1997).

In Piaget's view, people organize their thoughts so that they make sense, separating the more important thoughts from the less important ones, as well as connecting one idea to another. At the same time, people adapt their thinking to include new ideas, as new experiences provide additional information. This adaptation occurs in two ways, through assimilation and accommodation. In the former process, new information is simply added to the cognitive organization already there. In the latter, the intellectual organization has to change somewhat to adjust to the new idea (Crowther, 1997).

Vygotsky (McMahon, 1997) put forward the idea that learning proceeds from external action to internal activity. His hypothesis is that the mind emerges through interactions with others and the environment. Artefacts, signs and language mediate this. Vygotsky argued that the most significant moment in the course of intellectual development occurs when speech and practical activity, two previously independent lines of development, converge (McMahon, 1997). Gradually, children rely less on the external support of people and objects in their world to cue their behaviour, as this behaviour becomes directed by internal mental processes (Hung and Wong, 2000). As an example, children transact with the world without initially understanding what they are doing. However, through such a process, they gradually notice patterns in their behaviour and come to understand their external activity. With this new understanding of their behaviour, comes the internalisation of that activity (Hung and Wong, 2000).

2.5.2.1 Dirty assumptions about knowing

Knowing is not something that comes free with full databanks and through practice; it is something won by the struggles of the organism to learn - to conjecture, probe, puzzle out, forecast, and so on (Brown, 1997). Knowing is an action participated in by the learner. Knowledge is not received from an external source. The proponents of the dirty approach believe that the learner actively constructs knowledge; that knowledge is not passively received from the environment (Jaworski, 1993). Knowledge is not a static object, but a dynamic process; a vibrant, living thing resting on shared assumptions, complex perceptions and sophisticated logic (Daniel, s.a.). This approach holds that knowledge has to be discovered, constructed, practised and validated by each learner.

2.5.2.2 Dirty assumptions about learning

The view of learning within the dirty paradigm sharply contrasts with the clean view. Dirty learning involves active struggling by the learner (Hiltz et al, s.a.). Learning is a process of comparing new experience with knowledge constructed from previous experience, resulting in the reinforcing or adaptation of that knowledge. Coming to know is a process of adaptation based on and constantly modified by a learner's experience of the world (Jaworski, 1993).

Dirty learning engages the learner and results in more meaningful and transferable knowledge (Jonassen, s.a.). With dirty learning, there is no tabula rasa on which new knowledge is etched. Rather, learners come to learning situations with knowledge gained from previous experience, and that prior knowledge influences what new or modified knowledge they will construct from each new learning experience (SEDletter, 1996). Learning involves active engagement during the learning process (Fineman & Bootz, 1995). Learners apply current understandings, note relevant elements in new learning experiences, judge the consistency of prior and emerging knowledge, and based on that judgment, modify knowledge (SEDletter, 1996). A dirty learner creates his or her own meanings. Understanding is what matters, not the quantity of facts that they have accumulated (Keizer and Wright, 1997).

2.5.2.3 Dirty assumptions about teaching

Dirty learning is fluid and has variable outcomes — the role of the teacher is to provide flexible structures for learning, acknowledging the existence, and validity, of many possible outcomes from the learning process (The Council for Museums, Archives and Libraries, s.a.). The teacher is interested in creating authentic learning tasks, engaging the learner in realistic, thematic learning activities, and attempting to interpret the needs of learners as they become evident (Keizer et al, 1997). Social interactions within the learning environment are an essential part of this experience and contribute fundamentally to individual knowledge construction. Shared meanings develop through negotiation in the learning environment, leading to the development of common or 'taken-as-shared' knowledge (Jaworski, 1993).

With the dirty approach to learning, the teachers' role is no longer seen as that of disseminator of expertise and wisdom. In such a learning environment, the teacher is a fellow learner or collaborator. Dirty teachers do not take the role of the 'sage on the stage.' Rather, teachers act as 'guides on the side' who provide learners with

opportunities to test the adequacy of their current understandings (SEDletter, 1996). Dirty teachers provide learning environments that exploit inconsistencies between learners' current understandings and the new experiences before them (SEDletter, 1996). Dirty teachers also encourage group interaction, where the interplay among participants helps individual learners to become explicit about their own understanding by comparing it to that of their peers.

2.5.3 Conclusion

In the knowledge age information is plentiful. What is scarce is the intellectual work that transforms information into useful knowledge systems (Benton Foundation, 1997). The Internet has given people access to information to which they never used to have access. It has created an opportunity for educators to use technology-based tools to enable online learning environments to be created for learners (Gillever et al, 1999). Educational institutions are recognising the need to meet the demands of the knowledge age. They are incorporating the online world into their curriculum. This does not necessarily mean that learners are learning suitable skills for their future employment. At present, the majority of these institutions are simply re-organising material originally published in print, for online viewing.

2.6 The development of an online learning environment

The Web and alternate pedagogies have brought about new possibilities for online education. Dirty learning in particular has re-conceptualised learning as a constructive process whereby information is turned into knowledge by means of interpretation (Tam, 2000). The Internet's versatility and accessibility has assisted in shifting the foci from knowledge-as-possession to knowledge-as-construction, and from learning-as-outside-guided to learning-as-self-guided (Tam, 2000). To realise knowledge age education, online learning environments that subscribe to a dirty pedagogy need to be created. The challenge facing the development of such environments is to find the relationship between the contents of the course and the pedagogy adopted (Pulkkinen and Niemi, 1997).

2.6.1 What is an online learning environment?

An online course has as many definitions as the thousands of institutions, companies, and individuals that offer solutions to computer-based instruction (Beam, 1997). Neither is there a single definition for an online learning environment (Pimentel, 1999). The clearest understanding of the term comes from the words

'online' and 'learning'. Online learning environments have to be primarily thought of as learning environments as opposed to online environments. The 'learning' aspect drives the activity (Barajas and Owen, 2000). What distinguishes online learning from other types of computer-based instruction is that online learning environments make use of a connected technology to deliver the learning activities. 'Online' thus refers to the technology that is brought in to support the learning (Barajas and Owen, 2000). Wilson's (2000) description of what happens in an online learning environment is probably the most helpful in understanding the term.

An online learning environment is an environment where learners and educators may work together and support each other as they use a variety of tools and information resources in their pursuit of learning goals (Wilson, 2000).

Such a learning environment provides the following (Wilson and Lowry, 2000):

- Access to rich sources of information
- Meaningful interaction with content
- A forum for people together to challenge, support or respond to each other

2.6.2 Pedagogy and the online learning environment

It has been established that educators need to identify a pedagogical approach before making use of the technology to create a learning environment. Educators have a choice of which approach to adopt. The clean approach is the more traditional paradigm, and linked strongly to print-based resources. The dirty approach is a more innovative paradigm, and has only been developed with the growth of information technologies. To understand the difference between the two paradigms, this essay will explore how each of the pedagogies is implemented when designing an online learning environment.

2.6.3 The clean learning cycle

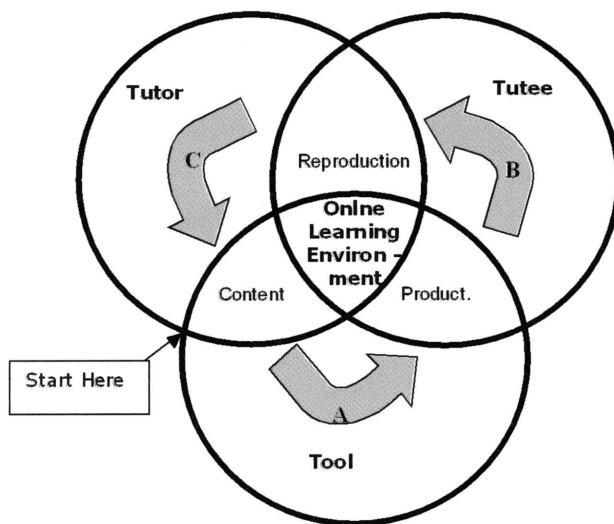


Figure 2.5 The clean learning cycle

The starting point for the clean approach is the interaction between the educator and the tool. Using this approach, the educator begins with the tools of an online environment and asks the following questions; 'How can we deliver content in the most efficient manner?' and 'How do we ensure that the appropriation of knowledge, from the educator to the learner can occur?' (Hung and Nichani, 2001). The educator selects the content he wants to transmit and uses the technology to transform them into information objects (see figure 2.5). The computer is then used as a tool to deliver a product to the learner **(A)**. Once the educator has provided the learner with packaged content, the learner receives those information objects **(B)** and then completes activities to reinforce concepts that the educator has set out to teach. The learners reinforce the content they have learnt in online activities such as quizzes and tasks to be accomplished. The results of these tasks and quizzes are evaluated by the instructor **(C)**. The instructor, using what he has learnt about the learners' levels of knowledge in the feedback process, selects more content to teach the learners **(A)**. This then sets the learners and the instructor off onto another round of clean learning and so the cycle continues (Hung and Nichani, 2001).

2.6.4 The dirty learning cycle

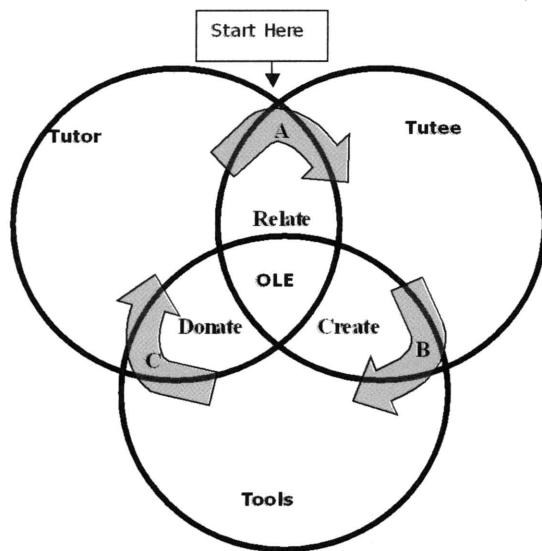


Figure 2.6 The dirty learning cycle

The dirty learning cycle begins at the intersection between the educator and the learner. The key idea behind dirty learning is that educator and learner must be meaningfully engaged in learning through interactions with others, and the tasks (Kearsley and Shneiderman, 1998). The dirty learning cycle starts the learning process off with the educator engaging with the learner **(A)** (Oliver, 2000). Kearsley and Shneiderman (1998) have called this element the 'Relate component'. Moonen (2000) calls this the 'consensus space'. In this space, the main objective is for stakeholders to construct a framework, discuss and evolve towards a temporary agreement about potential solutions (Moonen, 2000). In such a space, the learner can either relate to their peers (where each learner can express what he or she knows). Or they can relate their understandings with some expert or professional (Oliver, 2000). Once the learner has had the opportunity to relate with fellow learners or experts, they might reflect on the opinions of others and the feedback that they received about an idea. They might then revise their initial opinion and express a more advanced conception (Oliver, 2000). This process of expression, revision and reflection may go on for a while. The net results of the 'relate component' are the initial functional specifications for the product (Moonen, 2000). Once this emerges, the learner is ready to move into the next part of the dirty learning cycle.

The 'create component' (Kearsley and Shneiderman, 1998) is the second element of the dirty learning cycle **(B)**. Moonen (2000) has called this the task space. The main

objective of the create component is 'to construct a series of half products' (Moonen, 2000). At this point, the learner, having defined the problem in the relate phase, uses the tools available to him or her in some sort of creative, purposeful activity (Kearsley and Shneiderman, 1998). Within the create component, the learners focus their efforts on the application of ideas to a specific context. There is no limit to the variety of different type of projects that the learners can engage in. In the creation component, learners must make decisions about what is relevant. They may critique the work of other learners and may choose to engage with the information objects to negotiate and co-construct knowledge (de Caprariis, 2000). The point is that they create a product that expresses their understanding established in the relate component of the model. The final half product should satisfy the functional and technical specifications that have evolved in the task space (Moonen, 2000).

The third component is called the donate component **(C)** (Kearsley and Shneiderman 1998). Moonen (2000) call this the implementation space. This component, according to Kearsley and Shneiderman (1998), involves completing the project for an outside customer. This ensures that learning has an authentic focus. Ideally, the project is done for a community organisation, school, church, library or museum. In such a space the objective is to confront the actual end users with the final half product and create opportunities for the end users to adapt the product for their own particular needs (Moonen 2000). The authentic learning context of the project increases learner motivation and satisfaction (Kearsley and Shneiderman 1998).

2.6.5 The design of a dirty learning environment

Using the clean learning cycle (see figure 2.5), instructional designers have been able to create an instructional episode for learners, with measurable outcomes, that require learners to interact in some way with knowledge which was prescribed for them and transmitted to them either via a teacher or some other mechanism (Lefoe, 1998). Most available Instructional Design models, to one degree or another, accept the specific 'rules-and-recipes' approach (Willis, 2000). These designers assume that a problem can be well defined. Once the problem is defined, such an approach assumes that there are well-defined solutions that are available to solve the problem. According to this approach, the task of the designer is to design the 'instructional experience for the acquisition of the desired knowledge or skill' (Willis, 2000).

Fewer designers have adopted the dirty cycle (see figure 2.6) and taken the 'Pablo Picasso' approach to designing an online learning environment (Braden, 1996, quoted by Willis, 2000). Those designers that have taken this approach work from a different framework. They believe that truth and knowing are local events and highlight the importance of context in arriving at solutions. They do not provide rules. Rather, they provide guidance. They are more artistic than scientific and call for thoughtful and careful attention to, as well as the understanding of, the context in which the problem occurs (Willis, 2000).

The dirty framework for learning with technology does not offer an instructional strategy to be deployed under appropriate conditions. Dirty learning, with its focus on learning rather than instruction, challenges the educator to look for new models, but it seems that by its very nature, dirty learning defies the concept of a rules and recipe approach (Lefoe, 1998). Greening (1998) suggests that the reasons for focussing on the theory rather than the practice are inherent in the philosophy itself.

- Dirty learning theorists shy away from the suggestion of formalised lesson plans and are critical of them for being overly simplistic.
- Dirty Learning theorists hold that knowledge and learning are dependent on context. This context dependency of knowledge means that its content cannot be assumed to be uniform across a population.
- Dirty Learning provides a means of thinking about design rather than a vehicle for the process of design itself.

The dirty approach to knowledge is an underlying philosophy or way of seeing the world (Wilson, 1995). The dirty approach believes that a designer guides or coaches the learner as the need arises, but does not impose a particular way to learn. The learner is given much of the responsibility for deciding what to learn and how to learn it. The function of the teacher or instructional designer is to support what the learner decides to do (Pinder, 2000).

2.6.6 Which pedagogy to adopt?

If a clean pedagogy is chosen, then a more traditional use of Internet technology is likely to be adopted. This clean paradigm will offer a set of instructional principles to guide the design of the learning environment. The clean approach to technology encourages a passive approach to learning (Doherty, 1998). When using a clean

pedagogy, the learner experiences that he or she, as a person is secondary to the process of learning. What is to be learned is 'out there', defined ahead of time by someone else and hidden in the technological tool. Learning becomes a search to find what has been defined, remembering it and reproducing it and not a process whereby the child explores, creates, and owns (Brown, 1997). The impression is created that the computer knows the answers and the learner simply has to work out the answers. Passive approaches to learning assume that learners learn by receiving and assimilating knowledge (Doherty, 1998).

The clean approach is the antithesis of the dynamic, problem-based learning that knowledge age workers need (Sevilla and Wells, 2000). Knowledge age workers need learning opportunities to exercise their creative powers. The clean approach to learning isn't about problem solving; it's an assessment of memory. Rather than drill and quiz techniques that characterise a clean pedagogy, creative problem solving requires an environment where the learner performs within a specific context and receives feedback from an expert or mentor (Sevilla and Wells, 2000).

2.6.7 A model to guide the design of an online learning environment

The use of technology in the learning process poses challenges for designers of the online learning environment (Barajas and Owen 2000). The dirty view of learning asks instructional designers to move away from the rules and recipe approach to instructional design and to develop rich learning environments that help to translate the philosophy of dirty learning into actual practice. The problem is that the philosophy of dirty learning is just that, a philosophy, and not a set of specific instructional guidelines.

An appropriate instructional approach that matches the pedagogy of dirty learning will be difficult to find. There are no specific guidelines for the design of an online interface that takes cognisance of the pedagogy of dirty learning, yet structures and present the task on screen in a clear and concise manner. Gagné's nine events of instruction do offer a process and template for organizing and sequencing instruction (Wilson, 1995). I used Gagne's nine events of instruction (1985) because they emphasized the steps or stages of design, or steps or stages of instruction that are necessary for learning. Each learning task was based around the following nine events of instruction.

1. Gain Attention

2. Inform learner of lesson objectives
3. Stimulate recall of prior learning
4. Present stimuli with distinguishing features
5. Guide Learning
6. Elicit performance
7. Provide informative feedback
8. Assess performance and
9. Enhance retention and transfer.

Although dirty learning is not a prescriptive theory of instruction, the cycle that has been described can be adapted to Gagne's nine steps (Gagne, 1985) and provide a model for the process of dirty learning (Mergel, quoting Jonassen, 1998). A model would give structure and meaning to the instructional problem and enable the would-be designer to negotiate their design task with understanding. This model offers the instructional designer a route 'out of the pedagogical clouds' (Pinder, 2000).

The model (figure 2.7) is based on the assumption that the Internet is the technology of the knowledge age. The model does not, however, focus on the Internet itself, but looks at the intersection of educator, learner and tools whilst using this technology. The model offers the possibility of two pedagogical approaches to the use of this technology, namely clean and dirty learning. This essay has thus far argued that dirty learning is a suitable pedagogy for the learning age.

Consequently the model adopts a dirty pedagogy. The pedagogy of dirty learning encourages educators to see their online education less as product – a set of permanent text capsules like the chapters of a textbook – and more as process, as the exercises of a group in action (Beam, 1997). The proposed model does not have prescribed tasks, but rather 'best practices' that instructional designers should follow (Crowther, 1997). It encourages the idea that it is not the 'content' that makes the learning experience. The content is only the rails on which learning runs (Beam, 1997). Learning is seen as an active process whereby experience is converted into knowledge and skills (Cronjé, s.a. quoting Merrill, 1991).

The model suggests that the designer moves through three consecutive spaces when designing an online learning environment. In each space, the educator, tool and learner are engaged with each other. Direct experience, making errors, and looking for solutions are part of the process. Learners are not 'taught' but given learning tasks, which they could only complete by acquiring certain knowledge and skills. (Cronjé, s.a. quoting Merrill 1991) When information is introduced as an aid to problem solving, it functions as a tool rather than an isolated arbitrary fact.

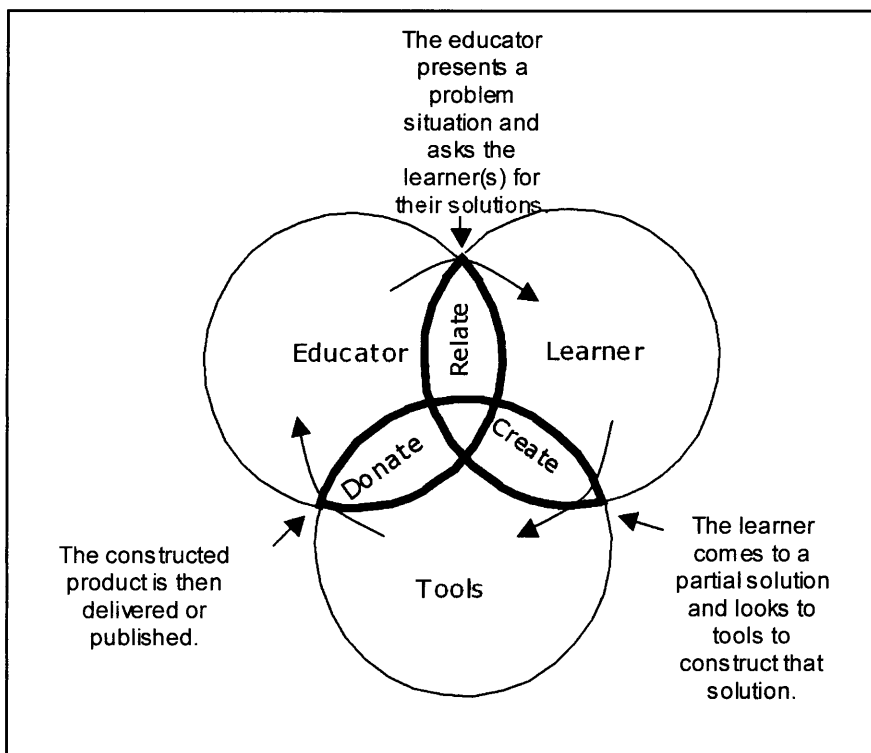


Figure 2.7 A model to guide the development of an online learning environment

The model is a tentative model⁶. No model will ever be complete or comprehensive in all of the factors and mechanisms involved in learning. The problem in Web-based course design has been the lack of functional, practical models and tools for the construction of online learning environments (Pulkkinen and Niemi, 1997). This simple model is valuable because it helps to guide thinking about a phenomenon such as learning and technology and offers a direction for educators to follow.

⁶ No model is a perfect reflection of reality. Most models are probably guilty of oversimplification and are inadequate to capture the complexities involved in teaching and learning (Reeves, s.a.).

2.8 Conclusion

The model developed throughout chapter 2 suggests a set of principles that can guide the design of learning environments. A dirty framework for learning with technology does not however offer an instructional strategy to be deployed under appropriate conditions. This dirty approach to knowledge is an underlying philosophy or way of seeing the world. The dirty approach believes that a designer guides or coaches the learner as the need arises, but does not impose a particular way of learning. The learner is given much of the responsibility for deciding what to learn and how to learn it. The function of the teacher or instructional designer is to support what the learner decides to do. Designing such a learning environment is an enormous challenge to an educator. The above model does not pretend to involve all the mechanisms and factors involved in learning. But it does give the educator who wants to embark on a journey into dirty learning, a set of principles to start from.

In the next three chapters, I will explore the use of this model in a series of case studies.

Chapter 3

Case Study #1 – Grade 8 *Weblearning* (Phase 1)

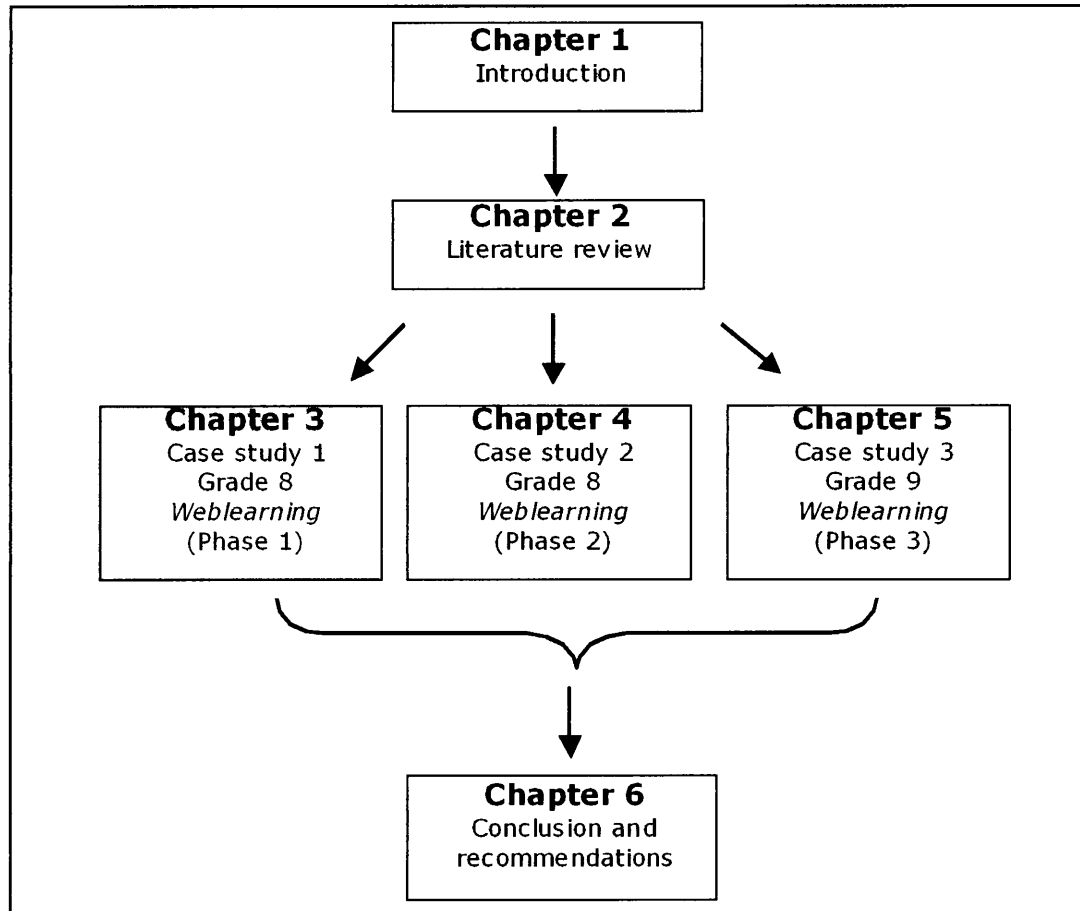


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3.1 Introduction

The online learning environment that was used for this study was developed over two years in three phases. The first phase ran from April to October in the year 2000, the second phase ran from January to July in 2001 and the third phase from April to October 2001. This chapter contains the first case study, called Grade 8 *Weblearning*⁷, and is an account of my first attempt at fostering dirty learning. It reports on the design, development, delivery and maintenance of an online learning environment. Chapter four and five, respectively, contain a record of the design, development, delivery and maintenance of a second and third online learning environment.

The goals of this chapter are:

- to report and reflect on the assumptions involved in the design, development, delivery and maintenance of an online learning environment that was intended to foster dirty learning.
- to use the insights gained from these reports and reflections to facilitate the development of an appropriate set of guidelines for the use of technology and pedagogy when creating subsequent online learning environments.
- to apply these findings and insights to the development of a model which describes the process of using dirty learning in an online learning environment.

⁷ The origin of the brand *Weblearning* is described in chapter 1.

3.2 Structure of the Action Research

I made use of an action research cycle to structure my research (see Chapter 1 figure 1.1). The research cycle is as follows⁸.

- Plan
- Act
- Observe
- Reflect

3.3 Plan

The planning process that is described below did not happen as neatly and clearly as the outline suggests. At times, action preceded planning. Learning tasks were developed before the overall curriculum was finalised. Tasks were uploaded, and then revised and these revisions led to changes in delivery. This outline of section 3.3 attempts to offer a coherent description that broadly reflects the planning that took place in the development of Grade 8 *Weblearning*.

3.3.1 Background

In April 2000, I became engaged in the process of building an online learning environment with the intention of developing learners' computer skills. This learning environment was aimed at Grade 8 learners and attempted to use dirty learning as its pedagogy.

As I.T. facilitator at Alexandra High School, I was responsible for the tuition of 220 grade 8 learners in computer skills. My learners were split into 6 classes. The majority of them were second language learners and most had not had much prior experience with a computer. Up until recently, computer classes had worked systematically through a variety of software applications, teaching the necessary skills 'just in case' a learner might need to use the skill. Using the 'just in case' approach to teach computer skills had many pitfalls. Learners were instructed step-by-step to follow a sequence of directions as they mastered a particular piece of software. Those who had no experience with computers struggled with the step-by-step approach and got left behind. The computer literate and advanced learners

found the step-by-step approach restricting and soon got bored with the pace of the lesson. For both the novices and the advanced users, the 'just in case' approach did not foster the development of transferable skills. Using the 'just in case' approach does ensure that a series of software packages are comprehensively taught. But practice with previous packages gets neglected and consequently very little is learnt.

The 'just in case' approach has, however, been challenged by a new approach entitled 'just in time'. With this approach, learners are taught the software skills right before they need to use the particular application. Those learners who are familiar with the application can move straight onto completing a task that they have been set. Those who need assistance are supported by the teacher and can learn the necessary skills 'just in time'.

I thought the 'just in time' approach to teaching computers might be more appropriate at Alexandra High School. With such an approach, learners could be given a task that was appropriate to the school curriculum, and then asked to solve it, thus making the skills that were taught both relevant and active. To address the problem of pace, I decided to locate these lessons online, so that by clicking on hyperlinked tasks, learners could determine the pace at which they wanted to learn.

The precepts of dirty learning also informed my decision to abandon 'just in case' (Cronjé & Barras Baker, s.a.) teaching. It appeared that 'just in time' and dirty learning were a compatible set of pedagogies. Dirty learning would give learners the opportunity to develop their own schema. 'Just in time' (Cronjé & Barras Baker, s.a.) teaching would encourage learners to use relevant software when they needed to. Together, in an online learning environment, these two approaches would allow learners the autonomy to use a particular software package and construct artefacts that would reflect their own understanding.

3.3.2 Rationale

My rationale for building an online learning environment was two-fold. The first stimulus for action came from an interest in the data and information capacities of the Internet. As I.T. facilitator at Alexandra High School, I persuaded the management and staff of the school that the Internet was a valuable educational

⁸ For a more detailed description of the action research cycle used, refer to chapter 1.5

tool. I wanted to construct an online learning environment that would demonstrate to staff what could be achieved with the Internet in an educational setting.

My second stimulus for building an online learning environment came from the philosophical and psychological perspectives of dirty learning. My Master's coursework introduced the idea that learners construct (in their minds) knowledge, skills and abilities by actively experiencing contextual objects or information (Pinder, 2000). I surmised that irrespective of the exposure a learner has had to a computer, they nevertheless bring their knowledge (schema), experience, and values into the classroom (Bruner, 1966). I wanted to create a learning environment that encouraged active learning and allowed learners to use their schema to acquire knowledge. I hoped that learners could use the Internet to make decisions about the tasks they were to perform, how they were to navigate around the learning environment and how they would present the skills that they had learnt. Such a learning environment would enable the learner to elaborate on his or her own existing knowledge structures (schema) (Campbell, 1999). This schema would provide the foundation on which new knowledge could be built (Pinder, 2000). These tentative speculations acted as the foundation for the construction of the online learning environment.

3.3.3 Assumptions

There are three components to an online learning environment; the educator, the tutee and the technological tools (Papert, 1993). I held a set of assumptions about the roles of the three main actors in the learning environment (see 2.4.1 of the literature review). Table 3.2 summarises the assumptions that I acted on as I constructed *Weblearning*.

Assumptions	Elaboration on the assumptions
Assumptions about the teaching	▪ The teacher arranges the required learning resources in the online learning environment (Conway, 1997). ▪ The teacher acts as a guide as learners use the learning resources to 'teach' themselves (Watson and Rosset, 1999).

Assumptions about learning	▪ Learning is best when learners engage in solving problems (Merril, 2001). ▪ Learners bring their knowledge (schema) to a learning environment (Mergel, 1998).
Assumptions about the technology	• The World Wide Web can facilitate the creation of an online learning environment (Wilson and Lowry, 2000). ▪ An online learning environment can offer rich, innovative and new learning experiences that a traditional setting cannot (Phillips, 1998). ▪ This online learning environment can be used as a medium to publish learners completed tasks (Ryder, 1996).

Table 3.2 Assumptions about an online learning environment

3.4 Act

I moved into the action phase, took the pedagogy of dirty learning and my assumptions about the roles of the three components of the model and attempted to create an online learning environment that was innovative in terms of its use of technology as well as in terms of its teaching methodology. To facilitate an accurate and coherent report on the action phase, the 'act' phase of the action research cycle is broken up into four sections.

1. Design;
2. Development;
3. Delivery; and
4. Maintenance.

Table 1.1 in chapter 1 elaborates on each section.

3.4.1 Design of the online learning environment

I began the design of *Weblearning* with the 'just in time' (Cronjé & Barras Baker, s.a.) approach to teaching computers in mind. I identified a set of computer competencies that I thought learners would use in their school academics. Each of these computer competencies was then transformed into a task, so that learners could learn by doing and solving the task. For example, in Geography, learners are often sent to the computer lab to produce a research report about geographical phenomena. One of the most basic competencies required of learners to perform this task, is the ability to cut and paste images and text. I developed a task to facilitate the practice of this competency, which simply required learners to create a collage out of a variety of Web-based sources. Learners were asked to go to a variety of listed Web sites, find images and cut and paste them into a graphics package. The end product was intended for the title page of their geography book.

As designer, I went through popular Grade 8 subjects and proceeded to identify a variety of computer competencies that I thought were required in school. These competencies included the ability to enter and format text, to create files and folders, to use computer tools to illustrate and draw. Each competency was transformed into a task and each task was given a name or title. Then, the tasks were arranged in order, from the most simple to the most complex. This list of tasks became the *Weblearning* curriculum. Examples of the titles of the tasks were 'Design your own logo', 'Create a collage' and 'Write your own April fool's newspaper'. Figure 3.1 is a screen shot of the *Weblearning* Curriculum

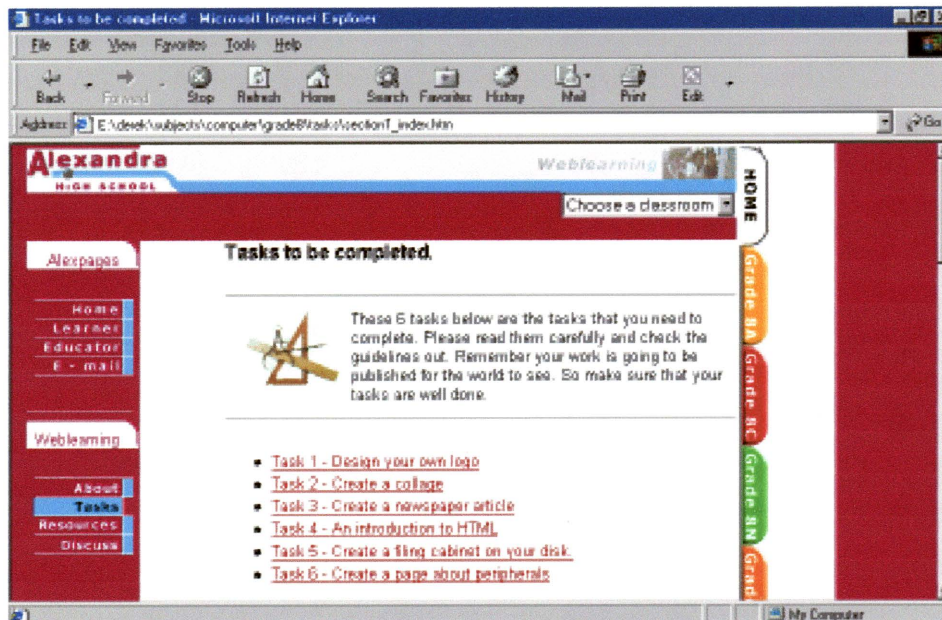


Figure 3.1 Screen shot of the tasks that made up the curriculum.

3.4.2 Development of the online learning environment

The intention behind the development of Grade 8 *Weblearning* was to create a learning environment that would assist learners to construct build on and develop their schema. This learning environment was created to do three things:

- Communicate the task to the learner;
- Allow the learner to engage in a problem solving activity; and
- Publish the learners' artefacts as evidence of a mastered competency.

I soon discovered that developing a Web page to communicate the task to the learner was not as straightforward an activity as I had assumed. I spent an enormous amount of time ensuring that the task was communicated as clearly and as precisely as possible. Afternoons and evenings were spent looking at Instructional Design models and looking for the best structure to use when communicating with learners.

Gagné's (1985) nine events of instruction offered me a structure for organising and sequencing instruction, and because of my inexperience with any other instructional models, I decided to design the tasks with the nine events of instruction as my guide. These are

1. Gain Attention
2. Inform learner of lesson objectives
3. Stimulate recall of prior learning
4. Present stimuli with distinguishing features
5. Guide Learning
6. Elicit performance
7. Provide informative feedback
8. Assess performance and
9. Enhance retention and transfer.

The events of instruction allowed me to communicate the task to the learner, as well as offering the Web page a sequence of steps to support the learner as they attempted to solve the problem.

Merril's (2000) assumption that learning is best when learners engage in solving problems, guided me as I developed the online learning environment. I saw it as my task as educator to ask questions and not to provide answers. I wanted learners to be able to link their learning to existing schema through the learning environment (Mergel, 1998). I assumed that my task was to help learners to build on their schema through guided reflection and further questioning to make real the steps in learning and understanding.

The almost unrestricted storage space that comes with having a server, allowed me to store and publish learners' work on the Internet. Their artefacts were made accessible and available to learners simply by placing a set of tabs down the right-hand spine of the Web site, with links to classes and then to the specific learner's work within that area (see figure 3.1 for the tabs).

3.4.3 Delivery of the online learning environment

With the design and development of Grade 8 *Weblearning* completed, my first online learning environment was uploaded onto Alexandra High School's Web server.

Learners then accessed grade 8 *Weblearning* via the Internet. This learning environment was usually used during computer lessons with my supervision; but learners also made use of the learning environment after school and at home (if they had a computer).

A *Weblearning* lesson consisted of learners going to the Internet and loading the *Weblearning* Web site. They then chose the task that they were busy on, worked through Gagne's nine events of instruction (1985), performed the task that had been set and then handed the saved task on disk to the teacher. This completed task was then uploaded to the server so that learners could see each other's work. Once learners had completed this sequence, they then moved onto the next task. Each successive task was built upon skills acquired from the development of the prior task. By engaging in this process I hoped they would build on and develop their schema.

This sequence of tasks meant that it was possible to ascertain which aspects of instruction made sense to learners and which did not. Observing where and when learners got held up in the online learning environment allowed me to make appropriate alterations so that other classes would not experience the same problems.

3.4.4 Maintenance of the online learning environment

The content that had been uploaded onto the server was fairly static. It had been defined and prescribed by myself in the planning and design of *Weblearning*. The only active content was the learners' completed tasks. The task of uploading over 200 completed artefacts to the server is what took up most of the development time.

3.5 Observe

I used a mixture of quantitative and qualitative research strategies to record my observations about the learners' use of grade 8 *Weblearning*. I kept an informal research journal where I noted down learner comments or responses to the online learning environment. A survey of learners' responses to the course was also conducted at the end of year by means of a written questionnaire where learners responded to key statements (see Appendix 1). I also used the learners' completed tasks that I had uploaded onto the server to assess how many had completed their work and how well they had completed them. The findings on the use of the online

learning environment are divided into three subsections; observations about learning, teaching and technology.

3.5.1 Observations about learning

When analysing the responses to the questionnaire it became clear that many learners were positive about the extent of their

learning in *Weblearning*. In the survey, learners across all six classes were asked to rate the extent of their learning on an ordinal scale. 56% of learners indicated that they had learnt "quite a bit". 24%

The categories on the scale included

- not much,
- a little,
- quite a bit and
- a lot.

indicated they had learnt a lot. The reasons given by these learners for the extent of their learning varied slightly. It seemed that learners attributed their success to:

- their own competence;
- their determination to understand; and
- the active learning style of the tasks.

These were learners who had taken on the challenge of learning in an online learning environment, applied their minds to the task and had their completed work published. Their success was due to their willingness to grapple with their learning and their tenacity to come to terms with the subject matter.

The records of completed artefacts show, however, that a large proportion of learners did not complete their tasks and neither did they have their work published. Their reasons for not completing their work were attributed either to time, inadequate understanding of the task or the failure of the teacher (myself) to teach. The shortage of time in front of a computer is quite understandable. Learners did have to share computers (sometimes four to one computer) and did not always get the time required to master the task. Computer lessons were also infrequent. Learners sat in front of the computer only once a week. Some learners from a second language background struggled to understand the tasks that had been set. The interface used to convey Gagne's nine events of instruction (Gagne, 1985) requires that the learners comprehend a vast amount of information before they even start performing the task. Not surprisingly, these learners were dissatisfied with the extent of their learning.

My culpability for the lack of learning is perhaps the most enlightening aspect of this case study. In my desire to explore teaching with technology, I expected learners to use the technology to teach themselves to perform the tasks. Learners who struggled to understand what was expected in the tasks were redirected to the resources of the online learning environment. It was here that I hoped they would use their reasoning skills to solve their uncertainties. When they expressed an inability to complete the task, my inadequate response to them was to instruct them to reread the instructions and the supporting materials. I assumed that because I had designed and developed a host of support resources, learners would be able to refer to them and thus complete the task. This assumption was misplaced. The literature review and the model developed (see chapter 2) insisted that pedagogy should not come before technology. I had committed the classic mistake of attempting to replace the teacher with set of data and information.

3.5.2 Observations about teaching

Learners were also asked in the questionnaire to rank on an ordinal scale what may have improved their learning. A significant proportion of learners reinforced the

The categories on the scale included

- More specific instructions from the teacher
- More notes from the teacher
- No tasks
- More time in front of the computer
- The whole class should have worked through the task together

observation made in the previous paragraph and indicated that they would have liked more help from the instructor rather than help from notes. A few said that they wanted to work through the task together. But they did want more specific instructions from the teacher.

In creating an online learning environment, I did not want the learners to rely on me as the source of all answers. I wanted them to use the tools that I had created to help them learn. Learners were, however, not prepared to accept such an approach. I identified three main reasons for their refusal:

- They could not absorb the avalanche of information that came with the course. I assumed that offering more specific help online would assist the learners. They interpreted the help as simply more confusing data and information. This was particularly unhelpful for learners who were working with English as their second language.

- The system that they were using was new and they had no experience or expertise to draw on. Classrooms have trained children very well in an accepted textbook-centred pedagogy, and I had offered learners a completely different learning environment.
- Much of the written content that was intended teach the skill was in itself unnecessary, because learners could watch some one else perform the task or use their own schema to use the software on their own. The teaching technology, by coming in between what they were learning and what they were trying to do, hindered their learning.

Certainly, the knowledge age does require that learners look beyond the instructor for answers. I focussed too strongly on this point, throughout the implementation of the online learning environment. Learners do, however, need a specific teacher to judge what the learners' pre-existing schema is, and then to mediate between this pre-existing schema and the development of a new one (Jonassen s.a.).

3.5.3 Observations about the use of technological tools

Learners were quite ambivalent in their response to using the Internet as their 'teacher'. Those classes that were more experienced on computers were more comfortable with using the Internet as their primary source of structured information. Whereas those who were unsure of computers, struggled to do so. When it came to the use of extra resources, it is clear that learners did not make much use of the discussion or FAQ facility.

Learners were very positive about having their work published. Surprisingly for teenagers, few were embarrassed at having their work visible to the world. They displayed a sense of pride in a finished piece of work and having the completed artefact published. Learners also found it exciting to look at each other's work and to vote on who they thought had constructed the best piece.

3.5.4 Summary of observations

The key to successful learning lay in the learners' confidence in their ability to complete the task. Successful learners were those who were willing to attempt to find their own solutions. Those who had completed their tasks were those who had been able and willing to experiment and to try out different paths to solve the tasks. Once they attempted a task, they received feedback from their peers, their own

experience and myself. This enabled them to modify their mistakes, integrate their experiences into their schema and re-attempt the task. Soon these learners began to claim competency in the certain skill they were practising.

Many of these successful learners were from groups where a member of the group had shown his or her peers their solution to the task. This completed task provided an impetus to the rest of the group to master the skill and they moved forward in mastering the computer tasks together. Other successful learners were those who had had previous experience with computers. They applied their existing schema to the task and simply found their solution. Those learners who were unable to make progress were those who were not able to engage with the problem in the time allocated. This group of unsuccessful learners varied in size. Across the grade approximately 20% of learners were dissatisfied with their levels of learning. In the second language classes (learners grouped together because of their lower proficiency in English) this formed a larger proportion of the class.

3.6 Reflect

In the final phase of the action research cycle, I reflected on the accuracy of the assumptions that I had made before the construction of Grade 8 *Weblearning*. I also noted the observations that I had recorded in the observation phase of the action research cycle. These reflections are summarised as findings about pedagogy and technology.

3.6.1 Findings about pedagogy

The online learning environment was designed assuming that learning is best when learners are engaged in solving problems (Merril, 2001). It was also assumed that when learners enter an active learning environment, they bring their existing knowledge to problems and attempt to solve them (Mergel, 1998). To an extent, this assumption was correct. Those learners, who could use their existing schema to engage in the tasks and solve them, were successful. However, many learners in grade 8 were new to computers and could not access the assumed schema to construct a solution to the problems.

Weblearning (Phase 1) demonstrated that novices in an online learning environment require as much, if not more, support from the instructor. The technology is simply a

framework whereby the learners are exposed to new ideas and approaches to learning. The task of fostering learning remains that of the teacher.

I had invested an enormous amount of time in the design and development of this online learning environment. Each task had been planned in great detail and thoroughly thought through. I had also created extensive online support resources. I had assumed that the time and effort that had been invested in communicating the task to the learners would result in the acquisition of knowledge and the construction of new artefacts. The validity of these assumptions proved to be dubious. In choosing to focus on the technological attributes of the Internet, I neglected the learner and the support that he/she required when learning. Problems may provide a good context for learning, but learners cannot always access their existing schemata no matter how good the instruction may be. Learners need support from the educator, fellow learners and other print-based media when looking for solutions to problems. Otherwise they will not always be able to solve the problem. I discovered that when designing an online learning environment, one couldn't only look to learners' pre-existing schema as building blocks for constructing new knowledge. An educator needs to look at the interaction between the social context, the learners' knowledge and the problem. It is the interplay of these factors that determine what will be learnt.

3.6.2 Findings about technology

In Grade 8 *Weblearning*, I had arranged the online learning environment in such a manner that technology was my priority. I saw it as my responsibility to arrange the learning resources and then to guide learners as they moved through the online learning environment. In allowing learners to control the pace at which they moved through the learning environment, I thought that I had adopted a learner-centred approach. I assumed that I had relinquished my teacher's authority and given learners control of their learning environment.

Traditionally, the source of control in the learning process has been the educator, who chooses educational objectives, selects content, determines the instructional strategy and evaluates learning (Reigleluth and Moore, 1999). In an online learning environment, the educator can still choose to remain in control of the learning process, and use technology to reinforce that control. Alternatively the educator can

focus his attentions on the learner and not the technology. I chose to focus on technology to the detriment of the learners.

Technology also allows for the creation of a learner-centred environment. Dirty learning offers the educator a mode in which the learner can take more responsibility for defining learning outcomes and for choosing the road needed to achieve those outcomes. I failed to recognise that I had used technology to retain control. By expecting the learners to use technology as their teacher, I adopted a teacher-centred mode and set the educational goals.

If an online learning environment is to be successful, then more social participation and interaction in the online learning environment needs to be encouraged. I realised that I had failed to recognise that learning occurs in a social context.

I began the design of this online learning environment convinced of the need for a new paradigm in education. Yet, after the experience of implementing Grade 8 *Weblearning*, I had to acknowledge that the Internet has not made any fundamental changes in basic human learning processes. The Internet may give learners access to information that they never have had access to, and offer them an opportunity to experience a new and different teaching style. However, technology alone is not responsible for a 'paradigm shift' in learning.

3.7 Implications for the model

My dual interest in educational technology and innovative learning theories were the rationale for building Grade 8 *Weblearning* (Phase 1). This two-fold rationale contained a tension that I failed to recognise. My interest in educational technology led me to focus on technology and not pedagogy. The broken line in figure 3.3 represents this tension. The desire to impress staff and justify my choices to management meant that I had allowed technology (A) to supercede pedagogy (B). An interest in innovative educational theories had been subsumed by technological wizardry. My 'techno lust' (Bundy 2000) led me to spend much more time on designing technology and much less time considering pedagogical issues of teaching, learning and knowing in an online environment. The consequences of this choice became more and more apparent as I implemented Grade 8 *Weblearning* (Phase 1).

My two assumptions about an educator's role in an online learning environment reflected this tension. Whilst Conway (1997) saw it as my task to simply arrange the

learning resources, Watson and Rosset (1999) suggest that the teacher should guide the learners as they 'teach themselves'.

When looking at my assumptions and the model, I discovered that as educator, I had a choice when designing an online learning environment. I could either follow Conway's lead (see table 3.1 - Assumptions about the educator) and focus on the tools themselves and hope that this technology would be sufficient to engage the learner. By doing this I would be accepting Conway's assumptions and simply arrange the required learning resources. Alternatively, I could focus on the learners and find out more about their needs, assumptions, schema and experience. By doing this I would begin to meet Watson and Rosset's assumptions about learning and technology. The model (figure 3.3) reflects the tension that the educator in an online learning environment has to face.

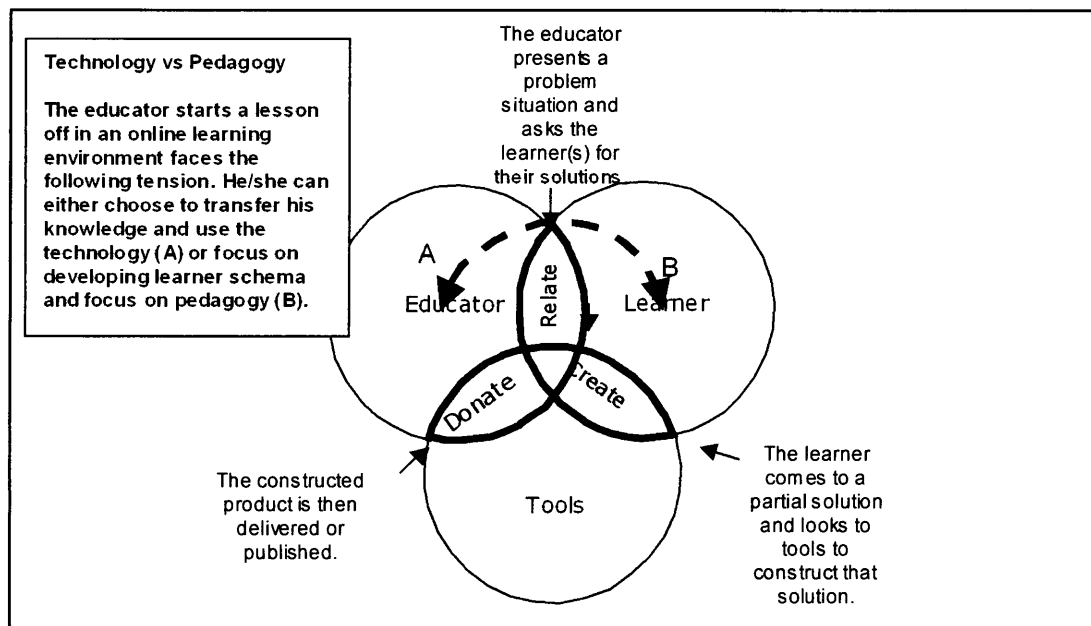


Figure 3.3 Technology vs. Pedagogy

Technological tools seem to promise smarter, happier, better educated and more fulfilled learners. Experience from *Weblearning* (Phase 1) had shown that access to technology in itself does not automatically result in improved learning. It is the educator who ensures that learners think meaningfully in a learning environment. The educator and not the technology has the capacity to ensure that learning takes place.

The dirty learning cycle that was developed in the literature review required that a designer of an online learning environment first consider the needs of the learners. My choice to accept Conway's assumption meant that I had adopted more of a clean pedagogy, where technology was the focus, and where learners had to interact with the technology and not the educator.

The implications of case study one and the model are clear. Tasks might be a useful point to start a learning program. But technological tools, whilst able to convey content, do not have the capacity to necessarily engage the learner in meaningful thinking. This is the responsibility of the teacher and the pedagogy that he adopts.

From case study one, I emerged with a reconstructed vision of an online learning environment. I retained the belief in the importance of problems as a source of learning, but added the need for strong support from other learners, the technology itself and from the instructor. I also realised that looking to learners' individual schema to provide a foundation for learning was too simplistic. Learners, with no experience in computers, have few schemata to build upon. The place where schemata are built is in the social interaction between learners themselves and the task that is set. These lessons, I took into Grade 8 *Weblearning* (Phase 2).

Chapter 4

Case Study #2 – Grade 8 *Weblearning* (Phase 2)

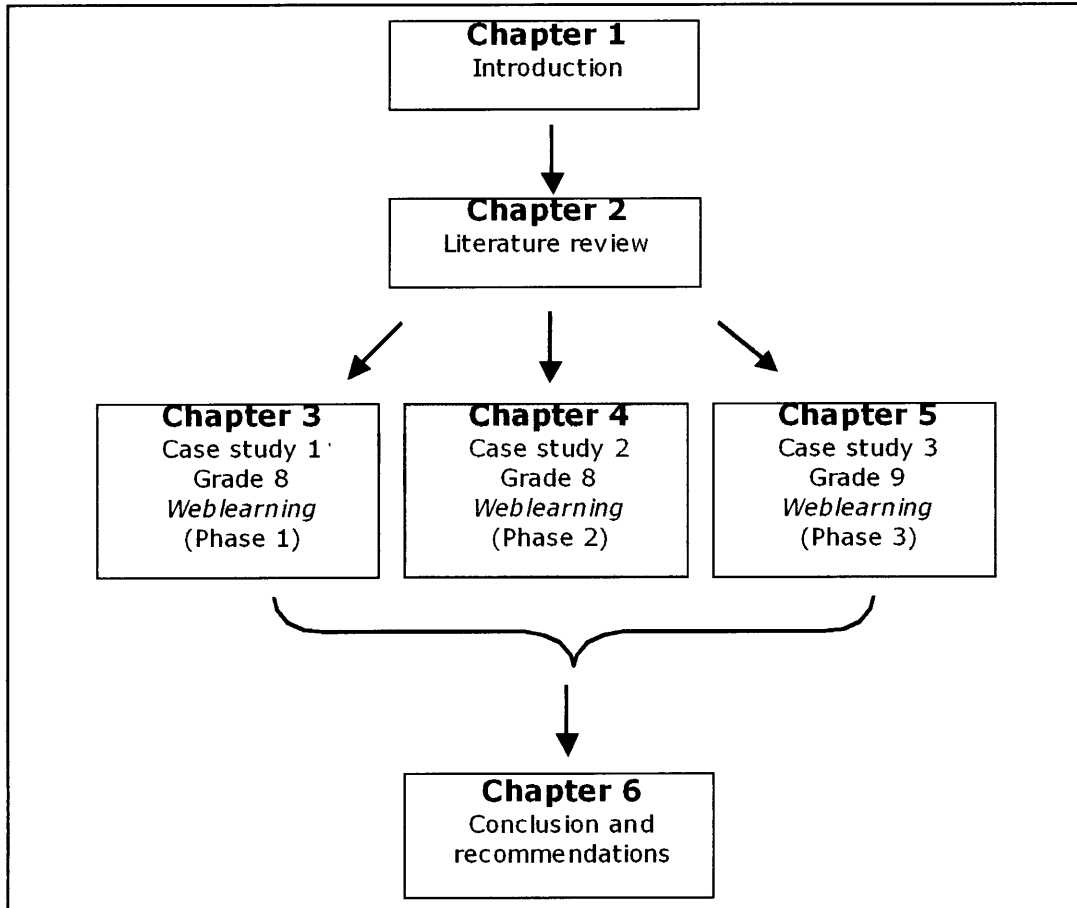


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4.1 Introduction

This chapter contains a new case study that reports on the design, development, delivery, and maintenance of my second online learning environment. Grade 8 *Weblearning* (Phase 2) was developed upon and in response to the findings about Grade 8 *Weblearning* (Phase 1).

This online learning environment is also called Grade 8 *Weblearning* as it taught computer competencies to Grade 8 learners in the subsequent year. To distinguish this case study from the previous one, I have added 'Phase 2' to the title.

This chapter offers a record of my revised attempts to implement dirty learning. The implementation of the online learning environment took place in the first six months of 2001.

The goals of this chapter are:

- to report and reflect on the assumptions involved in the design, development, delivery and maintenance of an online learning environment that intended to foster dirty learning.
- to use the insights gained from these reports and reflections to facilitate the development of an appropriate set of guidelines for the use of technology and pedagogy when creating online learning environments.
- to apply these findings and insights to the development of a model describing the pedagogy of an online learning environment.

4.2 Structure of the action research

This chapter is structured around the action research cycle used in the previous chapter. This case study uses the same action research phases⁹ (plan, act, observe, reflect) to arrange the report.

4.3 Plan

The process described in the following four phases is a rough approximation of the sequence of events.

4.3.1 Background

The previous year's experience of designing an online learning environment had reinforced Sims' (2001) contention that "it has become all too easy to create Web-based materials without understanding the underlying principles of online, interactive, engaging learning." Grade 8 *Weblearning* (Phase 1) had shown how easy it is to put technology before pedagogy. My online attempts at education had been thwarted by a focus on the technological tools and a failure to engage with the learners. This misdirection of effort meant that I had not succeeded in developing an online learning environment where learners could optimally develop their computer competencies.

The failure to engage the majority of learners in the online learning environment indicated a poor implementation of the dirty learning model described and developed in chapter two. In Phase 2 of *Weblearning*, I would again attempt to use this model, focusing on the learners and not the technological tools. The second online learning environment still had the intention of assisting grade 8 learners to develop computer competencies, but the means of accomplishing such a goal would be different. Technology would no longer be the focus, but would be used as a gateway between educator and learner.

The educational context of the research was similar to case study one. I taught 6 classes with approximately 36 learners per class. The majority of the learners were second language learners and most of these had not worked on computers before. The computer network available at Alexandra High had 12 workstations. So three learners usually shared one computer.

⁹ For further details on the action research cycle, see chapter one.

4.3.2 Rationale

In Grade 8 *Weblearning* (Phase 1), I initially assumed that the task of the educator was to arrange the learning resources in the online learning environment to enable learners to acquire knowledge. Learners would then use this knowledge to build an artefact that represented their understanding. This artefact would demonstrate that the learner had mastered the computer competency taught.

The previous case study revealed that more was required from the educator if the learning, described in the previous paragraph, would happen. Watson and Rosset (1999) point out that technology has not yet replaced the social interaction of a traditional classroom. I began to see that the educator did not only occupy the commonly quoted role of “guide on the side” but occupied a variety of roles including mentor, facilitator and instructor (Watson and Rosset, 1999). My attention switched from technology to building an online learning environment that encouraged the social and collaborative dimensions of learning. Case study one made it clear that there needs to be strong support from the educator to assist learners in their learning. The Internet and its resources are not a substitute for a teacher.

My first online learning environment may have provided learners with an unprecedented amount of information. But learning is more than reading information and practising new skills. Learning is a social process and it is in the interaction between learners and educators that information becomes meaningful. In order for learning to occur, the learning environment has to combine both human and technological interventions.

Learners bring their schema to the online learning environment (Mergel, 1998). It is the interplay of the schema, the context and the problems to be solved that determines if anything is learnt (Tam, 2000). Active participation by both educator and learner in understanding and completing the tasks is necessary to foster the development of learners’ new schema.

In case study one I had assumed that learners would be comfortable with using the technology of the Internet. I assumed that the rich and innovative learning experiences of the World Wide Web would be inherently motivating and would engage learners so that their technological competencies would not hamper learning. Experience showed that most learners were unfamiliar with an online learning environment and many resisted attempts to be part of it. A possible reason for this

resistance lies in the level of technology use (Harmon and Jones 1999). Learners needed to feel in control of the technology they were using. Otherwise, they would resist using the technology, and learning would not take place.

I realised that learning occurs in social context. This persuaded me to scale down the technological dimensions of the online learning environment and to focus more on the social aspects of constructing a learning environment. These realisations led to a new set of assumptions.

4.3.3 Assumptions

The successes and failures of Phase 1 of *Weblearning*, as discussed in the rationale above, led to a revised set of assumptions about the educator, learner and the tools. This new set of assumptions is summarised in table 4.1. These revised assumptions guided the design of *Weblearning* Phase 2.

Assumptions	Elaboration on the Assumptions
Assumptions about the educator	▪ The educator needs to be aware of the learners' pre-existing schema and then arrange the required learning resources in the online learning environment accordingly (Jonassen, s.a.). ▪ The educator is required to take on a variety of roles in an online learning environment. The educator can act as a guide as learners use the learning resources to 'teach' themselves. The educator can also act as a facilitator with regard to learners' interactions with content and each other. The educator sometimes needs to instruct learners directly (Watson and Rosset, 1999).
Assumptions about the learner	• Problems can provide a context for learning. But there also has to be strong support to assist learners to get past the hurdles that hamper the development of solutions (Ge et.al., 2000). • The interplay between learners' existing schema, the social context and the problem to be solved determines what is learnt (Tam, 2000).
Assumptions about the tools	▪ Learners, who are unfamiliar with the pedagogy of an online learning environment, should experience a mix of traditional and innovative approaches to technology use (Harmon and Jones 1999). ▪ An online learning environment must allow, encourage and build into the learning activities tasks that allow learners to interact with each other, using the technology as a gateway (Watson and Rosset, 1999). ▪ The online learning environment should be used as a gateway whereby learners can interact, construct, view other learners' tasks and respond to them (Tam, 2000).

Table 4.1 Assumptions behind the online learning environment

4.4 Act

Having redefined the rationale for engaging in the development of a new online learning environment and adjusted my assumptions accordingly, I then moved into the action phase of the action research cycle. Case study one had shown that using a computer network is relatively straightforward. But using it profitably for educational purposes may not be quite as simple (Trentin, 1999). With more circumspection about using the Web as a learning technology and with more experience in the pedagogical approaches of an online environment, the “act” phase of the action research cycle began.

In the interests of clarity, the ‘act’ phase of the action research cycle is divided into four sections:

- Design;
- Development;
- Delivery; and
- Maintenance

Table 1.1 in chapter 1 elaborates more on each section.

4.4.1 Design of the online learning environment

The clearest lesson of case study one was that technology itself is not an educator. No matter how engaging, well structured and well designed, an online learning environment is not a substitute educator. Technology does not only have to be used to deliver content. It can also promote the social nature of learning by acting as a gateway between educators, learners and content.

Although the Web does offer enormous learning possibilities, learners require more than access to a learning environment to construct their own schema. Learners (whether online or not) require relevance, personalisation, responsiveness and flexibility. Technology itself cannot provide what a human mediator can offer (Spitzer, 2001).

Technology can however function as a gateway; a gateway to resources, collaborative learning and individual achievement (Tam, 2000). For learners struggling to construct their schema, the Web can act as a gateway to allow

communities of learners to work together in collaborative groups to achieve a common goal. Technology may not be a substitute educator, but educators can use the technology available on the Web to provide human interaction. Careful design of the online learning environment is needed to facilitate such interaction.

The online learning environment needs to be designed to encourage interaction rather than as a tool to teach content. The Web does contain strong potential for social interactivity (McMahon, 1997). Traditional Internet tools such as e-mail, newsgroups, discussion boards and Internet Relay chat offer both rapid synchronous communication of normal speech as well as asynchronous interaction (McMahon, 1997). Human interaction is, however, often the last thing on the mind of technologists fascinated by the latest delivery system hardware (Spitzar, 2001). Case study one supports this observation. When designing I had asked the question, "what skills do the learners need to know?" and attempted to make the technology deliver the answers to these questions. I now saw that the focus of the designer needed to shift from content to process and I needed to create an online learning environment that would facilitate interaction and 'hold the hands of online learners' (Watson and Rosset, 1999).

4.4.2 Development of the online learning environment

The interface that was used for *Weblearning* Phase 1 was used again in *Weblearning* Phase 2. Instead of spending too much time on the re-design of the interface, more time was spent on working out how to create an environment that emphasised interactions amongst participants. The following collaborative model for the design of the online learning environment was adopted and was based around the following steps:

1. Collaborative team formation;
2. Problem presentation;
3. Problem demonstration and problem identification;
4. Initial task assignment;
5. Learner controlled manipulation;
6. Non intrusive educator available on demand;

7. Feedback; and
8. On completion of the first assignment, learners work on a new problem.

4.4.3 Delivery of the online learning environment

When delivering the learning programme, I kept in mind the idea that technology is a gateway and not a delivery mechanism. Learning needs collaborative problems and educators need to be responsible for assisting the learner to access prior knowledge. I delivered an adapted online learning environment that moved the learner through the following steps:

4.4.3.1 Collaborative team formation

Before learners switched on their computers, I ensured that learners were seated in groups where learners were comfortable with each other. These groups were to be the teams that would work together solving the tasks that were set before them.

4.4.3.2 Problem presentation

Once the team were ready, they went to the *Weblearning* Web site and selected a problem or task. The problems were relevant to their experience with computers. At the most basic level, the problem was how to turn on or off a computer. At a more advanced level, the problem was how to convey emotion in e-mail. All these problems were located in a context where collaboration, using technology, was necessary.

4.4.3.3 Instruction and problem demonstration

The problem was followed by a set of direct instructions. The instructions involved actual activities that the learners were required to perform. This instruction might have been to login to their e-mail or to go to a discussion board. In most cases, the learners had no previous experience of that activity. The solutions to achieving this instruction were shown in a PowerPoint slide show that followed the instruction. This slide show would try to address the broad parameters of the activity and how to engage with it.

4.4.3.4 Initial task assignment

Once learners had seen the problem demonstration, they were assigned a task that they had to complete at the end of the slide show. They were asked three specific questions and were expected to record their answers to these questions in their computer books. Although the slide show and the initial task assignment were quite 'clean' in their pedagogical approach, the learning was still dirty because this was not the end of the process. Learners then went on to experiment with the technology and to master the set task.

4.4.3.5 Learner controlled manipulation

Once the group of learners had seen the demonstration of the problem and recorded their answers to the questions posed, they then engaged with the technology and began to grapple with finding a solution to the problem. Many learners skipped back and forward between steps four and five, using the slide show to guide them as they attempted to master the task. Others engaged me in attempting to find solutions to the problem, thus making use of step 6. In both cases, they worked collaboratively on the task.

4.4.3.6 Non-intrusive educator available on demand

I made sure that I was available and willing to assist the learners. I did not however, tell learners what the answers were. Rather, with the process in mind, I guided learners past stumbling blocks or to appropriate parts of the slide show. Most importantly, the Internet was no longer seen as the educator. It might have held the solutions, but I was the encouraging or motivating force behind the learners' actions. Where learners strayed from the task, I had to become more authoritarian. However, this seldom occurred and learners generally kept to the task.

4.4.3.7 Feedback

Once learners had performed the task, the performance was publicised or communicated in some form. For example, learners' contributions to a discussion were then immediately publicised on a discussion board. If learners were e-mailing, their e-mail was directed to myself or to fellow learners. This ensured that feedback varied depending on the context. When the task involved communication with myself, then I responded. In other instances, the tasks required that learners engage with their peers or with a whole class. Sometimes the feedback would correct

mistakes. The feedback might be individual or might be feedback for the whole class. It depended on the nature of the task. Once learners had received positive feedback from me, they were then instructed to move onto the next task.

4.4.3.8 On completion, move to the next assignment

Each task was followed by a slightly more challenging task. The tasks followed the same format as the previous one except that the new task expanded on what was learnt in the last task. Each successive task encouraged greater interaction between class participants. As a result learners not only mastered new skills, but they had the incentive of learning new communication technologies. This sequence of tasks is pictured in Figure 4.1.

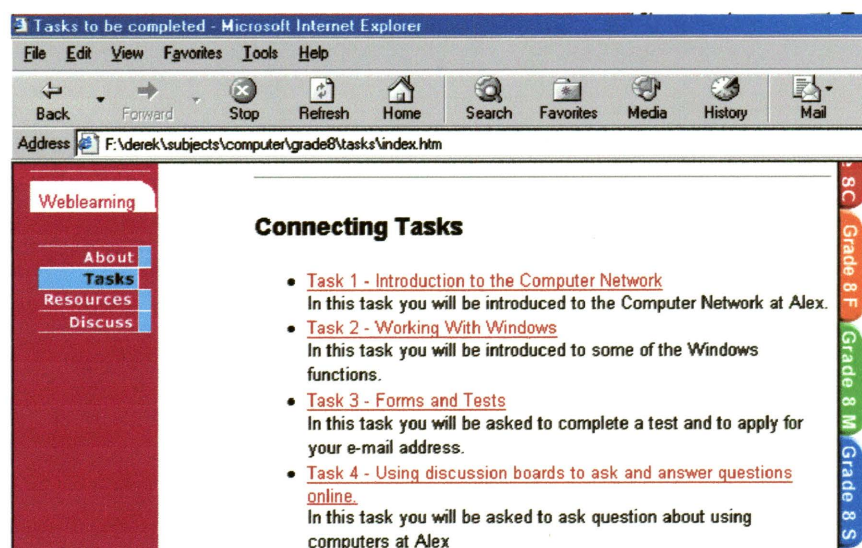


Figure 4.1 The sequence of tasks in *Weblearning* (Phase 2)

4.4.4 Maintenance

Once the online learning environment was constructed and the learning tasks uploaded, the maintenance of the learning environment focussed on facilitating interactions. The learners' collaborative tasks created further additions to the resource base. These contributions required maintenance. I responded to learners' e-mails and moderated discussion boards after they completed certain tasks. Using the technology as a gateway allowed new interaction opportunities with learners.

Learners were engaged in using the technology as a gateway and were not specifically using software to produce artefacts. This meant that learners did not have to hand their disks in to me. This saved an enormous amount of effort and

time. But it did mean that learners' own work could not be publicised, as had been the case in case study one.

4.5 Observe

The observe stage of the action research cycle was conducted using a variety of quantitative and qualitative research strategies. I continued to note learner comments and responses in my informal research journal. I also asked learners to perform certain tasks in which they claimed they had competencies and then collected feedback from the class by means of a survey at the end of the course (see appendix 2). Learners' use of the interactive features of Grade 8 *Weblearning* (Phase 2) were stored on the server and these were used to assess how many had completed the set tasks and to what degree they had completed them.

The observations about the use of the online learning environment are divided into the three subsections that match the model:

- Observations about learning;
- Observations about teaching; and
- Observations about the use of the technological tools.

4.5.1 Observations about learning

For most of the learners using grade 8 *Weblearning*, this was their first experience of computers and they had never been taught on, let alone used, a computer. My research journal notes that the response of these "newbies" to the learning environment was positive, throughout the duration of the course. In the feedback, learners from all six classes were asked to rate the extent of their learning on an ordinal scale. 58% of learners indicated that they had learnt a fair amount about computers. 29% indicated they had learnt a lot. The reasons given by these learners for the extent of their learning varied, but it seemed as if learners generally attributed their success to their ability to master the variety of Internet tools.

The categories on the scale included:

- I have not learned much at all
- I have learned a little about computers
- I have learned a fair amount about computers
- I have learned a lot.

The positive response to Phase 2 is also evident in the online records. Each task had extensive contributions, and it was sometimes difficult to persuade learners to proceed to the next task because they were enjoying mastering the activity.

An interesting difference emerged between the two case studies. The learners', who were using Phase 1, attributed their success to their own personal characteristics. In Phase 2, learners attributed their success to their technological skills. This was ironic, as I had placed all my efforts in Phase 1 on building a technological tool. Yet in Phase 2, where I concentrated my attention on the interaction between educator and learners, the learners attributed their success to their mastery of the tool. Perhaps successful learners are learners who compensate, and when the focus is on technology, they then develop their own learning skills. This notion could also be reversed i.e. if the focus is the learning, then successful learners are those who master the technological tools. This has important implications for learning. The tendency of successful learners to compensate suggests that it is vital that the learner in the online learning environment should feel that they are successful. Such an attitude can only breed confidence in the learners and in their own ability to solve further problems.

On examining records of completed tasks, it was clear that learner confidence with the learning environment did not necessarily translate into competence on computers. An overview of the tasks that were performed showed that many times the learners failed to grasp the competency that was supposed to be developed. My research journal records that I asked a few learners whether they were able to perform a certain competency, and although their response was affirmative, their ability to perform whilst being observed was poor.

When asked to explain the discrepancy between their expressed ability and their actual ability, some learners attributed their failure to nervousness when being observed by myself. Others insisted that they knew how to do the task, they had simply had got it wrong and asked for another attempt.

This exercise does not discredit what was learnt, but reinforces the ideals of dirty learning. Clean learning looks at failure as a negative outcome. Dirty learning sees failure as an opportunity to ask three questions:

- How did I fail?

- How can I fix this? and
- What do I have in my experience to help me?

This process is to be expected and occurs when learning happens by doing. If we fail, that failure is a catalyst to learn from the failure and try again. A confident learner is a learner who will try again. It's the learner with no confidence who gives up.

4.5.2 Observations about teaching

Learners were also asked to rank on an ordinal scale what they thought might have improved their learning. In contrast to Phase 1, where several learners attributed the lack of learning to the educator, most learners thought that more time in front of the computer would have improved their learning. The fact that there were only 12 computers being shared among 36 learners made this a legitimate concern. A busy timetable also restricted learners access to one computer class a week. However, these were variables beyond my immediate control.

Teaching in the online learning environment within the parameters of the revised assumptions was far more pleasurable. The fact that I had mastered the technological Web-based skills in Phase 1, meant that I spent less time designing and developing and more time as coach, facilitator and instructor. I also discovered that in an environment where co-operative learning was the norm, the learners found the space to teach themselves and each other. When something went wrong, and with no fear of recrimination, the learners usually sought out advice from their peers or myself in order to avoid repeating the same mistakes.

4.5.3 Observations about the use of technological tools

The use of technology in Phase 1 allowed learners the opportunity to create and publish work in the learning environment, but it had also hampered the relationship between educator and learner. Technology use in Phase 2 was shifted and the focus moved from looking at technology as educator to seeing technology as gateway. The technological tools were now used to allow the educator and learners to relate. This shift made the online learning environment far more pleasant as learners could choose to take responsibility for their learning and either ask me, fellow learners or find out the answers with the help of *Weblearning*. The shift in focus to seeing technology as gateway also meant that technology focused on facilitating

communication and collaboration. The Web as gateway had ensured this partnership. One of the highly rated sections of Phase 1 was the opportunity to publish their work. But because of the use of technology as gateway and not instruction medium, this feature was not developed in Phase 2.

In terms of technology, I began to use Active Server Page (ASP) scripts in the design of the learning environment, and this allowed me to spend less time updating pages since technology had automated the process.

4.5.4 Summary of Observations

Confidence is an essential characteristic for a learner to be successful whilst learning online. Such an attitude allows the learner to get dirty and fail, and then use the failure as a learning experience. The teacher in the online learning environment needs to foster such a positive attitude in the learner. To do so he/she can adopt a variety of different roles. The technological resources of the Web allow the teacher to move beyond the role as the dispenser of knowledge. The new roles that the teacher adopts are dependent on the learners who are learning in the online learning environment. If technology is used as a gateway between the teacher and the learner, then this technology can facilitate collaboration between all parties in the learning environment.

4.6 Reflect

In the final Phase of the action research cycle, I considered the accuracy of the new set of assumptions that had been made before the construction of Phase 2 of grade 8 *Weblearning*. I also considered the decisions taken in the design, development, delivery and maintenance of an online learning environment and drew up the set of reflections below. These reflections are summarised as findings about pedagogy and technology.

4.6.1 Findings about pedagogy

With Grade 8 *Weblearning* (Phase 2), I continued to apply Merrill's basic assumption that learning is best when learners engage in solving problems (2001). I did, however, modify this position with Ge's (2000) idea, which was that there needs to be strong support to assist learners to get past the hurdles that hamper learning. The collaborative structure used in the learning environment ensured that there was an interplay between learners' schema, the context and the problem to be solved. In

Phase 2, support for learning was shared between a variety of actors including the instructor, the peers and the technology. Phase 2 also demonstrated that successful learners were learners who had worked together in their groups with a problem and had come to some sort of solution.

A successful educator was more than just a person who managed to arrange the learning resources appropriately for the learners. This educator would be also assume a variety of different roles in the online learning environment. The educator engage learners in dialogue, offer learners support in understanding the task, facilitate collaboration and encourage learners' successes as they worked their way through the series of tasks.

Generally, the assumptions that I had made about learning proved to be correct. The need for problems with good support was observed and the ability of learners to construct schema in collaboration with the task and their context was noted.

4.6.2 Findings about technology

In case study one, I had mistakenly assumed that my function had been assumed by the technology. Learners' responses to this case study had shown that this assumption was wrong. In case study two, I took on a more active role in the classroom. I realised that teaching in an online environment does not mean that the educator abrogates his responsibility as educator. On the contrary, I discovered that the educator is more involved in the educational process. The educator has to be learner-centred and make sure that the learner is successfully able to use the online learning environment. The role of the technology is to act as a gateway and integrate the instructional materials, to offer live and virtual support and to give learners access to communication tools, by means of which the progress of users can be visible to all participants.

In Phase 2, it seemed as if learners were very happy using technology as a gateway. At times it seemed as if they wanted to focus on one problem and engage with it in a number of ways. For example, e-mailing friends had an intrinsic motivation. The social nature of the task encouraged the learners to continue working at it. This meant that apart from the e-mails that were sent between the different parties, no permanent artefacts were created. The original point of the online learning environment was to develop a variety of different competencies amongst learners. Learners' enthusiasm for using technology as a gateway resulted in their confidence

in their mastery of the medium. The weakness of case study two was that learners became so confident with the technology and interacting with content, fellow learners and the instructor that they did not move forward and start to apply this confidence to learning new skills. In terms of development of new sets of schema, the learners were quite content to remain at a certain level of technology use and not develop new skills and abilities.

In order for this to be an online learning environment and not simply a communication gateway, learners need to be able to do more than simply use the technology confidently. They need to be able to use the technology to construct. In case study one, learners had been asked to construct before they were confident in the use of the online learning environment. In case study three, a means would need to be found to develop confidence in the online learning environment but also encourage learners to continue to develop further and construct artefacts that represented their understanding.

The success of *Weblearning* (Phase 2) showed that the human element is the most influential aspect of any technology solution and the success of an online learning environment depends on the people using it.

4.7 Implications of these insights for the development of the model

The rationale behind the construction of Grade 8 *Weblearning* (Phase 2) was the assumption that learning takes place in a social context and the task of the educator is to foster a collaborative learning environment where learners can engage in dialogue with each other and the educator and thus develop their own schema.

The failures of Grade 8 *Weblearning* (Phase 1) were due to my focus on the technological tools and my neglect of learners and their schema. Phase 2 showed that the provision of data, information and instruction is not sufficient for learning to occur. Collaboration between learners and educators is necessary before a technological solution is created. Most importantly, the interaction between educator and learner must come before the interaction between educator and tools. Learners, especially those who have had limited experience with computers, need to have someone to 'hold their hand' and be guided while working in an online learning environment. A learner cannot simply be 'given' information, which they immediately understand and use. New information must fit into a learner's schema.

My two assumptions about an educator's role in an online learning environment (table 4.1) showed that that I had considered learner's schema and also the need for a balance between social and content interaction. But my assumptions about the learner indicated that I focussed more on developing support and creating a social context for problem solving (Ge et.al., 2000; Tam, 2000). My attention to content was limited.

The model (figure 4.2) offers a visual explanation of the social interactions that occurred in this case study.

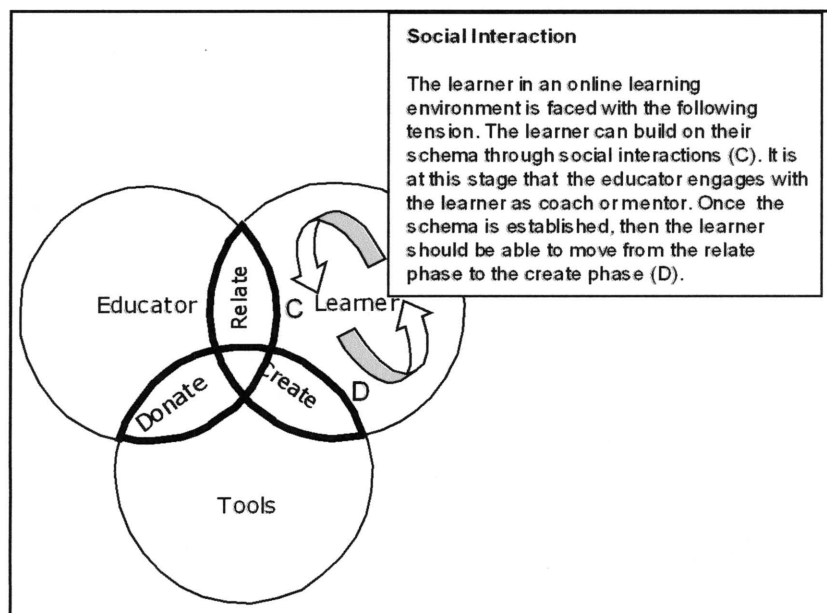


Figure 4.2 Social Interactions

When looking at my assumptions and the model, it is clear that I had designed Grade 8 *Weblearning* (Phase 2) with the focus more on social interactions and less on content interactions. I had used the Internet as a framework and constructed a gateway for learners and the educator to interact. This gateway had increased the levels of dialogue between all parties and learners' confidence in the technology was also fostered. This gateway had not however, built learners' knowledge. The tasks that focussed on social interactions kept learners occupied. But the tasks did not promote knowledge acquisition.

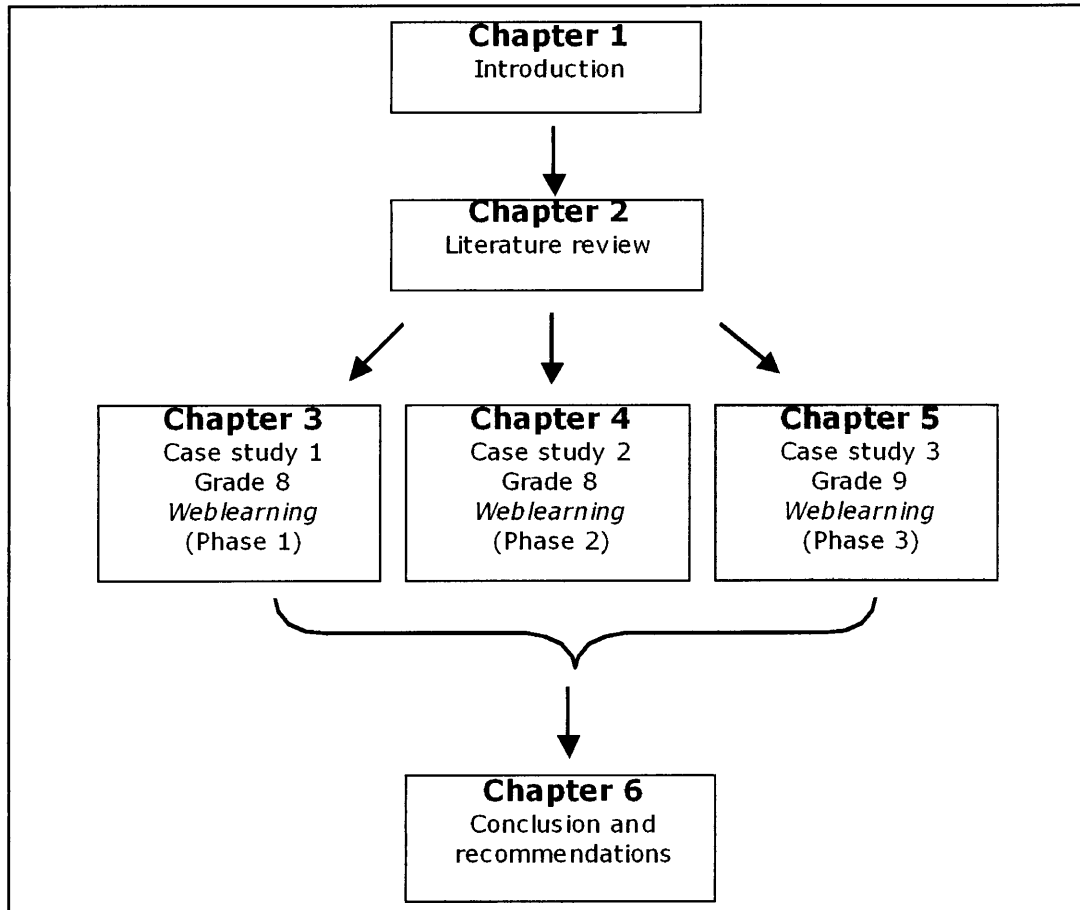
Case study two established that an online learning environment will increase its value as a learning resource to the extent that it can bring people together rather than isolate them. When faced with a formidable learning challenge, many learners

turn to other people for help. Case study two developed a means for learners to work with each other.

The pedagogy of an online learning environment has to foster social and content interactions. If the designer of an online learning environment focuses on process and only develops social interactions, then the class will be full of happy learners who are not building their own knowledge. Learners' interactions with content are also necessary for learning to occur.

Chapter 5

Case Study # 3 - Grade 9 *Weblearning*



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5.1 Introduction

This chapter reports on the design, development, delivery and maintenance of the third online learning environment known as Grade 9 *Weblearning*. The chapter contains a case study that records my third attempt to develop an online learning environment that uses a pedagogy called dirty learning. This particular learning environment was created upon and in response to the two previous online learning environments that I had developed and used, as described in chapters three and four.

The goals of this chapter are:

- to report and reflect on the assumptions involved in the design, development, delivery and maintenance of an online learning environment that had the intention of fostering dirty learning.
- to use the insights gained from these reports and reflections to draw up guidelines for the appropriate use of technology and pedagogy when creating future learning environments.
- to apply these findings and insights to a model which describes the process of using dirty learning in an online learning environment.

5.2 Structure of the Action Research

The action research cycle that had already been used in case study 1 (chapter three) and case study 2 (chapter four) was again used as a basis to structure my research. In this chapter the action research cycle was used for the third and last time¹⁰.

5.3 Plan

My findings in the case studies thus far have led me to the conclusion that doing action research has strong parallels with doing dirty learning. The lessons that I've learnt about online education have been gathered from getting dirty and constructing three successive online learning environments. These environments are the artefacts that I have made and they reflect my understanding of online learning. The process of constructing *Weblearning* Phase 1 and 2 has given me a set of experiences to draw on. Without this prior experience, my knowledge of what to do to avoid repeating my mistakes in Phase 3 would be limited. My experiences of implementing online learning environments ensured that I embarked far more cautiously onto this third attempt to educate online.

5.3.1 Background

The learning environment that was created was aimed at 80 grade 9 learners who had chosen computers as their subject for the year¹¹. The intention of the online learning environment was to teach about computer hardware and software to learners who were considering taking computer science as a matric subject.

As this was my second year as IT facilitator, the learners who participated in Grade 9 *Weblearning* had also been part of the Grade 8 *Weblearning* (Phase 1) the previous year. They therefore had had a year's exposure to learning online with a dirty pedagogy.

This year, the curriculum prescribed that learners were introduced to computer hardware and software. Instead of presenting learners with a whole lot of data and information about input devices, output devices, peripherals, components, system software etc., I decided to ask them to create an educational Web site that would introduce hardware and software to a new computer user. It was explained to the class that the Web site they would create would be written in HTML (using Notepad).

¹⁰ For a more detailed description of the action research cycle used, refer to chapter 1.5.

The different pages of their Web site would be published on the World Wide Web. A textbook would provide the content for the Web site, and learning would be derived from the series of tasks that were in the online learning environment. This series of tasks would direct learners to use the notes from the textbook and incorporate the information about a particular aspect of hardware or software into an HTML page. The learners themselves would construct this HTML page. The guidelines for writing these HTML pages would be provided by a set of Web-based notes that contained HTML codes, that increased in complexity as learners moved through the sequence of tasks.

5.3.2 Rationale

In case study 1, I created an online learning environment that had attempted to engage learners in the exploration of a resource rich environment. This first learning environment used the technological resources of the Internet to present content to learners. I assumed that learners would learn from this technology. On reflection, I realised that I had created a highly structured course that had few learning activities and that neglected the social aspects of learning.

In Phase 2 of *Weblearning*, I switched my focus from using the technology to present content, to using technology to build an online learning environment that encouraged collaboration. In this learning environment, technology became the gateway between learners and myself. I used this gateway to participate with learners in the process of solving meaningful and realistic problems. The more collaborative nature of this online learning environment allowed learners to use the Web to interact. This interaction had two consequences:

- a learners could access and develop their schema; and
- learner confidence in the technology was created.

The collaborative approach did not ensure that a range of new skills was learnt. Learners were often engaged in activities that kept them occupied, but did not necessarily promote the acquisition of new knowledge.

¹¹ Although this third learning environment was aimed at a different audience and had different intentions, the assumptions and model used for designing the online learning environment remained consistent.

The experience gained from the first online learning environments led me to conclude that it is all too easy to focus on the technology and forget about the learners and their learning. Case study two showed me that technology could be used so that the educator and learner are brought together to challenge, support or respond to each other in a collaborative environment. However, a focus on collaboration does not ensure that new skills are developed. In both cases, the respective focus on content or dialogue did not necessarily facilitate knowledge acquisition. Thus far both online learning environments had not taught what I had intended. Most learners had not been able to take what they had learnt from the course and make use of this knowledge in their high school curriculum.

My focus on the educational potential of the Internet, my interest in theories of knowledge and how such knowledge is acquired, my use of tasks, my development of engaging online resources and my use of collaborative learning had taken my attention away from the key question that, as designer, I should be answering:

Will a learner learn anything from this course?

In this case study, I would design a course that combined the technological lessons of case study one with the social lessons of case study two and focus on making sure that the course was memorable and that learners would learn from it.

In designing this course I would have to look at educator-centred and learner-centred factors to promote learning. The use of tasks, the development of engaging resources and the social interactions had all been attempts to make learning memorable. However, little attention had been paid to how the educator could use both the learning environment and the learners' responses to the learning environment to promote learning. A combination of educator and learner-centred factors would now be needed to ensure that the course was memorable.

5.3.3 Assumptions

I developed a revised set of assumptions¹² about learning, teaching and technology. These assumptions were based on my readings, the experiences of two previous online learning environments and the rationale developed above (see chapter 5.3.2).

¹² Unlike the assumptions that had guided Grade 8 *Weblearning* (Phase 1 and Phase 2), these assumptions were drawn from a combination of experience and the literature review. Some assumptions are therefore not referenced.

These assumptions guided the design of the third online learning environment (see table 5.1).

Assumptions	Elaboration on the assumptions
Assumptions about learning	▪ Learning is best when learners and educators collaborate and are willing to learn from previous failures (Merril, 2001; Ge et.al., 2000). ▪ Conceptual development comes through the use of problems that relate to existing schema, have a social context and involve doing (Tam, 2000). ▪ Knowledge acquisition develops as learners bring their schema, values and experiences to reason through a sequence of successively more complex problems.
Assumptions about teaching	▪ The educator considers the learners' existing schema and arranges an online learning environment with the necessary resources to encourage the learners to observe good practice (Conway, 1997; Jonassen, s.a.). ▪ The educator can construct different systems to motivate a learner to access his/her schema. These systems can lure, teach, guide, nudge, cheer and connect learners (Watson and Rosset, 1999).
Assumptions about the technology	▪ Learners, who are familiar with the pedagogy of an online learning environment, should be exposed to more innovative approaches to technology and be encouraged to explore (Harmon and Jones, 1999). ▪ The online learning environment is a framework and technology should allow learners to view other learners' created artefacts and emotionally respond to them (Tam, 2000).

Table 5.1 The assumptions behind the online learning environment

5.4 Act

Having defined the rationale for engaging in the development of a new online learning environment and refined my assumptions, I then moved into the action phase of the action research cycle.

As before, the "act" phase of the action research cycle is broken up into four sections:

1. Design;
2. Development;
3. Delivery; and
4. Maintenance.

5.4.1 Design

As mentioned in the rationale (see chapter 5.3.2) the design of Phase 3 was focussed around the question – “Will the learner learn from this course?” The literature review had established that dirty learning was a more appropriate pedagogy for learning with technology. Case study 1 and 2 had shown that learning requires both content and social interactions for learning to take place. Case study 3 would focus on making the course memorable and try to combine the pedagogy of dirty learning with social and content interactions.

Dirty learning does not ask learners to collect a series of facts. It assumes that the learner has a set of schema and knows something implicitly. When exposed to a learning experience, the learner is able to combine this new experience with their implicit knowledge to construct some new artefact, which expresses a development in his or her understanding. The learner’s schema is developed and knowledge is acquired.

When considering the issue of ‘constructing’, the focus should not be on the content, but rather on the process. Reigeluth and Moore (1999) propose that we should think of the learner as operating in two ‘spaces’ during the problem solving process. One is the problem space, in which learners work directly on solving a problem. But when they encounter a knowledge or skill deficiency related to solving the problem, it is helpful to think of the learner as jumping out of the problem space and into an

instructional space, in which the learners work on acquiring knowledge skills and attitudes (Reigeluth and Moore 1999).

Watson and Rosset (1999) point out that educators can use a variety of different systems to develop a learner's schema. They claim that an instructional space can be designed anywhere on a continuum from a highly constructivist approach (where learners are basically on their own to figure out where and how to acquire what they need) to a highly directive approach (in which an extensive structure is provided to help the learners acquire what they need to complete the task.)

Lebow (1993:5-6 quoted by Tam, 2000) combines constructivist elements in his instructional design models. He suggests that clean and dirty learning are not incompatible pedagogies and proposes that traditional design principles be applied in online learning environments. He argues that innovative pedagogies such as dirty learning "offers instructional designers an alternative set of values" (Lebow, 1993:5-6 quoted by Tam, 2000). These values could introduce a new mindset that may significantly influence methods, without challenging the coherence and consistency of the basic Instructional Systems Design model. The context of learning should stimulate cognitive activity, as learners engage in relevant problem solving. The levels of learners' engagement in the task should be the measure of the success of the learning environment rather than how well the learning environment has implemented a certain theory of learning.

5.4.2 The development of the online learning environment

As with case study one and two, I chose to use the same layout to develop the online learning environment and returned to the basic structure. The learning environment gave learners the opportunity to publish their work. An alphabetically organised tabbed navigation feature on the right hand side of the page was again used. Each learner had a link to their space, where their work would be displayed. The tabbed navigation allowed learners to publish their completed work on the World Wide Web, so that their classmates, all other grade 9 learners, and eventually the whole school could see what is possible on computers.

I also retained the link to the discussion forum on the page. But this time I had no illusions about learners going to it to engage in some form of online discussion about their task. That would have to be built into a task for such use to happen.

In an attempt to address Reigeluth and Moore's (1999) point about learners moving between problem space and instructional space, I created a variety of different instructional and learning resources that would be used in the online learning environment. These included:

Instructional Resources

- A worksheet containing content regarding computer technologies, the actual subject of the lessons, was created.
- A slide show outlining the skills required for each learning task was created.

Learning resources

- A handout in which learners had an example of HTML to type out, and then add to, was developed.
- The online learning environment, with its instructions and links and resources.

5.4.3 Delivery of the online learning environment

I made use of the delivery structure as outlined in chapter four and followed the same sequence of events.

5.4.3.1 Collaborative Team Formation

Before learners went into the learning environment they were asked to form a group of two. This group was formed as a system to motivate them to access their schema. The group would offer each other encouragement and support each other's learning. The group was given a copy of the textbook that contained the necessary content about hardware and software. They were also given the hardcopy HTML instructions that showed them the HTML codes they had to use to complete the task. Once they had formed their groups and received the instructional resources and learning resources required, they then went into the online learning environment.

5.4.3.2 Problem Presentation

Once the group had been prepared with off-line material, I instructed them to go online and move to the appropriate task. These tasks began with a problem. The problem was usually personal in form and enquired about a certain aspect of experience or knowledge the learner had about computers. The online learning

environment contained a sequence of ten tasks. This sequence allowed learners to practice the skill of reasoning. It was this reasoning through the problems that made the learning on the course more memorable. Once learners had reasoned through the problem, they were then prepared to attempt the task.

5.4.2.3 Instruction and Problem demonstration

In the instruction phase, learners were exposed to the primary instructional resource. This instruction usually took the form of a Power Point slide show. The slide show allowed the learners to observe examples of good practice. The demonstration offered the learners the opportunity to observe and to think about what they had seen. Using the slide show was usually not imperative to their ability to complete the problem. The slide show offered learners a visual representation of the problem.

Following the slide show were links to other sites that might have extra information for the learners to add to their constructed HTML pages. Some might be helpful Web sites, others were *Flash* examples of what the HTML page looked like. An actual example of the HTML was not given, because learners would have simply used the cut and paste facilities of the computer to paste the HTML from the notes into theirs.

Learners were encouraged to explore these links. Those learners who 'discovered' the links found a useful resource to refer to as they completed their tasks.

5.4.3.4 Initial Task Assignment

Having moved through the first three steps, learners then moved onto the task that they had been set. Having accessed their schema and been introduced to the task, they now began the "doing" of dirty learning. Although dirty learning is in essence about doing, the process of getting to the "doing" had been gradually introduced. Learners had been prepared before being asked to simply construct. They had reasoned, explored and observed a demonstration of the problem. The formation of a group had also offered motivation opportunities.

5.4.3.5 Learner controlled manipulation

The tasks required that the learner use HTML to present his/her findings about some aspect of computer hardware or software. An example of this HTML was handed out as a learning resource at the beginning of each lesson. The learners had to type out this HTML. It was expected that learners would struggle to get their HTML correct on

their first attempt. Their failure to type in the code correctly would frustrate them and offer an experience of failure. Once they had discovered the source of their failure in the HTML code, learners were able to make corrections and then go on to adding their own HTML. The experience of failure reinforced what they had learnt thus far. Learners' failures led to their ability to manipulate the HTML tags and work out which tag resulted in what feature on the screen.

5.4.3.6 Non-intrusive coach on demand

I ensured that I was available and willing to assist learners. I did not always tell them the answers, but guided them to fellow learners who had succeeded with the problem, to the learning resources or to the appropriate instructional resources. I wanted to re-enforce the idea that learners could master the material if they used the resources available to them and not solely rely on myself for direction.

5.4.3.7 Feedback

Learners received feedback in a number of forms. Once they had finished the task, they were instructed to view their completed HTML in a browser. This action gave them feedback straight away and a preview would show them whether they had completed the HTML successfully. Feedback also happened when learners handed in their disks with the completed HTML on them. This HTML was uploaded onto the server and into learners' individual folders. The completed HTML was accessible to the whole class and learners received feedback from the class members. Learners were then given a second opportunity to submit their work to the server. This time I marked their work and gave them feedback by means of a rubric that recorded where they had gone wrong. The feedback would certainly evoke an emotional response from learners. The first case study had shown that they were pleased or embarrassed, but none were neutral.

5.4.3.8 On completion move to the next task

Each task was followed by a slightly more challenging task that required greater HTML skills of the learners. At the end of the course the learners had finished a series of 10 tasks and had taught themselves:

- Hyperlinks;
- Inserting images;

- Inserting tables;
- Using a table to lay out a page;
- Creating a JavaScript roll over; and
- Creating frames.

5.4.4 Maintenance of the online learning environment

The maintenance of the online learning environment revolved around the publication of learners' materials in the online learning environment. Learners handed in their disks once they had completed an HTML task and this was uploaded into their folder on the server. Because the class size was approximately 80 learners and not 220 (as in case study one) the task of uploading this work was not too onerous.

5.5 Observe

I used a mixture of quantitative and qualitative research strategies to record my observations about learners' use of Grade 9 *Weblearning*. I kept an informal research journal where I noted down learner comments or responses to the online learning environment. Learners also completed a survey at the end of year by means of a written questionnaire where learners responded to statements (see appendix 3). Learners' completed artefacts were also kept by myself. These were used to assess how many had completed the task and how well they had completed the tasks. The findings about the use of the online learning environment are divided into three subsections, which represent the three actors present in an online environment (see 2.4.1).

5.5.1 Observations about Learning

When learners were asked (in the questionnaire at the end of the year) whether they were pleased with their learning, 73% of learners expressed a positive opinion. Some were pleased that they had managed to master content that had initially seemed very foreign to them. A learner commented that he found it amazing that he could create such art by typing in letters. Some took their newfound skills and applied it to their own tasks: "At home I have created my own soccer Web site just for myself and I update it every week." Learners had taken the course and made it their own. Engaging learning had indeed taken place and new schema had become internalised.

With regard to learning, I found that learners who took responsibility for their own learning seemed to enjoy the online learning environment. When commenting on the year's learning, a learner summed up his experience by saying; "It was great because I did it all by myself". The activity-based approach of tasks appealed to learners, because (in one learner's own words) "we do the work instead of watching Mr Moore do it for us on the board, so we learn from our mistakes and it is easier to remember the HTML when you type it out."

Learners had different responses to the tasks. Some found that the tasks that were set were too difficult and involved too much work. Many commented on the fact that they did not understand a thing when they started off. "I was just typing in whatever was given out." "I couldn't understand the basics, but now I know most of the things that I thought that I couldn't do at the beginning." Others found that the sequence of tasks got more challenging and it became difficult for them to keep up with all the work and different instructions.

Two themes emerged around the use of tasks to foster learning. Firstly, learners found that the task-based approach involved an enormous amount of time. They also found that using tasks put them in control of their own learning, and they seemed to appreciate this. One learner commented that he liked the fact that they were not hand fed. Others noted that tasks meant that you had to "take self discipline into your own hands and do the work when told to do it."

It was interesting to note that learners attributed a lot of unintended lessons from tasks. "Tasks taught me to be more independent and it also taught me to be creative and use my imagination." They also saw that the tasks were preparing them for a large performance task at the end of the year.

5.5.2 Observations about the technology

Learners had both positive and negative comments about the technology. The first complaint was that the computers were too slow. This was quite an understandable complaint. Most of the work was being done on 486 machines, and loading Internet Explorer and the Web site did take a frustratingly long time. Again, this was a factor beyond my immediate control

Using the technology to find information for their tasks appealed to learners. "It is an interesting way to learn different things, no one can say they would rather go to the library and look for books than spend some fun time on the Internet."

"I like it because it is self education from the Internet. You don't have to listen to the educator and make notes. It is all there. I love the Internet. It is a way for us to learn for ourselves and in that way we can remember better and we don't get bored."

Learners were again very positive about the opportunity to publish their work on the World Wide Web. This gave their work an authentic context and one learner commented that he felt like "a real Web designer."

Publication of their work gave learners great satisfaction. "I liked seeing the things that I thought were impossible, but after this year, I know they are possible to design and I can design them myself."

They also appreciated the learning opportunities that publication gave them. "There is nothing better than having a brilliant Web site that everybody loves, but when you notice a big mistake you made, you are a little embarrassed." It also made the learners accountable for their work. One learner commented on his ambivalent feelings about publicising his task on the Internet. "I felt good because a lot of people could see it and sometimes not so good because I did not finish."

Probably the best comment about the medium came from a learner who felt that "it was nice being with Mr Moore but the computer was doing all the educating."

5.5.3 Observations about Teaching

I found teaching in an online environment a continuous challenge. Using a methodology where learners build and construct their own schemas meant that learners had to take responsibility for their own instruction and learning. Giving learners this responsibility while still maintaining responsibility for providing the school administration with class marks, made for the occasional conflict between the schools', the learner' and my agendas. I did attempt to explain my method of teaching to the classes and it was interesting to note some of their reactions. "At the beginning I was a bit sceptical about the way he teaches, only to find that there is nothing wrong with his teaching methods, if you do your homework and your work in class, you will get along."

The learners noted the tough expectations I brought to the classroom. "Mr Moore was very hard at first, but now I know why, to make us learn more than he teaches us." Learners again commented on the fact that they felt that the educator got cross often. In a teaching environment, where learners are given control of their own learning, this researcher found it very difficult to find the balance between letting learners get down to their work and letting them accept the consequence of choosing not to work. Some explained it in the following way; "He wants you to learn everything for yourself, that's what I like about him." "If it wasn't for him, we wouldn't of got so much work done because he was strict about us finishing our homework projects." Others however were clearly dissatisfied with this approach and expressed it in the following fashion: "I need a educator who knows his/her work and has the time to explain".

5.6 Reflect

5.6.1 The Insights gained about Pedagogy

In *Weblearning* (Phase 3) I continued to use a task-centred approach to foster learning. I also continued to hold to the original assumption that learning is best when learners do solve problems. In this case study, the problems that were set were rooted in a Web-designing context and were based around learners completing an explanatory task in HTML. Each task contained an expectation that learners would set out to solve them collaboratively, with the resources, fellow learners and the instructor himself.

When designing this learning environment, I ensured that the learners were not isolated in their ability to construct responses to the problem. They were offered assistance from print resources, fellow learners, online resources and myself. The problems themselves became successively more complex in nature. Each problem was built on concepts mastered in the previous task.

What was very interesting to note was that during this year some learners began to take responsibility for their own learning and understanding. When they did not understand, there was not the passivity that had characterised the learners in case study one. They sought solutions to these problems from their peers, the online resources and print-based resources, their own experimentation and from the instructor. This new responsibility for learning did not sit comfortably with other

learners. Those that were unhappy with their learning were mostly the ones that demanded that the educator revert to acting as instructor.

5.6.2 The insights gained about technology

All three case studies have shown that learners do not learn from technology. Rather, learners learn from thinking in meaningful ways. The technology is incidental to the process. Where the technology does become a problem is when the technology hampers the ability of learners to think meaningfully, because it is too slow or crashes.

When learners use technologies to represent what they know, they are entering into an intellectual partnership with technology. They enhance the capabilities of the computer and the computer in turn enhances their thinking and learning. The whole of learning becomes greater than the potential of learner and computer alone (Jonassen, 2000). The publication of the completed HTML tasks is an example of this.

5.7 Implications of these insights for the development of the model

The model has thus far accounted for the interaction between

- educator and technology;
- educator and learner; and
- learner and technology.

This new case study does not offer the model too many new insights into the above. The case study does however offer the model new insights for the design of a course. It is these insights that are explored in this final section of chapter 5.

Doing, as opposed to learning, makes the process of knowledge acquisition more memorable. This “doing” is essentially what dirty learning is aiming at. Everyone is not, however, able to “do”. The process of enabling a learner to “do” a task or solve a problem requires that the learner participate in a course that sets out to enable the learner to “do”. This course would engage the learner in both content or social interactions and make what they need to know is memorable. This would continue until the learner was able to “do”.

Embracing dirty learning does not mean that clean learning is implicitly rejected. Social interaction and co-operative enquiry between educators and learners is as critical as good teaching and the opportunity to explore. A course designer needs to plan learning around learner and educator-centred assumptions so that the memorability of a course is enhanced.

The assumptions used in the past three chapters have thus far been divided into assumptions about teaching, learning and technology. These assumptions can, however, be split into educator-centred assumptions and learner-centred assumptions. Motivation, for example, is more of a learner-centred assumption. Reasoning is more educator-centred (see table 5.2).

Educator-centred	Learner-centred
Reasoning (Tam, 2000).	Motivation
Exploration (Harmon and Jones, 1999).	Emotion (Tam, 2000).
Observation (Tam, 2000).	Failure (Merril, 2001; Ge et.al., 2000).

Table 5.2 Types of assumptions (adapted from Schank, 2002)

The educator uses the technology to express these assumptions in the online learning environment. If technology is used as a gateway, then the learner is allowed to respond to the educator-centred assumptions with their learner-centred assumptions. The course offers the two opposing assumptions a meeting place. The mixture of educator and learner-centred assumptions is what makes learning memorable (see figure 5.1).

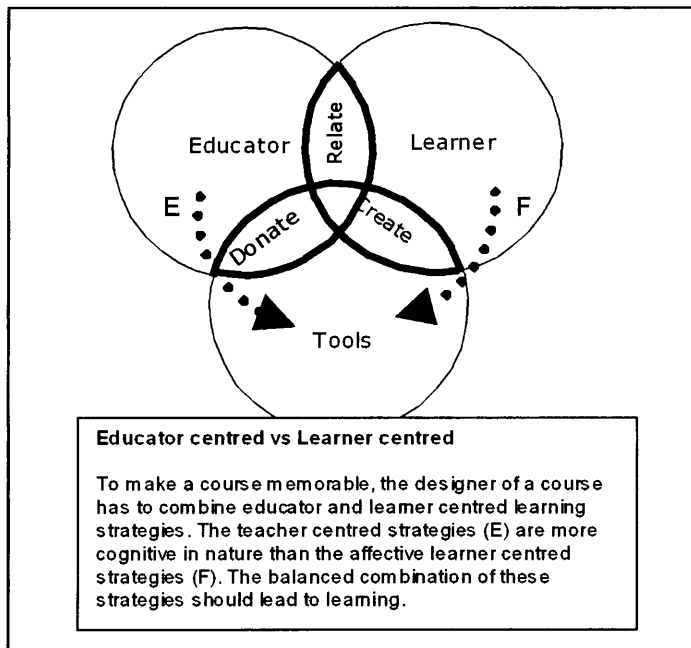


Figure 5.1 How to make a course more memorable.

Chapter 6

Conclusion and recommendations

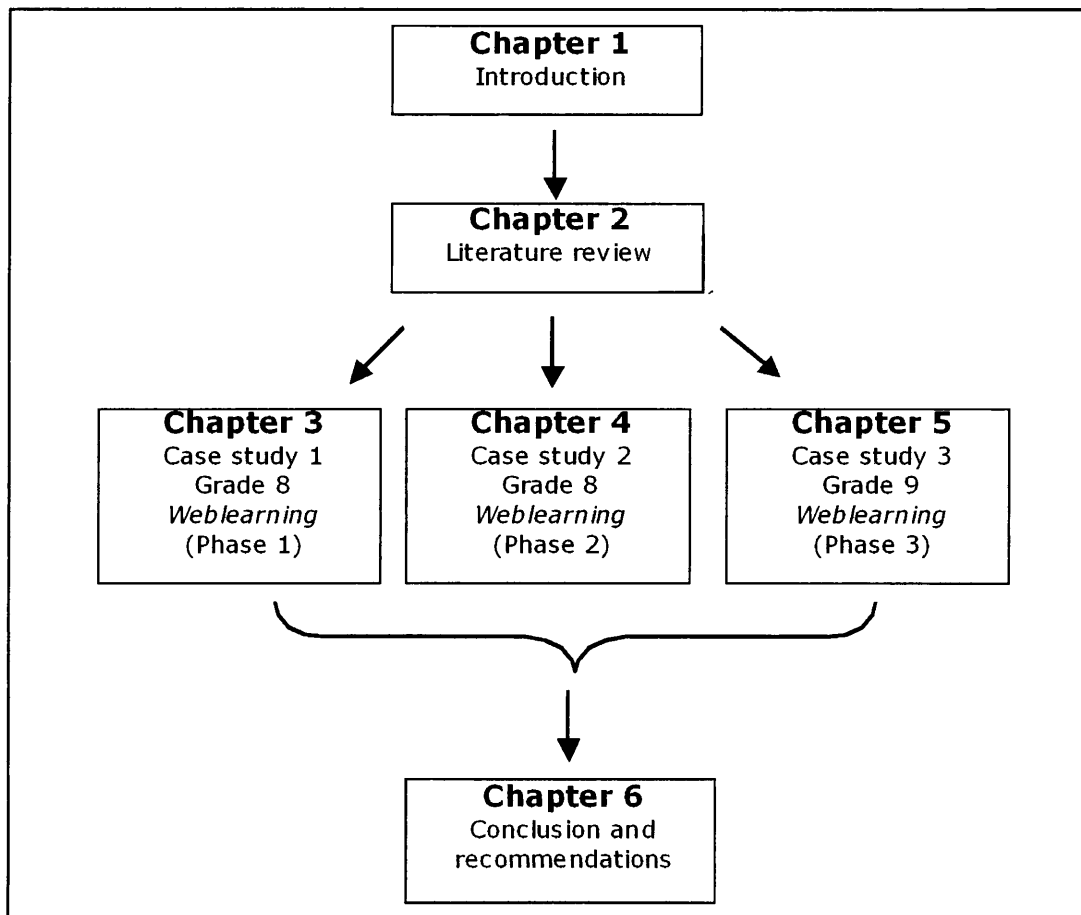


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6.1 Introduction

In this chapter, the findings from the literature review and the action research are merged. An attempt is made to answer the major research question and to address issues raised in chapter 1. Finally, a model is provided, which is designed specifically for high school teachers who are teaching via the Internet.

In Chapter 1, section 1.2, I ask; "How do you teach high school learners using Internet technology?" This question became the research problem for the essay. I put forward the notion that successful online teaching would occur if educators put more thought into Technology, Pedagogy and Course design.

In chapter 2, the literature review, an overview of the three issues identified in the research problem, is offered. Two learning theories (clean and dirty learning) are reviewed and a tentative model, that could be used to guide educators' thinking about their online pedagogy, is proposed. The chapter concludes by applying this tentative model to the design of an online learning environment that uses a pedagogy called dirty learning.

Chapters 3, 4 and 5 contain three case studies in which my attempts to implement dirty learning (my solution to the research problem elaborated on in chapter 1) is described. The three chapters report on the failures and successes in the design, development, delivery and maintenance of each online learning environment. These insights are used to inform the design of subsequent learning environments and also contribute to the development of the tentative model (proposed in chapter 2).

In this chapter, I intend to answer the major research question and use the cumulative experience of Weblearning Phases 1, 2 and 3 to draw up a final set of implications for the development of future online learning environments. The final set of implications can also be used for the development of the model. The chapter addresses each research issue in turn.

6.2 Review of the review question

In addressing the research question;

How do you teach high school learners using Internet technology?

I used the three research issues (below) to guide my investigation:

- Technology - How do you use the Web for teaching and learning?

- Pedagogy - What is an appropriate pedagogy for teaching on the Internet? and
- Course design - How do you design the optimal online learning environment?

6.2.1 Technology - How do you use the Web for teaching and learning?

In the literature review (chapter 2) it is argued that the Internet offers itself as a technology to meet the learning demands that come with living in the knowledge age. Educators, who have recognised this capacity, have chosen to use the Internet for teaching and learning. The three case studies record how I went about using technology to teach high school learners. Table 6.1 records the development of my assumptions about technology through the three case studies

Category	Case study one	Case study two	Case study three
Assumptions about technology	Technology offers access to a resource-rich learning environment.	Technology is a gateway to facilitate social interactions.	Technology can facilitate both content and social interactions.
Conclusions about technology	Technology is no substitute for the social interactions that occur in a classroom setting. Technology is not the source of meaningful learning.	Whilst social interaction can facilitate the use of technology for learning, scaffolded tasks continue to be important to ensure that new technological skills are acquired.	Technology is more than a gateway. Technology can also be used as a framework to facilitate content and social interactions. Technology's usefulness for learning is optimised when educator-dependant and learner-dependant factors are taken into account.

Table 6.1 Assumptions about technology

6.2.1.1 Technology – Case Study 1

I began Grade 8 *Weblearning* confident that I had considered my pedagogy and set out to implement my theories of dirty learning. I then discovered that my online learning environment did not work out as neatly as I had planned.

The reflections of my first case study showed (see table 6.1) that I had assumed that technology would facilitate learning. In making this assumption, I fell into the historical trap that catches all educational technologists. I mistakenly thought that in creating an online course that had the completion of tasks as its core, I was engaged in innovative teaching and had adopted the pedagogy called dirty learning. The reality was that I had simply used technology to create a Web site with a lot of instructions for learners to follow. I had not considered the social dimensions of learning, nor how learners' technological expertise would affect their ability to use the online learning environment. The findings of case study one show that although technology may offer both the educator and learner access to a resource-rich learning environment, such access without the social interactions of a classroom can result in learners who are unable to use their schema, understand the problem or complete the task.

Learners require support from the instructor and support from fellow learners when using technology. If such support is not forthcoming, then the technology of the online learning environment is simply educator-centred instruction. I concluded that technology was not the source of meaningful learning. This did not imply a rejection of Web-based learning however, because I realised that technology could be used as a gateway to foster the social interactions of a classroom.

6.2.1.2 Technology – Case Study 2

In case study two, I set out to use the World Wide Web and the computer mediation capacities of the Internet as if it were a gateway between the educator and the learners. This gateway would allow educator and learners to interact with each other, while using the technology. I hoped that in using the technology in this way, I would facilitate a level of social interaction that was lacking in the previous case study and thus better facilitate learning. To ensure that social interaction occurred, I also encouraged a classroom environment that was collaborative.

The result of this approach was that participation in and enthusiasm for my subject increased enormously. This second case study demonstrated that technology does not have to be used as a teaching tool to succeed as an online learning environment. If technology is used as a gateway, then it can increase learners' confidence in technology. This confidence in technology can lead a learner who wants to use technology to learn more. Alternatively, this confidence can lead a learner who wants

to use the technology to move off task or to simply exercise their basic skills in a way enjoyable to them.

Learners' confidence in the medium meant that they had developed an implicit knowledge of how the Internet worked. I, however, wanted to extend this implicit knowledge beyond the technology itself. To do this, technology has to be more than simply a gateway between learners and educators. Technology needs to be viewed as a framework for bringing together learner, educators and the tools that contain content.

6.2.1.3 Technology – Case Study 3

If Internet technology could be used as a framework, then it could allow me to be as imaginative, creative and flexible as I wished. I set out to design an online learning environment that was a framework that allowed both content and social interactions.

Using technology as a framework to facilitate a combination of content and social interactions resulted in a surprisingly delightful learning experience. Learners emerged from Grade 9 "Weblearning" (Phase 3) comfortable with the technology, having learnt a new set of skills and with a set of artefacts to demonstrate their achievements.

Learners used the technology of the online learning environment to collaborate, construct and publish their learning in HTML. By the end of the year most participants had created two complete Web sites and had them published on the World Wide Web. This suggested that the key to the successful use of technology in an online learning environment is to focus on the technology as a framework.

6.2.1.4 Conclusion

I concluded that technology is often mistakenly regarded as the source of all knowledge. At its most successful, Weblearning's technology was simply a vehicle whereby learners were exposed to ideas and each other. Technology might contain and offer access to rich learning resources, but it is only a framework and the educator is responsible for ensuring that technology is used as a gateway to both content and social interactions.

If the educator can use technology as a framework, then learners can enter into an intellectual partnership with technology and use the resource-rich environment of the

Internet to develop their own knowledge. But learners have to first be comfortable with the technology, given the opportunity to access their own schema and learn from both content-interactions and the social interactions between educator and fellow learners. Then they will be able to use technology to develop their solutions to tasks.

6.2.2 Pedagogy - What is an appropriate pedagogy for the Internet?

The conclusion from the first research issue (chapter 6.2.1.4) was that a learning programme should be based on an appropriate pedagogy and not the characteristics of the technology. If educators are going to use the Internet to teach, then their course needs to be based on a pedagogical mode that is applicable to online teaching and learning. The literature review (chapter 2) introduced two pedagogical modes¹³ that describe how technology had been used in education:

- A clean pedagogy
- A dirty pedagogy.

Dirty learning offers an innovative pedagogy to educators who want to use the Internet to teach their high school learners. As its premise, it asks that educators critically assess their assumptions about what constitutes knowledge. And then, once an understanding of knowledge and how it is acquired has been established, technology can be used as a framework for fostering knowledge acquisition. Table 6.2 summarises the development of assumptions about pedagogy through the three case studies.

Category	Case study one	Case study two	Case study three
Assumptions about Pedagogy	Learning is best when the educator sets tasks that require that learners become engaged in completing them.	The educator has to consider the schemata of all the learners engaged in solving tasks and must allow the learner sufficient opportunities to access his or her schema. Collaboration between fellow learners and the	Tasks are a starting point for dirty learning. Learners without appropriate schema need a variety of interventions. These interventions should be both social and content interventions.

¹³ In the essay these two modes are called clean and dirty learning

		educator can facilitate support of such schema. Collaboration between fellow learners and the educator can develop confidence in the technology of a learning environment	
Conclusions about Pedagogy	Tasks do not engage learners who are not able to access their schema. The educator needs to play a more active role to support the development of learners' schema and their use of the learning environment.	Collaboration does not necessarily lead to knowledge acquisition.	A pedagogy incorporating a variety of appropriate social and content interventions is most successful in fostering learning on the Internet. The most effective educator will be able to change role according to individual learners' needs, and will use a variety of other resources, including other learners and print-based resources, to facilitate learning with technology.

Table 6.2 Assumptions about pedagogy

6.2.2.1 Pedagogy – Case Study 1

In Case study 1, I set out to engage learners in the learning environment through the use of tasks. These tasks attempted to captivate learners' attention and to engage their efforts in constructing some form of artefact that represented their understanding of what they had been taught. By engaging learners in some captivating activity I assumed that I was using a dirty pedagogy.

Yet as I reflected on the findings of case study one, I discovered that some learners were not able to complete or even attempt the tasks that had been set. These learners had not been able to make the connection between their prior knowledge and the tasks that had been set. They were thus unable to actively engage in the

task and participate in the learning environment. As educator, I had failed to recognise the importance of learners' schema to the learning process. I realised that tasks had to be made possible for all learners. If the "doing" that was associated with completing a task seemed impossible to particular learners, then as educator it was my responsibility to ensure that I had other strategies available to help them to make the connections between their prior knowledge and what was expected of them.

Learners' lack of experience in an online learning environment also contributed to their under-achievement. I had assumed that learners' interest in the World Wide Web would implicitly facilitate their competence, and that they could learn from manipulating the technology. Experience showed that many of those who were unfamiliar with the technology chose to resist it and the associated learning.

Case study one showed that my pedagogy was flawed. I realised that 'doing' alone did not constitute dirty learning. Presenting interesting tasks does not necessarily foster engagement. In order for learners to become engaged in learning, two pre-requisites were needed. Firstly, an educator who will enable the learner to access his/her schema is essential. Secondly, a process that helps the learner to master the technology in a scaffolded, non-threatening way, must be encouraged. These two pre-requisites would be addressed by developing a series of collaborative activities involving the educator and other learners in each other's learning.

6.2.2.2 Pedagogy – Case Study 2

In case study two, I set out to rectify the pedagogical failures of Grade 8 Weblearning (Phase 1). The learning environment continued to make use of tasks. But I stopped looking at the online learning environment as an instructional resource and began to see it as a gateway between the learners and myself. My pedagogy now appreciated the importance of the social context to learning and used the technology to facilitate social interactions.

Tasks were still used, but with the Web being used as a gateway, learners were able to collaborate with each other. Collaboration meant that learners could use the social environment to access their own schema and help each other to develop their own technological competencies. Learning became focussed on the learners and took place at the learners' own pace.

Learners' confidence benefited from this approach and they became comfortable with using the technology. They did not, however, progress through the tasks at a pace that I had anticipated. It seemed as if their comfort with mastering the technology led them to resist moving on to new and more challenging tasks. Learners' social interactions dominated the learning environment. This suited the social agenda of the teenage learners, but did not suit my academic agenda. I concluded that my collaborative approach to the learning environment had succeeded in allowing learners to access their schema. But the collaborative approach had detracted from what I wanted learners to learn. I realised that my pedagogy had to allow for social interactions but also facilitate more content interactions.

6.2.2.3 Pedagogy – Case Study 3

In case study three, I wanted to ensure that the course built on the lessons of Phases 1 and 2, and more fully achieved its aims. Tasks again were at the centre of the online learning environment, but these tasks were supported by both collaborative and instructional activities. I again used social interactions to facilitate learners' access to their schema. I then also made use of instructional materials to expose learners to what I wanted to teach. The combination of these activities ensured that learners' schema were developed.

6.2.2.4 Conclusion

In all three case studies (see table 6.2) a key assumption was that task-based activities are vital for learning. The tasks create a context for learning and require that the learner apply his/her knowledge to a problem. Tasks allow learners to develop key skills including critical thinking, problem solving, communicating and practicing collaboration. Tasks also facilitate engagement. Learning, however, requires far more than tasks to engage the learner in the process of acquiring knowledge. It is vital that the educator consider:

- the learners' schema;
- their ability to master technology;
- their ability to work collaboratively; and
- their ability to use instructional resources.

An online pedagogy requires that the educator take an active role in these four areas. Without such support, many learners will not be able to learn effectively online.

6.2.3 Course design - How do you design the optimal online learning environment?

Those who subscribe to a clean pedagogy can look to the theories of instructional design to guide the design of their courses. Those who subscribe to a dirty pedagogy do not have a similar instructional strategy. The dirty pedagogy is more of a way of seeing how people come to know rather than a prescriptive theory and does not set out to offer clear rules for designs or instruction.

Most high school educators are busy professionals with little patience for interesting academic theory, if it is not clearly and concretely applicable to their teaching. If they are to implement a dirty pedagogy, they need a model upon which to base their teaching. The literature review proposed a tentative model for educators to hang their pedagogical practice on. This model looked at the interactions between educators, learners and the tools in the online learning environment. It offered a comparison between clean learning and dirty learning's use of the model. It was suggested that if the course designer adopted a dirty pedagogy, then learning would take place over three phases, namely –

- The interaction between educator and learner (called the relate component);
- The interaction between learner and the technology (called the create component); and
- The interaction between the technology and the educator (called the donate component.)

I then went on to explore the use of this model in designing a course. Table 6.3 details the progression of my assumptions about course design through the three case studies.

Category	Case Study 1	Case Study 2	Case Study 3
Assumptions about course design	A course should be designed in such a way that learners become engaged in the learning environment. Learners should use the course to reason, explore more and do what is asked of them.	A good course should also focus on factors beyond the screen. A good course should be designed to facilitate collaboration so that these needs are met.	Engagement and collaboration are a means to developing learners' learning. A course needs to be designed around learner dependent and-learner independent factors.
Conclusions about course design	Learners require more than access to technology to become engaged in learning. They also require a social environment.	Collaboration by itself does not lead learners to the creation of new schema.	Incorporating social collaboration, Web-based and other resources into a course design, maximises its effectiveness. Course design is important, but not exclusive, to learning success. Dirty learning goes beyond course design and is dependent on a range of other factors.

Table 6.3 Assumptions about course design

6.2.3.1 Course Design – Case Study 1

Grade 8 *Weblearning* (Phase 1) began with the assumption that a course should be designed in such a way that learners become engaged in the learning environment. In this environment, learners will want to reason, explore more and do because of their access to a rich variety of resources. The case study demonstrated that there were factors that hampered the learners from becoming engaged in the learning environment.

When designing the course, the designer needs to look beyond the interaction between technology and educator. Case study one had focussed mainly on one of the three phases (the donate component) and this imbalance prevented some learners from mastering what was taught.

6.2.3.2 Course Design – Case Study 2

In Grade 8 *Weblearning* (Phase 2) I realised that a good course should also focus on factors beyond the screen. This second case study demonstrated the need for a course that would 'hold the hand' of the online learner who was unsure of what he or she should do. The course had shifted its focus comprehensively from content to process. I abandoned the idea that technology would implicitly offer support and motivation for the learner and adopted an approach that engaged the learners and myself in a collaborative approach to learning.

My focus on process meant that, throughout the course, learners were able to develop their confidence in the technology, work collaboratively, and have the satisfaction of completing a task. Learners were more interested in the collaborative aspects of the task and less interested in acquiring new computer skills, however. They were quite happy to remain with one task and engage with it and with each other in a number of ways. With collaboration, the social needs of the learning environment were met, but learners did not move forward and start applying their knowledge to new tasks.

This second case study demonstrated that 'the relate' component of the tentative model was a good place to start the course. Learners would have to move through this component to 'the create' component if learning was to continue, however.

6.2.3.3 Course Design – Case study 3

Grade 9 *Weblearning* (Phase 3) set out to find a balance between content and process. I assumed that both engagement in tasks and collaboration was necessary for learning. I then focussed on factors that enhanced the memorability of a course. These factors were derived from the assumptions made at the beginning of case study 3. They are divided into two categories; learner-centred and educator-centred factors.

6.2.3.3.1 Failure

Case study one demonstrated that learning does not happen automatically in a task-based environment. Tasks must be scaffolded and learners supported, to build on their existing schema. Failure without support simply leads to disengagement from learning. Learning happens when there is a structural change in memory and new schema are created. This structural change in memory occurs when a learner has to

revise his knowledge base and seek explanations from himself. It was learners' HTML failures and subsequent collaboration with others that drove them to revise their knowledge base.

6.2.3.3.2 Emotional involvement

In case study one, one of the positive aspects of the learning environment was the publication of learners' work. Learners indicated that they felt a sense of accomplishment at having their completed artefacts work published on the World Wide Web. They also commented positively on associated comments from peers and educator. These reactions offered learners an emotional response to what they had learnt. Their feelings caused them to remember what they had learnt. These findings were strongly confirmed in case study three.

6.2.3.3.3 Motivation

In all three case studies, tasks were located in an authentic and recognisable context. Contextualizing tasks ensured that learners could recognise their need for the new information. Tasks that met the expectation that the content should be relevant to the learners' present or future life were tasks that motivated the learner.

6.2.3.3.4 Reasoning

All three case studies tried to foster learners' ability to reason and offered the opportunity to practice reasoning in task-specific situations. The tasks did not simply tell the learners what to do. Instead, they offered the opportunity for learners to figure out their own solutions. By allowing learners to reason, they began to develop their ability to create their own solutions.

6.2.3.3.5 Exploration

In case study 1 and 3, I used the unrestricted nature of the World Wide Web to promote exploration and enable enquiry. The tasks were structured to stimulate the learner to begin to wonder about issues within the framework of a course. Learners were encouraged to go and do what was necessary in order for them to satisfy their curiosity.

6.2.3.3.6 Observation

Observation of the educator's practice and observations of learners' work on the World Wide Web meant that learners were able to learn from seeing the practice and product itself. Allowing learners to see other learners' visual representations of what they had learnt meant that learners began to reflect on this and their own work.

6.2.3.4 Course Design Conclusion

Case study three demonstrated that a good course should be memorable. What is learnt in a course will be enhanced if both the educator and the learner have an impact on the course. Thus, a 'dirty' course is not just dependant on good design. It is as dependent on educator and learner interaction and personal involvement in the course.

An optimal course results in learners who can do what is intended when the course is designed. Although this might be stating the obvious, it is important to remember that neither content nor processes are the aims of the course. The aim of a course is to facilitate learning and engagement and collaboration are a means of developing learners' learning. A course needs to be designed around a combination of both learner-centred and educator-centred factors. It is the combination of these factors that will ensure that learners do learn what the course designer intended.

6.3 Final Observations about technology, pedagogy and course design

It's not surprising that educators have decided that the Web holds enormous possibilities for teaching and learning. The publication capacity of the Web has allowed educators to create learning environments where learners can acquire knowledge online. Access to the vast array of data and information on the Internet allows the learner incredible learning opportunities to explore this knowledge in greater detail. The interactive capacity of the Web also offers both educator and learner the opportunity to redefine the relationship between themselves and work in partnership in the learning process.

These exciting technological developments may certainly offer new possibilities to introduce educational innovations into the learning process; but those educators who have taken their teaching to the Internet and used its technological attributes to build their courses on do have to exercise caution. Technology might contain and offer access to rich learning resources, but it is only a framework. The educator is

responsible for ensuring that technology is used as a gateway to both content and social interactions.

Technology is not however going to teach, and access to any technology, whether it is the Internet or a printed book, does not guarantee learning. Technology - any technology - is simply a tool and not a new pedagogy. The Internet, in and of itself cannot improve the quality of learning. That depends on the educators who use the technology. Educators need to choose an appropriate pedagogical framework to make use of the technology and not let the technology dictate the pedagogy.

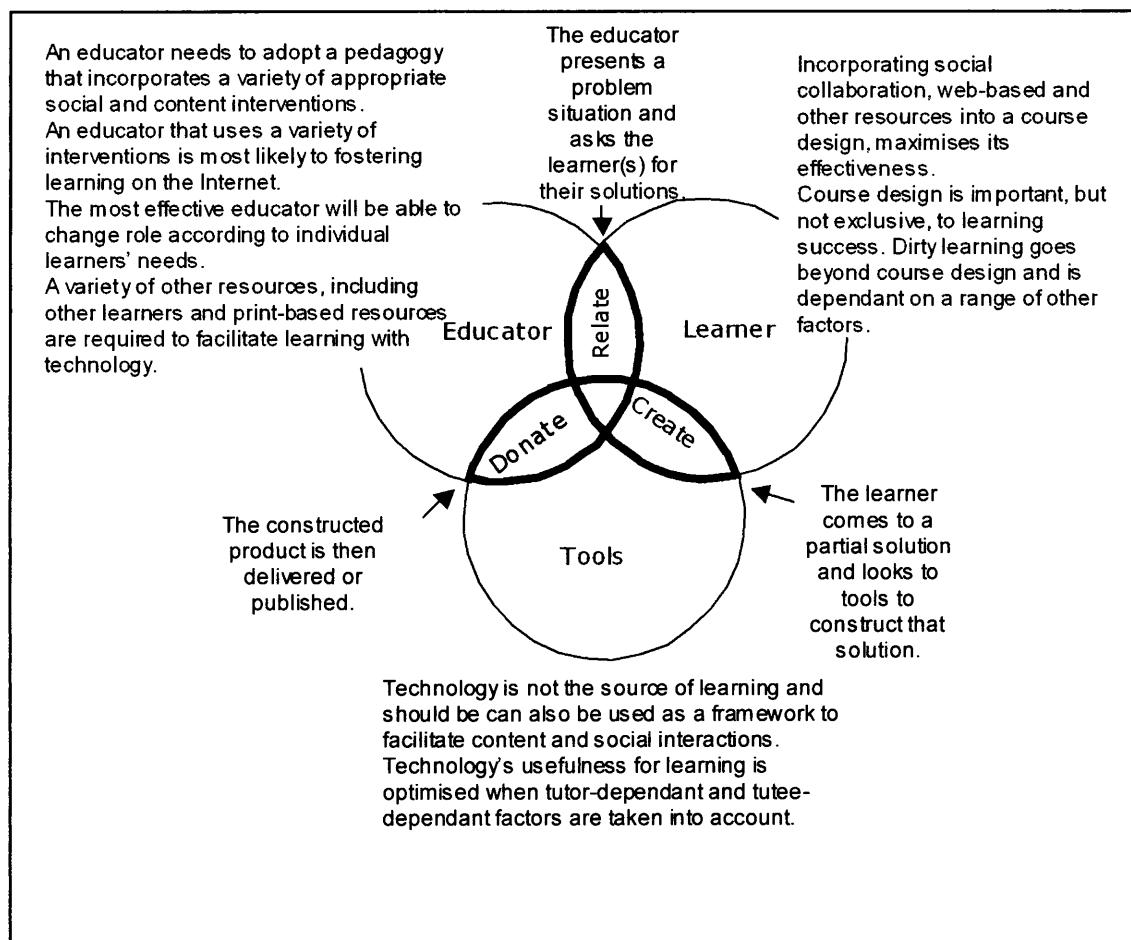


Figure 6.1 The model for an online learning environment

If the educator can apply the model and design a course that promotes collaboration, social and content interactions, then learners can enter into an intellectual partnership with technology and use the resource rich environment to develop their own knowledge.

6.4 Conclusion

The shortest possible summary of what makes for a successful online learning environment can be summed up in the statement; "Pedagogy first, Technology second".

The Internet may be the most significant development in educational and communications technology since the invention of the printing press. It could be the key to a profound revolution in learning. It has brought about new educational possibilities for all teaching and learning situations. Conversely, the Internet is also, merely another technology and no technology in itself can transform education. The responsibility for transforming education lies with the educator and the pedagogy he or she chooses to adopt. This technology requires adoption in the presence of sound theory.

In order to ensure that learners learn what educators intend, the course designer needs to ensure the pedagogy has a combination of social and content interactions. Dirty learning is an appropriate pedagogy for courses to be structured around. A course that is designed with such an approach and is memorable will successfully facilitate learning if it allows for educator-centred and learner-centred processes.

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Appendix 1

Weblearning Phase 1 Questionnaire

Class _____

Instructions

Please answer the following questions about your work that you have been doing on computers. Please answer them honestly. You do not need to give your name, but your feedback about the course is important.

- 1) How much have you learnt about using computers in the last two terms?
 - a) Not much
 - b) A little
 - c) Quite a bit
 - d) A lot
- 2) Give reasons for the amount you have (or have not) learned.
- 3) Make a list of what you have learnt so far about using computers
- 4) What would have improved your learning about computers? Number the following points in order of importance:
 - _ More specific instructions from the teacher when help was needed
 - _ More notes from the teacher
 - _ No tasks
 - _ More time in front of the computer
 - _ The whole class should have worked through each task together
 - _ Nothing would have improved it
- 5) How comfortable have you felt using the Internet as your teacher? (Circle the answer that is closest to your feelings.)
 - a) Not comfortable at all
 - b) A little comfortable
 - c) Quite comfortable
 - d) Very comfortable
- 6) Give reasons for the level of comfort.
- 7) How do you feel about having your work published, so that all learners can see it?

- a) I like it
 - b) It's alright
 - c) It's embarrassing
 - d) I never finished on time to have it published
- 8) Did you feel that you could make use of other learners' experiences on computers to assist you to complete your task?
- a) Yes
 - b) No
- 9) If a teacher asked you to do the following, would you be able to do it on the computer?
(Write yes or no next to each question).
- a) Draw a map of the layout of Alexandra High School
 - b) Draw a diagram of the life cycle of a butterfly, using pictures from the computer
 - c) Write a creative writing piece for English on a word processor
 - d) Construct a simple Web page that would lead other computer study learners to useful online resources
- 10) Any other comments about using computers?

Appendix 2

Weblearning Phase 2 Questionnaire

Class _____

Instructions

Please answer the following questions about your work that you have been doing on computers. Please answer them as honestly as you can. You do not need to give your name, but your feedback about the course is important.

- 1) How much have you learnt about using computers through the last two terms? (Circle the answer that you agree with most.)
 - e) Not much
 - f) A little
 - g) Quite a bit
 - h) A lot
- 2) Give reasons for the amount you have (or have not) learned.
- 3) Make a list of what you have learnt so far about using computers
- 4) What would have improved your learning about computers? Number the following points in order of importance:
 - _ More specific instructions from the teacher when help was needed
 - _ More notes from the teacher
 - _ No tasks, only shows
 - _ More time in front of the computer
 - _ The whole class should have worked through each task together
 - _ Nothing would have improved it
- 5) How comfortable have you felt using the Internet as your teacher? (Circle the answer that is closest to your feelings)
 - a. Not comfortable at all
 - b. I've felt mildly comfortable
 - c. I've liked having the Internet as my teacher
 - d. I've loved using the Internet as my teacher
- 6) Give reasons for the level of comfort:

- 7) How do you feel about being able to interact, ie see your photograph and other friend's faces, communicate and discuss via the World Wide Web?
- a. I liked it.
 - b. It's alright
 - c. It's embarrassing
 - d. I never finished on time to have it published
- 8) Give reasons for your feelings about the interaction.
- 9) Did you feel that you could make use of other learners' experiences on computers to assist you complete your task?
- a. Yes
 - b. No
- 10) If a teacher asked you to do the following, would you be able to do it on the computer?
(Write yes or no next to each one.)
- a) Turn on the computer
 - b) Check your e-mail
 - c) Write an e-mail to a teacher in a foreign school
 - d) Go onto the Internet
- 11) Any other comments to make about using computers?

Appendix 3

Weblearning Phase 3 Questionnaire

Class _____

Instructions

Questions to examine the extent of your learning. Answer these questions as honestly as you can.

1. How do you feel about what you learnt in your grade nine computer class this year? Please elaborate.
2. What did you like about using the Internet in your learning? What did you dislike?
3. How did you feel about using tasks to learn new things?
4. How did you feel about publishing your work on the Internet?
5. What role did the teacher play in your learning?
6. What would you have liked more of from the teacher?
7. What would you have liked less of from the teacher?
8. How would you describe computers to a grade 9 considering doing it next year?
9. Any other comments: