

**HOW SOUTH AFRICAN FURTHER EDUCATION AND
TRAINING LEARNERS ACQUIRE, RECALL, PROCESS
AND PRESENT INFORMATION IN A DIGITALLY
ENABLED ENVIRONMENT**

by

Pamela Ann Miller

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Supervisor: Prof. Dr. Johannes C. Cronjé

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Abstract

The aim of the research was to investigate how South Africa Further Education and Training learners acquire, recall, process and present information in a digitally enabled environment.

To determine how a changing society and technology have influenced the way learners interact with information in an educational environment, recent changes in society and their influences on young people were examined as well as the traits of the generations with respect to character, family life, the future, peers and technology. This revealed that learners today need

- material in visual format;
- to find or create their own learning content;
- fast access to learning material; and
- learning material with long-term career value.

It was also apparent that they are motivated by technology used in information transfer, are active learners and regard learning as a social activity.

The methodology of case study action research was used. Note was taken of measures to ensure reliability and validity and applied to this research to ensure that the findings are valid and reliable as well as generalisable in South Africa beyond the confines of Pinelands High School (PHS).

Two case studies observing the learners at PHS were undertaken:- creating web sites for the *ThinkQuest* web design competition and a building a web-based CV. The learners were heterogeneous and displayed a range of skills, ages, academic abilities and prior experiences. Many different management formats were employed, such as learning at a distance, in a contact environment, with examples and specific or open-ended instructions as well as different forms of motivation, time for the work in hand, etc.

The major findings of the research were the influence of peers and importance of external motivation in the form of grades on the learners' cognitive, affective and physical learning activities in the computer laboratory. Secondary findings indicated the importance of content, examples, instructions, time, mental state, classroom ecology, contact environment and software in the way learners acquired, recalled, processed and presented information.

The research concluded with a set of actions that should be taken to ensure successful interaction with information in a digitally enabled environment.

Key Words

Affective perspective

Classroom ecology

Cognitive perspective

Computer anxiety

Computer laboratory

Computer literacy

Digital environment

Digital information environment

Information processing

Physical perspectives

Nomenclature

The terms African, Asiatic, Coloured and White are used without racist intention. These terms continue to have currency in post-apartheid South Africa. The terms used are consistent with current local usage, although they can be regarded as social constructions rather than essential categories. The term African refers to those people of black African descent. Asian refers to those people of Asian descent. Coloured refers to people of mixed European, Asian and indigenous descent. White refers to those people of European descent.

Glossary of Terms

Persons in the educational context

Learners	In South Africa the word refers to what are commonly known as students in the United States and pupils in the United Kingdom.
Facilitator	In South Africa the word educator is the official designation of what has always been known universally as a teacher, in recognition of the movement away from teacher centred education towards learner-centred education, where the teacher acts more as a facilitator.
Teacher	
Educator	
FET learners	Adolescents in the South African education system of 16 years and older in Grades 10, 11 or 12 as well as adults are officially defined as Further Education and Training (FET) learners.

Environment

Contact situation	A situation where the learners and the teacher are physically in the same classroom at the same time.
At a distance	Where the learners are not in the same physical space as other learners with whom they are working.

Perspectives through which one can examine the educational phenomenon

Cognitive perspective	The recall or recognition of specific facts, procedures and concepts that serve in the development of intellectual abilities and skills as the learners acquire, recall, process and present information.
Affective perspective	How learners deal with <ul style="list-style-type: none">• one another and the information presented as content and as skills;• their emotions, feelings, values, appreciation, enthusiasm, motivation, attitudes and relationships; and• situations as they acquire, recall, process and present information.
Physical perspective	The learners' physical movement, coordination, use of motor skill areas, manipulative or motor skills in acquiring, recalling, processing and presenting information; including the environment in which they work.

Assumptions	The word <i>digital</i> and <i>electronic</i> are used synonymously.
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List of Abbreviations

AIDS	Acquired Immune Deficiency Syndrome
CD	Compact disk
CD-ROM	Compact disk read-only-memory
CV	Curriculum vitae
FET	Further Education and Training
GET	General Education and Training
ICQ	I Seek You
IRC	Internet Relay Chat
MTV	Music television
SG	Standard Grade
SMS	Short Message Service
PHS	Pinelands High School
URL	Uniform resource locator
WCED	Western Cape Education Department
VBA	Visual Basic for Applications

Software Cited

3D Studio Max Autodesk, Inc.
Adobe After-Effects 4 Adobe Systems Incorporated
Adobe Photoshop Adobe Systems Incorporated
CoffeeCup Firestarter CoffeeCup Software, Inc.
Crossword Compiler Across Export Library
Flash Macromedia, Inc.
Geometer's Sketchpad Key Curriculum Press
GIF Construction Set Alchemy Mindworks Inc.
HotDog Pro Sausage Software
JavaScript
Inspiration Inspiration Software, Inc.
Jigsaws Galore Gift Gray Design Associates
Macromedia Dreamweaver Macromedia, Inc.
Macromedia Flash 4 Macromedia, Inc.
MS Access Microsoft Corporation
MS Excel Microsoft Corporation
MS FrontPage Microsoft Corporation
MS PowerPoint Microsoft Corporation
MS Publisher Microsoft Corporation
MS Word Microsoft Corporation
NetOps School Networks Unlimited
Paint Microsoft Corporation
PaintShop Pro Jasc, Inc.
Spex Aspex Software
Tabs Aspex Software

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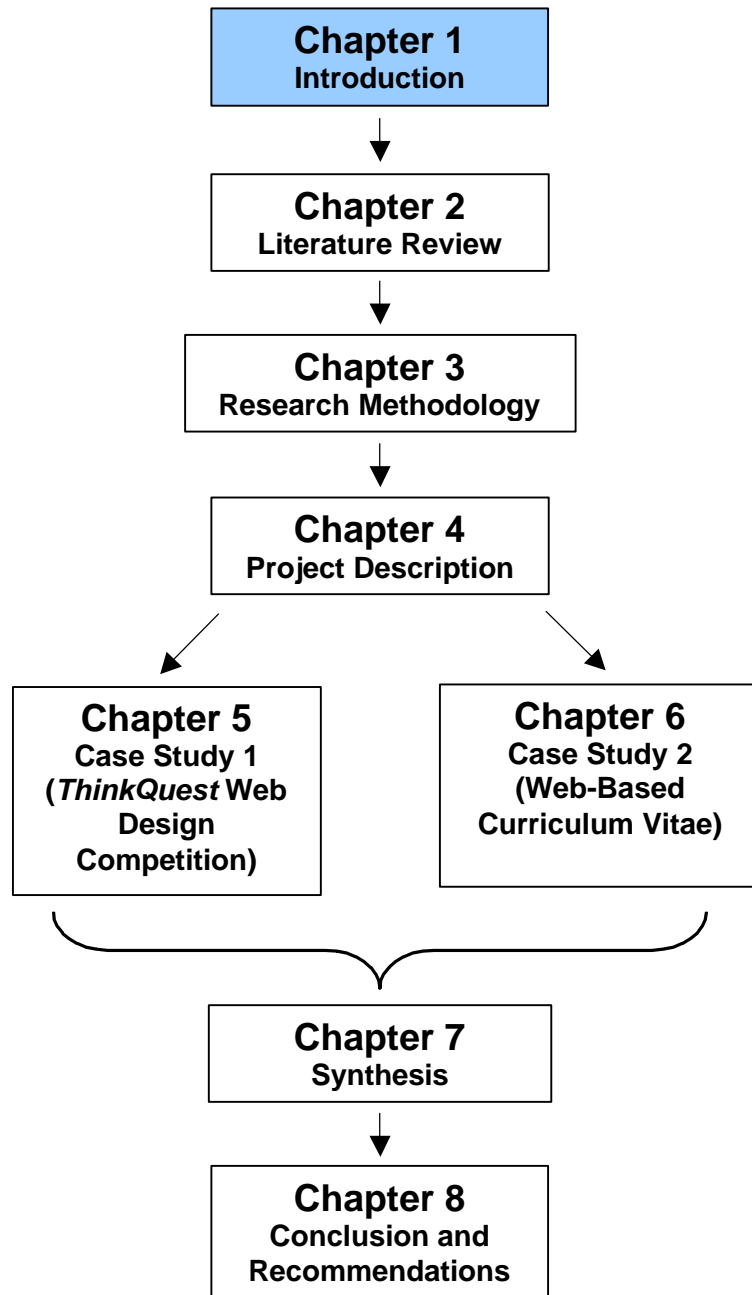
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Chapter 1



Chapter 1 Introduction

1 Introduction

The personal computer was developed by 1981 (Meyer & Baber, 1998, p. 35) and has become a household item in many affluent and even middle class homes. Sources of digitised information such as computers, television, tape recorders, video machines, digital calculators and CD-ROMs have gained the attention of adolescents and are influencing their leisure time and forms of interaction with information. The format of information is also changing and becoming non-linear (Hackbarth, 1997, p. 57). Changes have influenced society with the result that adolescents spend more time with fellow adolescents and have more time to spend with digital sources of information. The question to be asked is 'how do adolescents in an educational digital environment interact with information?' The question can be further developed into 'how do South African adolescents in an educational digital environment interact with information?'

2 Background

Children of the digital world are perceived to be different when working and using information resources. Both Tapscott (1999a, 1999b) and Rushkoff (1997, 1999), have written on the subject of the *digital* child but Tapscott refers more particularly to the children of the *Internet generation* while Rushkoff refers to children of a non-linear world or the *Chaos Generation*.

Tapscott describes the dynamics between the Internet generation and their world. The *Net Generation* use digital media for entertainment, communicating, shopping, making friends; almost every part of their lives. The *Net Generation* of young people want to be doers and users: 'they are actors in the digital world' (Tapscott, 1999b, online). This generation have become critical thinkers and know about teamwork. They work within an environment where they construct their own knowledge and 'have acquired collaborative, research, analytical, presentation and resource skills' (Tapscott, 1999b, online).

Rushkoff describes the child of the *Chaos Generation*, children born into a non-linear world (Rushkoff, 1999, p. 50-52), in that they

- have a broader attention range and a shorter absorption time;

- are able to 'multi-layer-scan' as they know where to look for information on screens, e.g. email message subject lines or sport scores;
- can process visual information very quickly;
- communicate with basic symbols and relationships; and
- are comfortable in a disassembled landscape such as the Internet, many television channels or multimedia CD-ROMs.

South African teenagers have different environmental influences to those of the American or European teenagers described by Tapscott and Rushkoff, but there are similarities due to globalisation (Codrington, 2000, p. 35).

Papert (1998, online) discusses children who come from a digital environment as follows:

'... those (children) who at home had these *richer* learning experiences with the computer are beginning to appear in school as a kind of a nuisance because they are demanding from school--"Why aren't we doing here what we know how to do at home?" So these children are beginning to produce a pressure on the school from within, a kind of subversive force coming into the system, not only demanding change ...'

Print media and textbooks lack the 'pizzazz of electronic media, do not permit real-time interactivity' (Hackbarth, 1993, p. 82) and require considerable reading skill and intellectual effort. Adolescent learners from a digital environment interact differently with interactive and non-interactive forms of information. Educators need to note the dynamics between the digital environment and the way learners interact with information, as well as the factors that influence them.

Adolescents in the South African education system of 16 years and older in Grades 10, 11 or 12 as well as adults are officially defined as Further Education and Training (FET) learners. The way in which the South African FET learner in a digital environment interacts with information, and the forces influencing that behaviour, need to be examined in order to make optimum use of digital technology to promote teaching and learning.

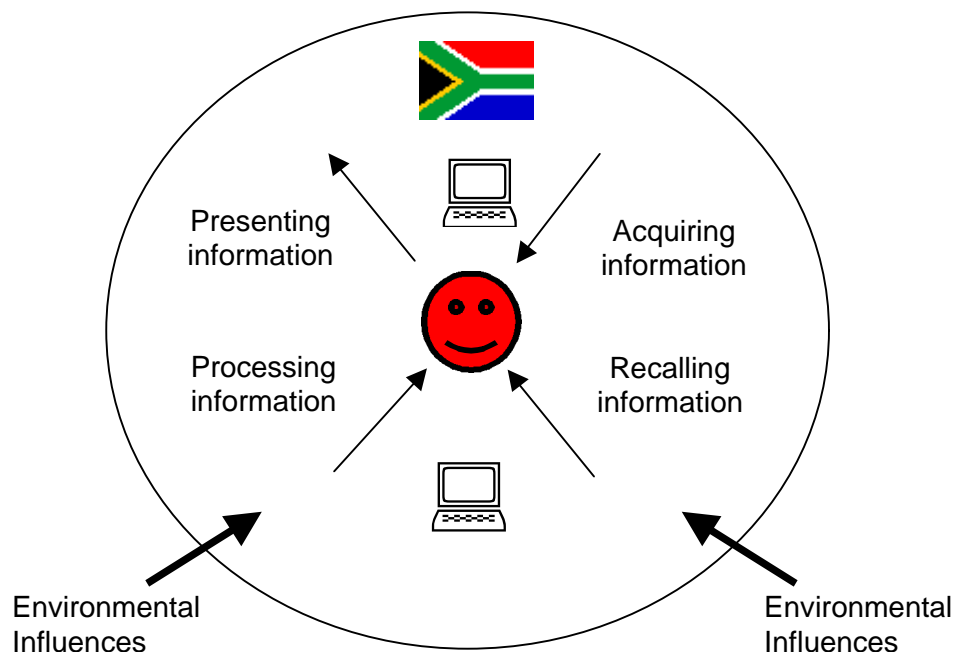
3 Research problem

The aim of this research is to investigate how South African FET learners interact with information in a digital information environment. In this investigation 'interact' encompasses acquiring, recalling, processing and presenting information. The major research problem to be answered by this research is

How do South Africa Further Education and Training learners acquire, recall, process and present information in a digitally enabled environment?

The research problem, and the context in which it is posed are described in Figure 1 - 1 and operationalised by the four research questions below. The figure illustrates the South African learner within a digital environment influenced by society, technology, economics and politics. The aim of the research is to investigate how learners acquire, recall, process and present information in a digital environment. The figure below is used throughout the thesis illustrating the development of the research.

Figure 1 - 1 Interaction with information by the South African FET learner in a digital environment



In order to address the problem, the following research questions were identified and examined:

- What is a digital information environment in the field of education?
 - How have a changing society and advances in technology influenced the way South African FET learners interact with information in an educational environment?
 - What is meant by cognitive, affective and physical perspectives with reference to interaction with information?
- 1 How do South African FET learners interact with information in a digital information environment from cognitive, affective and physical perspectives?

4 Research plan

The study began early in 1997 with the realisation of a problem in the digital environment of the Computer Studies Standard Grade (SG) classroom at Pinelands High School (PHS). The type of research employed to solve the problem, the participants in the research and the data collection methods are discussed below, and more fully in Chapters 3 and 4.

This research follows a relativist viewpoint as it is not large enough for a positivist viewpoint, hence it follows a qualitative case study methodology.

4.1 Action research cycles

The research follows an action research process and a case study methodology characterised by triangulation, long-term observation and field research. The research was divided into three main stages: preliminary, cycle 1 and cycle 2, each of which was further sub-divided.

4.2 Participants in the research

The participants in the research are learners at PHS in grades 10 to 12 who take the subject Computer Studies SG. The research targeted these learners and the way they interacted with information in a digital environment. Learners from two grades were used for the two case studies.

4.3 Data collection methods

The data collection instruments were a literature review followed by non-intrusive instruments of observation, event log, questionnaire, digital document analysis and interviews, described in Table 1 - 1.

Table 1 - 1 Data collection instruments

Instrument	Method
Literature review	Used text resources such as books and journals (print and digital).
Observation	Learners observed over a period of five years, from 1997, but especially in 2001.
Event log	Kept noting the unusual activities of learners in the computer laboratory, trying to understand how they interacted with information.
Questionnaire	Data was collected from the learners in the form of a digital questionnaire with open-ended questions and then analysed in a database.
Digital document analysis	Web sites made in the two case studies analysed, noting the cognitive, affective and physical perspectives of the way in which the learners worked in the digital environment.
Interviews	Held interviews with learners and parents trying to understand why the learners worked the way they did.

Table 1 - 1 describes the instruments and methods used to collect the data. The data collection methods fitted in with the action research process and case study methodology without intruding on the learners' usual class activities.

A data collection matrix, Table 1 - 2, tabulates the methods used to answer the particular research questions. The data collected from text, observation, event log, questionnaire, digital document analysis and interviews are interwoven, contributing to answering the research questions.

Table 1 - 2 Data collection instruments

Question / Method	Text	Observation	Event log	Questionnaire	Digital document analysis	Interview
1. What is a digital information environment in the field of education?	✓					
2. How have a changing society and advances in technology influenced the way South African FET learners interact with information in an educational environment?	✓					
3. What is meant by cognitive, affective and physical perspectives with reference to interaction with information?	✓					
4. How do South African FET learners interact with information in a digital information environment from cognitive, affective and physical perspectives?	✓	✓	✓	✓	✓	✓

4.4 Researcher

As researcher I have endeavoured to find a way to make my teaching in the digital environment of a computer laboratory more effective. For the last six years I have been teaching Computer Studies SG full time in the digital environment of the computer laboratory and have tried to find ways of doing so successfully. I have studied primary education, high school history teaching, librarianship, school media science and computer-assisted education. I have experience in teaching, working with information, writing and academia. My aim in this research is clear: I want the learners to succeed in their interaction with information in the digital environment of the computer laboratory in order to ultimately achieve good academic results.

5 Organisation of the research report

This research report is divided into eight chapters described in Table 1 - 3.

Table 1 - 3 Overview of the thesis

Chapter	Content
1. Introduction	<ul style="list-style-type: none"> • Introduction and statement of the problem.
2. Literature review	<ul style="list-style-type: none"> • Definition of a digital environment in education • Investigation into how a changing society and technology have influenced the way learners interact with information in an educational environment, including a South African FET environment • Definition of cognitive, affective and physical perspectives with reference to interaction with information • Investigation into how learners interact with information in a digital environment from cognitive, affective and physical perspectives • Development of a profile of a South African FET learner in a digital environment based on the findings of the literature review
3. Research methodology	<ul style="list-style-type: none"> • Description of action research process and case study methodology • Description of the cycles of the research • Methods taken to ensure validity and reliability of the research
4. Project description	<ul style="list-style-type: none"> • General overview and description of PHS • Description of the digital architecture of the school • Description of the participants in the research • Description of usual class activities • Description and comparison of Case Studies 1 and 2
5. Case study 1	<ul style="list-style-type: none"> • Description of the participants of the research • Description of the data collection methods • Analysis of the completed <i>ThinkQuest</i> entries and the process of creating them • Description of the measures taken to ensure validity and reliability
6. Case Study 2	<ul style="list-style-type: none"> • Description of the participants of the research • Description of the data collection methods • Analysis of the completed curricula vitae and the process of creating them • Description of the measures taken to ensure validity and reliability
7. Synthesis	<ul style="list-style-type: none"> • Synthesis of the findings of Case Study 1 and Case Study 2 • Description of how South African FET learners interact with information in a digital environment from cognitive, affective and physical perspectives based on the synthesis
8. Conclusion and recommendations	<ul style="list-style-type: none"> • Summary of the research • Recommendations for further research

Table 1 - 3 gives a concise summary of the contents of each chapter of this thesis.

6 Rationale for this research

It is hoped that this research will contribute to our theoretical understanding of how learners, particularly South African FET learners, interact with information in a digital environment from cognitive, affective and physical perspectives. It takes into account the fact that digital technology is being introduced in South African schools, South African FET learners are entering school from a digital home environment and information is generally available in digital format.

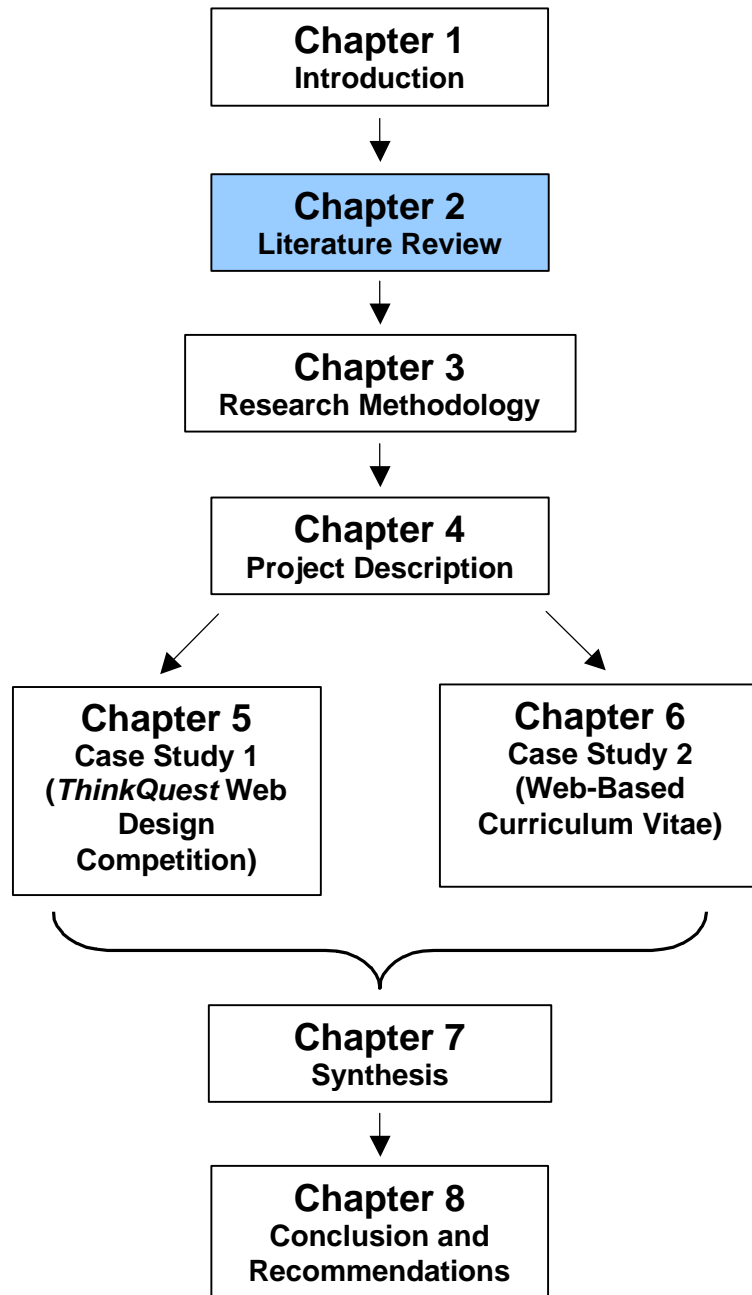
This research provides guidelines on how learners, in particular South Africa FET learners, interact with information in an educational digital environment from cognitive, affective and physical perspectives as they acquire, recall, process and present information. The utilisation of the guidelines can contribute to more effective teaching of and learning by South Africa FET learners in a digital environment.

The information gleaned from this study will add to an understanding of the research problem 'How learners South African FET learners acquire, recall, process and present information in a digitally enabled environment?'

7 Limitations of this research

The limitations of the research are that there are very few Black learners among the participants and the case studies are based in a middle class school environment although the learners may come from rich or poor backgrounds. In addition this research is limited to look for commonalities rather than differences, therefore it does not aim to extract and compare differences.

Chapter 2



Chapter 2 Literature Review: Learners in a digital environment

1 Introduction

The purpose of this thesis is to investigate how South Africa Further Education and Training (FET) learners acquire, recall, process and present information in a digitally enabled environment.

In South Africa there are currently over 3 million FET learners aged 16 and older, of whom over 2 million are found in the secondary school system (Department of Education, 2000, p. 2). This research will focus on the FET learner in the South African secondary school in the state educational system.

This chapter will synthesize the literature in answer to the following questions:

- What is an educational digital information environment?
- How has a changing society and technology influenced the way learners interact with information in an educational environment, including a South African FET environment?
- What is meant by cognitive, affective and physical perspectives with reference to interaction with information?
- How do learners interact with information in a digital information environment from cognitive, affective and physical perspectives?

Finally a profile of a South African FET learner in a digital information environment is created, based on the findings of the literature review.

2 Digital information environment in education

This research investigates how South African FET learners interact with information in a digital information environment. Table 2 - 1 defines *digital information environment* and *electronic information environment*. The information in the table has been synthesised from the works of a number of authors.

Table 2 - 1 Definitions of digital and electronic information environment

Key word	Definition
Digital	<ul style="list-style-type: none"> • Data that is represented as a series of binary digits. • Data that is encoded to receive and transmit information.
Electronic	<ul style="list-style-type: none"> • That which is produced by using electronic components.
Information	<ul style="list-style-type: none"> • Knowledge made up of interpreted data.
Digital information	<ul style="list-style-type: none"> • Knowledge stored and transmitted in digital format, such as that stored on a computer, cell phone, digital watch, etc. • Has a hypermedia format.
Electronic information	<ul style="list-style-type: none"> • Information produced by the use of electronic equipment.
Environment	<ul style="list-style-type: none"> • Physical surroundings and conditions, especially as affecting people's lives. • Conditions or circumstances of living.
Digital or electronic information environment	<ul style="list-style-type: none"> • Primary source of information has a digital nature. • Information produced by the use of electronic equipment. • Environment in which the reader and text can interact; the reader can be guided; the text can have different hierarchical structures; and the text employs new symbolic elements.
Hypermedia	<ul style="list-style-type: none"> • System that uses links to lead users to related graphics, audio, animation or video files.

(Hutchinson, 1997; Oxford Modern English Dictionary, 1995; Reinking, n.d.)

An electronic information environment is a much broader information environment than just a digital information environment, including tape recordings, film, radio, electronic mail or email, electronic banking, the World Wide Web, computers, etc. As indicated in the Glossary, for the purposes of this research the words *digital* and *electronic* are used interchangeably.

Information in a digital environment is of a hypermedia format. This research aims to describe how South African FET learners interact with information in a digital environment where the information is of a hypermedia format. The hypermedia format differs markedly from the print or oral format, as tabulated in Table 2 - 2. However the formats of information found in an educational institution are mixed.

Table 2 - 2 Characteristics of language forms

Print	Oral	Hypermedia
non-interactive	interactive	interactive
permanent	impermanent	impermanent
static	dynamic	dynamic
linear	non-linear	non-linear
narrative	narrative / episodic	episodic
single voiced	single / multi-voiced	multi-voiced
graphic / text	audio	all symbol systems

(Eagleton, 1999)

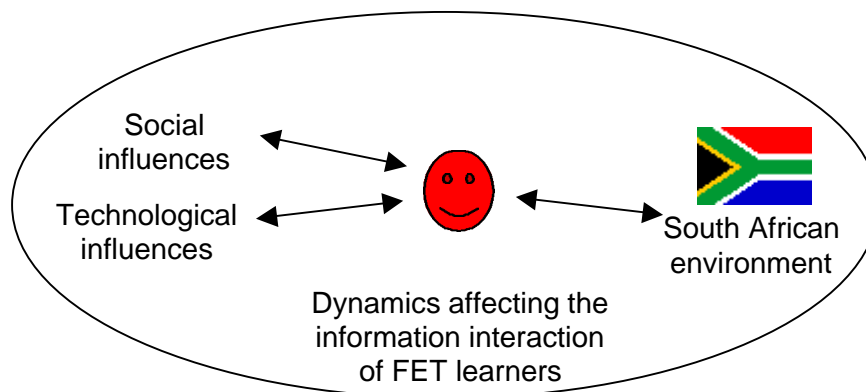
3 Changing society and technology and the influence on information processing in an educational environment, including a South African Further Education and Training environment

For the purpose of this literature review the dynamics between South African FET learners and information are examined by a number of factors that include

- *social changes*;
- the influence of *technology*; and
- living in a *South African* environment.

Figure 2 - 1 provides a schematic overview of the thesis with the South African FET learner in a uniquely South African context, influenced by social change and technology. These factors are examined to determine the dynamics of the learners' interaction with information.

Figure 2 - 1 Dynamics affecting information interaction of South African FET learners



For the purpose of this literature review the social influences are categorised in generations. The *Oxford Modern English Dictionary* (1995, p. 441) defines generation as 'all the people born at a particular time, regarded collectively' as well as 'the average time in which children are ready to take the place of their parents (usually reckoned at about 30 years)'. For the purpose of this study, a generation is reckoned at about 20 years. Sociologists use the term 'generation' to describe groups of people characterised by similar qualities and attitudes. It is not possible to generalise accurately but trends and generational attitudes can be discerned (Codrington, 1997, online).

Young people of the latter half of the 20th century have been described and categorised by the demographics, trends and attitudes in which they live and the trends and attitudes which develop as a result of this cohabitation. Table 2 - 3 is a list of the popular categories used to define the generations of the late 20th century. These characteristics are mainly applicable to American youth but with globalisation are also applicable to many sectors of South African society (Codrington, 2000, p. 35).

Table 2 - 3 Categories of generations

Category	Description
1 <i>Generation X (Xer)</i>	People born between 1961 and 1981.
2 <i>Generation Y</i>	Children born at the end of the 1970s.
3 <i>Millennial Generation</i>	Children born since the early 1980s.
4 <i>Oh-Oh teens</i>	Children who are teenagers during the Oh-Oh ¹ (2000 - 2009) years and born mainly between 1989 and 1994. Howe and Strauss (Howe and Jackson, 1998) referred to this group as the <i>Millennial Generation</i> .
5 <i>Net Generation</i>	Many of those born between 1977 and 1997 have become the <i>Net Generation</i> influenced by intensive Internet usage.
6 <i>Nintendo Generation</i>	Children between the ages of three and 18, and entering school in the 1990s influenced by <i>Nintendo</i> technology.
7 <i>Children of the Chaos Generation</i>	Children influenced by a non-linear culture, probably since the middle 80s.

(Cobb, 1998; Howe & Jackson, 1998; Lankard, 1995; Nintendo, 1999; Rushkoff, 1999; Tapscott, 1999; Zoba, 1997)

Table 2 - 4 illustrates the categories of generations showing when the generations discussed in Table 2 - 3 were born and the time span.

Table 2 - 4 Adolescents born in the different generations (shaded areas indicate birth years)

Generation	19	60	65	70	75	1980	85	90	95	2000	05
<i>Generation X</i>											
<i>Generation Y</i>											
<i>Millennial Gen.</i>											
<i>Oh-Oh Gen.</i>											
<i>Net Gen.</i>											
<i>Nintendo Gen.</i>											
<i>Child of Chaos</i>											

¹ Oh-Oh - Years that have two 00s in them, such as 2000, 2001, 2002, through to 2009.

Table 2 - 4 indicates that in the years 2000 and 2001 (year of the case studies) young people aged between 13 and 19 can be expected to have characteristics of the *Y, Millennial, Oh-Oh, Net, Nintendo* and *Children of Chaos* generations. While some adolescents may be the tail end of the *Y Generation*, it is not anticipated that many young people aged between 13 and 19 in the year 2001, the year of the case study investigation, showed characteristics of the *X Generation*.

For the purpose of this literature review, the different generations have been divided into main three groups based on their major influences and will be discussed as indicated in Table 2 - 5. Factors that influence their interaction with information are discussed separately and then synthesised into one table.

Table 2 - 5 Format of discussion on groupings

Grouping	Generation
Social Generations	1 <i>Generation X</i> 2 Millennial grouping which includes the <i>Y, Millennial</i> and <i>Oh-Oh Generations</i>
Technology Generations	3 <i>Net</i> 4 <i>Nintendo</i> 5 <i>Child of Chaos</i>
South African Generation	6 Profile of the South African teenager

3.1 Social Generations grouping

The effects of a changing society have been the main influence on this generation grouping. The ways in which information processing was influenced by those changes are examined.

3.1.1 *Generation X*

Generation X (Xer) reflects the effects of a changing society on a generation. These young adults born between 1961 and 1981 have different life experiences to those in previous generations. Social, economic and political events have had a large impact on their lives and, ultimately, their education. These are the parents of the generation under investigation in this research. Their years of birth in comparison to other generations are illustrated in Table 2 - 4.

The factors of character, family life, the future, peers and technology which have an impact on the information processing of *Xers* are tabulated in Table 2 - 6.

Table 2 - 6 Factors that impact on the interaction with information of *Generation X*

Factor	Impact
Character	<ul style="list-style-type: none"> • As they spent so much time on their own or with their peers they became used to doing things for themselves, hence <i>Generation X</i> persons tend to be independent problem solvers and self-starters. • Compelled to improvise in order to survive, they are thus resourceful. • Want support and feedback but do not want to be controlled. • Suffered from information overload and, because of it, did not experience any of the real conflicts presented on television.
Family life	<ul style="list-style-type: none"> • Families lived away from relatives capable of providing support and a haven for family members. • Grew up as latchkey children deprived of their parents, both of whom worked outside the home. • Children took their social cues from their own peer group. • Few older role models. Relationships with adults limited, and not grounded in fear or respect.
Future	<ul style="list-style-type: none"> • Aware that securing jobs, and job security, may be a problem. • As a result of limited career positions, when they attended university they studied career courses, such as nursing or computer sciences, in preference to general culture courses.
Peers	<ul style="list-style-type: none"> • Many of their friends grew up in single parent homes (children of divorced parents), therefore committed to spending time with own age group to whom they became very supportive.
Technology	<ul style="list-style-type: none"> • First generation to grow up with television's constant presence in the home and the rapid onslaught of other media. • Not afraid of technology. • Home alone with TV has resulted in <i>Xers</i> with short attention spans, capable of attending to multiple input and suffering from information overload. • Used to instant gratification from technology.

(Brown, 1997; Kalata, 1996; Lankard, 1997)

As a consequence of the changed *family life* described in Table 2 - 6 (Brown, 1997; Kalata, 1996; Lankard, 1997)

- *Xers* were forced to become self-sufficient, independent problem solvers: they needed autonomy to complete the task;
- they needed a variety of instructional methods in interaction with information ranging from video recordings, interactive CDs to self-paced modules; and
- as their relationships with adults were limited, they did not know authority.

As *Xers* spend so much time with their *peers* with whom they are supportive, as described in Table 2 - 6 (Brown, 1997; Kalata, 1996; Lankard, 1997),

- they were able to work co-operatively with other young people; and
- learning is a social activity as solving problems is a social activity.

As a result of the changing society, particularly the access to *technology*, as tabulated in Table 2 - 6 (Brown, 1997; Kalata, 1996; Lankard, 1997), *Xers*

- have become surfers and scanners of information, i.e. they move from one point to another quickly;
- have the ability to assimilate information quickly and focus on multiple ideas at once (therefore the layout of information should be very accessible with charts, graphics, text and photos included on a single page);
- want immediate response from their sources of information; and
- crave stimulation.

Therefore, based on the above, *Generation X* came to be characterised as independent problem solvers, self-starters, responsive, focused, ambitious, fearless and technologically literate.

3.1.2 Millennial Generations grouping

For the purpose of this study the Millennial Generation grouping influenced by changes in society include the *Y*, *Millennial* and *Oh-Oh* generations. Their years of birth in comparison to the other generations are illustrated in Table 2 - 4.

The following are important points to consider in this grouping:

- There is less authority in defining the *Y Generation* group than other groups. They are those born at the end of the 1970s (Tapscott, 1998, p. 33).
- The *Millennial Generation* are young people who come of age just before or after the turn of the millennium (Pirie & Worcester, 1999, online) or those born after 1982 (Howe, 1998, online).
- The *Oh-Oh Generation* are teenagers in the Oh-Oh years and born mainly between 1989 and 1994 (Cobb, 1998, online).

The factors of character, family life, the future, peers and technology that have had impact on their information processing are tabulated in Table 2 - 7.

Table 2 - 7 Factors that impact on the interaction with information of the Millennial Generations grouping

Factor	Impact
Character	<ul style="list-style-type: none"> • They are in need of continual 'hits' as they have been bombarded by frequent images. • They are jaded, and having a 'been there / done that' attitude, nothing shocks them. • They seem to be self-confident and self-dependent. • They are used to customising things.
Family life	<ul style="list-style-type: none"> • Peer pressure is important, leading to peers helping peers. They reach out to people and have a strong desire to be connected and collaborate with others. One-quarter to one-third comes from single parent homes. • As both parents work outside the home they are dependent on their peers. • In the absence of parents, digital technology has given them an artificial and superficial home, i.e. they are a cyber-suckled community.
Future	<ul style="list-style-type: none"> • They aim high and do not think themselves limited by their background.
Peers	<ul style="list-style-type: none"> • As they are left with others of their own age so much, they have learned to work together and on their own. • In high schools there is no one group that asserts an influence over all the others but many small groups, as they are not united by a common culture. They live in a fragmented culture with no common experience apart from media being the common influence between them.
Technology	<ul style="list-style-type: none"> • They are children of the digital age as they have grown up with a burgeoning software industry. • They have grown up in front of tubes, screens or boxes, as baby sitters, that have defined their perceptions of reality. • Technology has made them more individualistic; hence they are not a homogenous group. • To this group the remote control has symbolised their reality: change is constant; their focus is fragmented. • Many of these young people have their own computers.

(Beck, 1997; Cobb, 1998; Pirie & Worcester, 1999; Thomson, 1999; Zoba, 1997)

As a result of the changing society tabulated in Table 2 - 7, young people of the Millennial Generations grouping

- work with their peers or groups in preference to adults;
- need quick responses to activities;
- are creative thinkers able to customise things to their needs;
- need to do things;
- need to reach people of their own age; and
- are achievement orientated.

3.2 Technology Generations grouping

The Technology Generations grouping comprises the *Net*, *Nintendo* and *Child of Chaos* generations. The digital environment, rather than economic, social and political factors, has influenced this generation grouping. The ways in which information processing was influenced by the digital environment are examined. The birth years of the Technology Generations grouping are tabulated in Table 2 - 4.

As tabulated in Table 2 - 8, the changed sources of information in hypermedia format are the major influence on this generation, having moved from a mainly linear form to a non-linear form.

Table 2 - 8 Linear and non-linear forms of information

Linear Old	Non-linear New
<ul style="list-style-type: none"> • User has little control of the flow of information. • Examples include books, films, magazines, newspapers and radio. 	<ul style="list-style-type: none"> • User has the ability to redirect the flow of information, to explore information in 3D format. • Examples include digital compact disks (CD-ROMs), Internet (in all its many forms), video cassette players and video games.

3.2.1 *Net Generation*

The *Net Generation*, influenced by the digital environment, have a degree of fluency with digital media (Tapscott, 1998, p. 3), particularly the Internet. They use the Internet for entertainment, communicating, shopping and more activities as new digital technologies are moving towards the Net (Tapscott, 1998, p. 3). These people have new tools for inquiry, analysis, self-expression, influence and play via the Internet, by means of chatrooms, email, web pages, gaming, etc. In general, according to Tapscott (1998, p. 7), digital media is creating an environment where child development is being accelerated with the evolution of motor, language and social skills. The influences of the digital world on the *Net Generation* are summarised in Table 2 - 9. The cognitive, affective and physical perspectives used in Table 2 - 9 to examine the influences were selected by myself and not suggested by the literature review.

Table 2 - 9 Influences of the digital world on the information processing capabilities of the *Net Generation*

Influences	Impact
Cognitive influences	<p>Using the Net they have to</p> <ul style="list-style-type: none"> • develop critical skills to judge if the information has any value; • develop critical skills as they interact with each other in chat rooms or via email; • develop evaluation skills to see if the information is fact or fiction; • develop investigative skills to find the required information; • develop thinking skills to maintain an online conversation; • develop thinking skills to find required information; • develop writing skills in online chat and email; • question the implicit values contained in the information, as there is so much information; and • search for their own information.
Affective influences	<ul style="list-style-type: none"> • The <i>Net Generation</i> enjoys using the Net. • As young people hungry for expression, discovery and their own self-development, they use the Net. • They control the media, creating their own environment, developing their own feeling of autonomy and sense of values. • They learn social skills and social responsibility in chat rooms.
Physical influences	<ul style="list-style-type: none"> • Using the Net, this generation is active, they participate, inquire, argue, play, shop, criticise, ridicule, fantasise, seek and inform. • They want to be users, not just viewers or listeners.

(Tapscott, 1998)

As a result of the *cognitive influences*, the consequences for information processing in an educational environment are as follows:

- The content matter must be of a high quality, i.e. learning materials must be linguistically and factually of a high standard.
- Learners need content matter to evaluate and criticise, i.e. a single source of information is not stimulating enough.
- Learners must have the opportunity to find their own information.

As a result of the *affective influences*, the consequences for information processing in an educational environment are as follows:

- Information presented in such an environment must be as stimulating as that found on the Internet.
- Learners need to control the creation of their own information.
- Learners need autonomy in finding and evaluating their own information.

As a result of the *physical influences*, the consequence for information processing in an educational environment is that the learner

- needs to be active and cannot be expected to passively absorb information.

3.2.2 *Nintendo Generation*

The *Nintendo Generation*, who have grown up with computers and information technologies, have been immersed in non-linear digital equipment, such as video games, digital compact disks, video cassette players, etc. (Nintendo, 1999, online).

This generation comprises children able to

- interact with information;
- interrupt and redirect the flow of information;
- modify the complexity of information; and
- alter the communication speed of information.

3.2.3 *Child of Chaos*

The *Child of Chaos* is a child born into a non-linear culture mediated by the television and computer (Rushkoff, 1999, p. 3). As with the *Net Generation*, their culture is linear in the form of television, and non-linear in the form of video games, computers, MTV, etc. Their media is many-to-many of call-in radio and the Internet, non-linear and non-verbal.

Children of Chaos are comfortable in a disassembled landscape and seem to create one when it does not exist; for example, with the television remote control, the *Child of Chaos* channel surfs while still following the story lines (Rushkoff, 1999, p. 44). MTV, with its rapid-fire segments and slicing, is aimed at the *Child of Chaos* who seems to prefer disjointed media. *Children of Chaos* understand the underlying order in the apparently disordered postmodern world. As they understand the order in the disordered world, their information processing adapts to the changed environment. The factors of character and cognitive influences that impact on their information processing are described in Table 2 - 10.

Table 2 - 10 Factors of the non-linear digital world that impact on the interaction with information of the *Child of Chaos* generation

Factor	Impact
Character	<ul style="list-style-type: none"> • Comfortable in a disassembled environment. • Always ready to explore something new. • Do not get too engrossed in any one activity. • Willing to push themselves to the limits, then relax. • Actively participate to piece together information and draw conclusions for themselves. • Able to improvise, willing to test the waters and see what happens.
Cognitive influences	<p>Time / speed</p> <ul style="list-style-type: none"> • Can process visual information quickly. • Broad attention range, short absorption time. • Suspends time constraints of linear reasoning in order to allow for rapid dissemination of ideas and data. • Attention span able to maintain itself over gaps of discontinuity, between channel surfing or from session to session. <p>Complexity / depth</p> <ul style="list-style-type: none"> • Requires images of greater complexity. • Able to multitask, e.g. keep track of many TV shows at once. <p>Visual literacy</p> <ul style="list-style-type: none"> • Develops new language of visual information that depends on the relationship of different images and images within images. • Recognition of the basic elements in the language of visual gestures determines the ability to navigate the non-linear, non-verbal landscape. • Recognises the quality of something from its shape. • Depends on the iconic representation rather than the illustrative depiction. • Skims information. • Communicates with basic symbols and relationships; the rest is filled in by the viewer.

(Rushkoff, 1999)

As a consequence of the changed *character* described in Table 2 - 10,

- the information processing of *Children of Chaos* is active;
- they need multiple modes of input to retain their attention; and
- they do not spend too long on any one task.

Therefore, based on Table 2 - 10, in an educational situation for successful information processing, it would be beneficial

- to keep learners actively involved;
- use many modes of media; and
- not expect *Children of Chaos* to focus on one activity for too long.

As a result of the *cognitive influences* tabulated in Table 2 - 10, the consequences for information processing in an educational environment are that the learners

- get bored quickly and need continual and varied input;
- are better able to process graphic information than textual information;
- have a short attention span and cannot keep track of one type of input for long periods;
- can keep track of many information inputs at once;
- need information organised in a regular pattern, i.e. certain types of information always found in certain places on a page or screen; and
- skim the information sources.

3.3 South African Generation grouping

Unlike the Technology Generation grouping, the profile of the South African teenager is mainly *social* in nature. South African teenagers have different influences to those of the American or European teenager as they are influenced by different factors, but there are similarities due to globalisation. Information in Table 2 - 11 is based on the 1998 Codrington profile of South African teenagers looking at family life, the future, peers and technology (Codrington, 1999, online).

Table 2 - 11 Factors that impact on the interaction with information of South African teenagers

Factor	Impact
Family life	<ul style="list-style-type: none"> • Family important although there are communication problems. • Perceived insufficient time for family life. • Both parents work outside the home in 72% of households. • Breakup of family life with divorce experienced by 64%.
Future	<ul style="list-style-type: none"> • Negative feelings about the future by 24%. • Concerned about lack of job opportunities, parents dying, not being a success in life and AIDS. • Negative feelings towards politics.
Peers	<ul style="list-style-type: none"> • Spend a great deal of time with small groups of close-knit friends. • Lack of rivalry between groups.
Technology	<ul style="list-style-type: none"> • More than two hours a day spent watching television by 51%. • Dependent on background music in digital format. • Large percentage living in poverty: Africans 57%, Asian 6%, Coloured 19%, White 2%.

(Codrington, 1999)

Table 2 - 11 indicates some trends also found in the Millennial Generations grouping with regard to family and peers. South African teenagers appear to be more negative about their future than the Millennial Generations grouping.

3.3.1 Consequences for the information interaction of South African Further Education and Training learners affected by changes in society and the influence of technology

Based on the preceding discussion, the South African FET learner is influenced by and is a product of the societal Millennial Generations grouping, the Technology Generations grouping and the South African Generation grouping.

Access to technology influences confident computer use (Rosen & Weil, 1995, online). A large percentage of South Africans live in poverty (Table 2 - 11). The result of this is that relatively few South Africans would be considered as belonging to the Technology Generations grouping. Most South African FET learners show similarities with the societal Millennial Generations grouping influenced by society.

Table 2 - 12 tabulates the general consequences and indicates the consequence for information interaction for learners in South Africa today, based on *all* groupings, examining it from cognitive, affective and physical perspectives.

Table 2 - 12 Consequences for the interaction with information by South African FET learners

Type of consequence	General consequences	Information interaction consequence
Cognitive	<ul style="list-style-type: none"> • Television watching a common activity. 	<ul style="list-style-type: none"> • Learners need material in graphic format.
	<ul style="list-style-type: none"> • Lack of trust requires autonomy in creating own learning material. 	<ul style="list-style-type: none"> • Learners need to find / create their own learning content.
Affective	<ul style="list-style-type: none"> • Peers interact, communicate and support each other. 	<ul style="list-style-type: none"> • Learning is social therefore noise is inevitable.
	<ul style="list-style-type: none"> • Need content matter that has relevance for a career. 	<ul style="list-style-type: none"> • Learners need fast access to learning material, as they have no time to waste. • Learners need learning material that has long-term career value.
	<ul style="list-style-type: none"> • Motivated when using technology. 	<ul style="list-style-type: none"> • Learners are motivated by technology used in information interaction.
Physical	<ul style="list-style-type: none"> • Necessity for physical activity during the learning process. 	<ul style="list-style-type: none"> • Learners must do things.

This section of the literature review has looked at how learners today interact with information as a consequence of social, economic, political and technological factors, and concluded with how South African FET learners interact with information. The review continues with how information is acquired, recalled, processed and presented.

4 Cognitive, affective and physical perspectives with reference to interaction with information in an educational environment

The chapter continues with references to cognitive, affective and physical perspectives as learners interact with information. These perspectives are defined in Table 2 - 13 and selected to examine the learners' interaction with information as it provides a means from which to do so. The areas of cognitive, affective and physical perspectives in an education environment encompass the way the learners intellectually interact with information, their emotions as they interact with the information and those around them, and how they physically interact with information.

Table 2 - 13 Definitions of cognitive, affective and physical perspectives

Perspective	Within an educational environment ...
Cognitive perspective	the recall or recognition of specific facts, procedures and concepts that serve in the development of intellectual abilities and skills as the learners acquire, recall, process and present information.
Affective perspective	how learners deal with ... <ul style="list-style-type: none"> • one another and information presented as content and as skills; • their emotions, feelings, values, appreciation, enthusiasm, motivation, attitudes and relationships; and • situations ... as they acquire, recall process and present information.
Physical perspective	the learners' physical movement, coordination, use of motor skill areas, manipulative or motor skills in acquiring, recalling, processing and presenting information; including the environment in which they work.

(Bloom *et al*, 1956)

5 Interaction with information in an educational digital environment from cognitive, affective and physical perspectives

The aim of this research is to investigate the complex process of how South African FET learners in a digital environment interact with information, i.e. acquire, recall, process and present information. This section will examine

- the formats of information found in a digital environment;
- the effects of a digital environment on the acquisition, processing and presentation of information in general; and then
- interacting with information in a digital environment from the cognitive, affective and physical perspectives.

Although the acquisition, processing and presentation of information in a digital environment are all part of a whole, each will be examined from a different perspective, viz

- acquiring - obtain information mainly by the visual, aural and haptic channels
- processing - form meaning from information mainly by mental processing
- presenting - give expression to or present the information

5.1 Formats of information

The technologies of text, still or animated graphic, movie segments, sounds and music are currently converging in non-linear hypermedia Internet technology

(Tapscott, 1998, p. 3). In a digital environment the major format of information is of a hypermedia nature. Hypermedia encompasses multimedia and hypertext as tabulated in Table 2 - 14.

Table 2 - 14 Formats of information

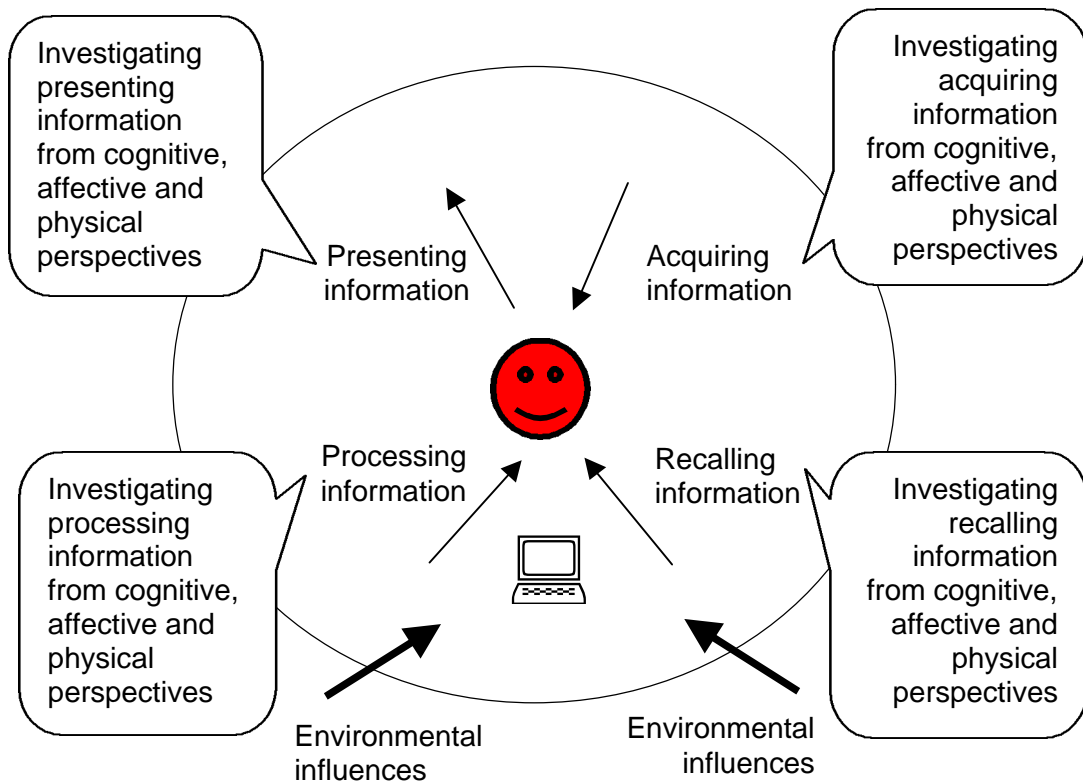
Multimedia	Hypertext	Hypermedia
<ul style="list-style-type: none"> Does not necessarily include computer usage. 	<ul style="list-style-type: none"> Computer-based system. 	<ul style="list-style-type: none"> Computer-based system.
<ul style="list-style-type: none"> Not necessarily interactive. 	<ul style="list-style-type: none"> Allows interactive linking. 	<ul style="list-style-type: none"> Allows interactive linking.
<ul style="list-style-type: none"> When presented via a computer, may overlap with the term <i>hypermedia</i> and <i>hypertext</i>, if it includes non-linear interactive links. 	<ul style="list-style-type: none"> Allows non-linear access to information. 	<ul style="list-style-type: none"> Allows non-linear access to information.
<ul style="list-style-type: none"> Comprises multiple media formats for the presentation of information. 	<ul style="list-style-type: none"> Textual information including diagrams, tables and pictures. 	<ul style="list-style-type: none"> Presented in multiple formats that include text, still or animated graphic, movie segments, sounds and music.

5.2 Effects of a digital environment on interaction with information

Figure 2 - 2 depicts the learner in a digital environment and the dynamic interaction with information, the speech bubbles illustrating what is being investigated. There is no South African flag as the investigation is generic.

The following section discusses how learners in a digital environment acquire, recall, process and present information from cognitive, affective and physical perspectives.

Figure 2 - 2 Aspects of a digital environment



5.2.1 Screen dynamics

Screen dynamics, i.e. the way users reach various parts of the screen (Piolat, Roussey & Thunn, 1997, p. 568), influence acquisition, recall and comprehension of information as tabulated in Table 2 - 15. Table 2 - 15 looks at activities done on screen: reading on screen, cognitive processing of material on screen, reading text on the screen, scanning of the screen and reading the screen.

Table 2 - 15 Effects of screen dynamics on acquisition, recall and comprehension of information

Activity	Effect
Reading on screen	<ul style="list-style-type: none"> • Deep cognitive study is problematic when reading on screen unless there are spatial anchors. Spatial representation is useful when recalling information. When reading, text positional information in the form of x and y co-ordinates is processed and assists in recall. Deep study [of a book or article] requires jumping from one section to another, comparing widely separated statements, analysing graphics in context and making notations: this is problematic on screen without anchors.
Cognitive processing of material on screen	<ul style="list-style-type: none"> • Cognitive processing on screen is superficial: corrections made in word processing documents are at surface level, not affecting text coherence or organisational design.
Reading text on screen	<ul style="list-style-type: none"> • Reading text on screen takes longer than reading text from a book. • Text read on screen or on a book page is made more accessible if it is chunked in bite size bits but this leads to learners remembering bytes of information and not the bigger picture.
Scanning of the screen	<ul style="list-style-type: none"> • Experienced computer users scan the screen: they know where to look for specific information. For example, they scan email message subject lines and are able to keep track of sports scores on television by watching the bottom of the screen.
Reading the screen	<ul style="list-style-type: none"> • Research on areas of the screen that have been read, indicates that young people read the peripheral areas for long periods, and concentrate on small areas of detail. Their preferred area of content is on the right hand side of the screen.

(Borchers *et al*, 1996; Hackbarth, 1993; Howarth, 1997; Piolat, Roussey & Thunn, 1997; Rushkoff, 1999)

Table 2 - 15 tabulates the influences of reading text on screen as opposed to reading text in printed format: text is read in a different way.

5.2.2 Technological anxiety

Technological anxiety may be described as negative feelings towards technology and computers that impact on the way information is acquired and processed via them. The three main categories of technological anxiety are presented in Table 2 - 16.

Table 2 - 16 Categories of technological anxiety

Category	Effect
Technological anxiety	<ul style="list-style-type: none"> • Negative attitudinal and affective responses towards technology with associated behavioural consequences, resulting in slower and less accurate performances.
Technophobia	<ul style="list-style-type: none"> • Anxiety about present or future interactions with computers or computer-related technology.
Computer anxiety	<ul style="list-style-type: none"> • Fear of computers when using the computer or when considering the possibility of computer use which causes avoidance of computer use. Computer anxiety is influenced by demographic, cultural and psychological factors.

(Brosnan & Lee, 1998; Chua, Chen & Wong, 1999; Weil & Rosen, 1995)

Information in a digital environment is mainly available via computer as tabulated in Table 2 - 16, therefore computer anxiety will greatly impact on the acquisition and processing of information (Tseng *et al*, 1998, p. 599).

Demographic, cultural and ethnic and psychological factors that influence computer anxiety are shown in Table 2 - 17.

Table 2 - 17 Factors that influence computer anxiety

Factor	Influence
Demographic	Main influences: <ul style="list-style-type: none"> • Prior experience with computers • Utilisation of computers • Accessibility to computers Lesser influences: <ul style="list-style-type: none"> • Level of computer education • Use of own computer • Economic status of family, i.e. ability to purchase a computer • Urban or rural life, i.e. density of population and access to technology • Family structure, i.e. single parents are not always able to provide the means to purchase computers • Educational level of parents • Time to explore and use the technology of the computer • Age of computer user • Gender of user, with males being less anxious about computer use
Cultural and ethnic	Negative influences: <ul style="list-style-type: none"> • Culture of the software is not that of the local culture • User interface is not that of the local culture • Language of the computer interface is not the vernacular • Spatial visualisation ability of the users is poor • Computers are so expensive that they inhibit their use • Not enough recreational use of computers • Rote learning in school is encouraged
Psychological	<ul style="list-style-type: none"> • Perceived ability to use the computer • Learning styles • Motivation

(Al-Khaldi & Al-Jabri, 1998; Amory, Mars & Meyerowitz, 1999; Blignault, McDonald & Tolmie, 2000; Brosnan & Lee, 1998; Burrell, 2000; Chua, Chen & Wong, 1999; Fajou, n.d.; Rosen & Weil, 1995; Weil & Rosen, 1995)

Therefore, based on Table 2 - 17, prior experience with computers and access to computers will greatly influence the level of computer anxiety and impact on the acquisition, recall, processing and presentation of information in a digital environment.

5.2.3 Access-speed

A key feature of the digital environment is access-speed that influences information acquisition and processing as the user engages, searches, scans, processes, touches and communicates in ways indicated in Table 2 - 18.

Table 2 - 18 Effects of access-speed on the acquisition, processing and presentation of information

Activity	Effect
Engage	<ul style="list-style-type: none"> • Puts learners into a 'flow state' or the pleasurable experience of total absorption in a challenging activity. Anything that is perceived as an interruption to the flow state, receives a negative reaction. Learners are reluctant to reflect on the activity, and rather continue their pleasurable online flow state activity. The result is that learners do not reflect or cognitively engage at a deep level as they move onto the next screen or graphic.
Search	<ul style="list-style-type: none"> • Allows users to search documents for words and phrases and acquire relevant information on CD-ROMs and computer files quickly, at a distance or nearby, by fast-forwarding or sorting.
Scan	<ul style="list-style-type: none"> • Forces the learner in a digital environment to scan the screen to find the required information quickly, skim-reading the material.
Process	<ul style="list-style-type: none"> • Allows users to follow ten or more TV or video programs at once, as they switch from channel to channel just in time to catch important events on each as they quickly visually process the information.
Touch	<ul style="list-style-type: none"> • Leads to the 'Butterfly Defect' (Salomon, 1997) where a person touches nothing but the headline or soundbite and does not process that information into knowledge.
Communicate	<ul style="list-style-type: none"> • Affects grammar and literacy, as young people are developing a lexicon of abbreviations and symbols for digital communication use in email and text messages sent by cell phone.

(Csikszentmihalyi, 1990; Hackbarth, 1993; Montgomery, 1996; News24.com, 2000; Rushkoff, 1997; Rushkoff, 1999; Salomon, 1997; Yeo *et al*, 1998)

The access speed of the digital environment influences the acquisition and processing of information leading to greater speed and efficiency on the one hand, and superficial acquisition of information on the other.

5.2.4 Multimedia

Multimedia can include print, sound, animation and digital formats. Multimedia is multiple media formats used for the presentation of information (Hackbart, 1993, p. 57) woven in combinations of text, graphic art, sound, animation and video elements. It conveys information more effectively and powerfully than any single format. Table 2 - 19 summarises the effects of multimedia on the acquisition, processing and presentation of information by helping to build mental models, make meanings, transfer learning, present the world in shorthand, cross from abstract forms to other forms, communicate understanding, lure the reader, promote higher levels of thinking, provide greater access and provide different learning styles.

Table 2 - 19 Effects of multimedia on the acquisition, processing and presentation of information

Multimedia effect	Effect on the acquisition, processing and presentation of information
Builds mental models	<ul style="list-style-type: none"> • Provides print or still visuals with more impact, realism and immediacy thus helping readers build mental models.
Makes meanings	<ul style="list-style-type: none"> • Allows people to make meanings through combinations of symbol systems that they could not make, or make as well, through any of the systems on their own such as text or speech.
Transfers learning	<ul style="list-style-type: none"> • Promotes the transfer of learning to contexts beyond the confines of the classroom.
Presents the world in shorthand	<ul style="list-style-type: none"> • Presents the world in shorthand, suitable for the speed of access of the digital environment.
Crosses from abstract forms to other forms	<ul style="list-style-type: none"> • Helps people cross from the literate and abstract forms to other forms of presentation of information.
Communicates understanding	<ul style="list-style-type: none"> • Provides learners with the opportunity to communicate their understanding of the subject to those around them.
Lures the reader	<ul style="list-style-type: none"> • Lures the reader to more fascinating visual experiences, continually moving to the next image by using the ability of hypermedia; at the same time negatively influencing information acquisition by not processing the image into knowledge.
Promotes higher levels of thinking	<ul style="list-style-type: none"> • Creates opportunities for higher levels of thinking. When learners work in a hypertext or hypermedia design the minimum level of cognition attained on Bloom²'s Cognitive taxonomy is the level of <i>Application</i>.
Provides greater access	<ul style="list-style-type: none"> • Provides greater access by offering the possibility of greater educational equity for children who, for example, may be more visually than linguistically oriented.
Provides different learning styles	<ul style="list-style-type: none"> • Meets the needs of different learning styles and different literacy levels.

(Cooper, 2000; Ginn, 1995; Hackbarth, 1993; Lemke, 1992; Mayer & Gallini, 1990; Papert, 1993; Ross, 1993; Salomon, 1997; Wilhelm, 1995)

Table 2 - 19 tabulates the effects of multimedia on interaction with information. It has profound wide reaching effects enhancing the acquisition, recall, processing and presentation of information. In the digital environment multimedia becomes hypermedia that accentuates the interactivity of the information and makes it more attractive to young people.

² Bloom's Cognitive Taxonomy has six levels ranging from the lowest level of Knowledge, to Understanding, Application, Analysis, Synthesis to the highest level of Evaluation (Bloom, 1956).

5.2.5 Interactivity

The interactivity of the digital environment assists the learner acquire and process information. The different forms of interactivity found in a digital environment are tabulated in Table 2 - 20 with examples.

Table 2 - 20 Forms of interactivity found in digital environment

Interactivity	Example
Immediate response and feedback	<ul style="list-style-type: none"> • Accessing information with a click.
Adaptability and flexibility	<ul style="list-style-type: none"> • Adapting to the needs of individuals.
Feedback with a number of options	<ul style="list-style-type: none"> • Allows option of moving in non-linear form.
Grain-size waiting periods	<ul style="list-style-type: none"> • The user is able to interrupt or initiate an action with relatively short access time.
Learner control	<ul style="list-style-type: none"> • Handing some degree of responsibility to the user, i.e. self-pacing.
Object interactivity	<ul style="list-style-type: none"> • Activating objects by using a mouse or another pointing device.

(Borsook & Higginbotham-Wheat, 1991; Simms, 1995)

The above table illustrates how the many forms of interactivity in the hands of the user make the digital environment so attractive.

Vaughan (1998, p. 3) claims that by weaving together the sensual elements of multimedia - dazzling pictures and animations, engaging sounds, compelling video clips - you can electrify the thought and action centres of people's minds. Add the ability to control what and when those elements are delivered, and you have interactivity, 'potent forces in the lives of children' (Montgomery, 1996, online). Online media is thus dynamic and two-way. This participatory quality makes it particularly compelling (Montgomery, 1996, online), and it is this interaction with information that enables possession and acquisition of information (Wurman, 1989, p. 166).

5.2.6 Literacy

Levels of literacy competency affect information acquisition and processing. The nature of literacy is continually being refined with changing technologies for information and communication, as well as changing environments for their use (Leu, 1997. p. 62). Literacy is not static but a process one has to update as new technologies appear. While networked technologies are responsible for these changing and expanding definitions of literacy, defined and tabulated in Table 2 - 21,

they also provide the means to keep up with the change that will be a part of one's life.

Table 2 - 21 Definitions of literacy

Key word	Definition
Literacy	<ul style="list-style-type: none"> • Competence with a written language, a script. • Movement between and among communication systems, or transmediation.
Information literacy	<ul style="list-style-type: none"> • Ability to access, evaluate and use information from a variety of sources.
Digital literacy	<ul style="list-style-type: none"> • Ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers. • Literacy activities that are delivered, supported, accessed or assessed through computers or other digital means rather than on paper. • Ability to interact with information, using new and a growing number of symbolic elements as well as different structure forms.
Hypermedia literacy	<ul style="list-style-type: none"> • Involvement of the 'reader' in a hypermedia environment in cognitive reconstruction to suit own requirements and specifications.

(Doyle, 1995; Gilster, 1997; Leland & Harste, 1994; Reinking, n.d.; Topping, 1997)

The forms of literacy defined in Table 2 - 21 indicate a progression from simple literacy of competence with the written word, to hypermedia literacy when users are able to cognitively reconstruct a topic to their own requirements, from being competent with one format to competence with many formats. More so than in a traditional print environment, literacy on the Internet (Leu, 1997, p. 65) and in a digital environment is gained through experience (Berners-Lee, 2000, p. 143) and informal social interactions with peers (McCluskey, 1996, online).

An experienced user in a digital environment

- knows where to find information on a busy screen;
- develops sophisticated navigational strategies to source information in a digital format on the World Wide Web, CD-ROM or computer screen;
- becomes sceptical of digital material;
- evaluates information based on the authority of the uniform resource locator (URL) or compact disk (CD) publishing data;
- is aware of the variety of meanings inherent in the multiple media forms in which messages appear;
- is aware of peer review when material is available in digital format; and

- recognises the basic elements in the language of visual gestures that determine their ability to navigate the non-verbal, non-linear digital environment (Alvarez, 1998, p. 42; Berners-Lee, 2000, p. 143; Leu, 1997, p. 64-65; Rushkoff, 1999, p.52).

Lack of experience in a digital environment results in information anxiety and inhibits information acquisition and processing.

5.2.7 Preferred information sources

The preferred source of information in a digital environment is dependent on the need and type of information required. Of all forms of information exchange, verbal communication is used the most as it is simple, informal, flexible, interactive and private. Paper-based documentation is more commonly used for formal communication. Computerised information is mainly used as an information management tool. There is little evidence that computer-derived information is preferred over traditional written or verbal sources (Zeffane & Cheek, 1995, p. 119).

5.2.8 Computer laboratory ecology

The spatial configuration of a room influences social behaviour and interaction (Jaffee, 2002, online). Classroom ecology influences the way the learners interact with each other.

5.2.9 Confluence of influencing factors

In conclusion, when learners work in a digital environment, information acquisition, processing and presentation are inhibited by technological anxiety and information illiteracy and, at the same time, are both positively and negatively affected by screen dynamics, access speed, multimedia, interactivity, information literacy and lack of technological anxiety.

There are various models that show the amount of remembering which takes place in different situations. The percentages in Table 2 - 22 are similar to those found in many places in the literature indicating the amount of remembering which takes place when a person reads, hears, sees, says and does.

Table 2 - 22 Percentages of remembering based on the activity

Activity	Rosario	Rose	Average
Reading	10%	20%	15%
Hearing	20%	30%	25%
Seeing	30%	40%	35%
Seeing and hearing	50%		50%
Saying	80%	50%	65%
Doing		60%	60%
Saying and doing	90%		90%
Saying, doing, seeing and hearing		90%	90%

(Rosario, n.d.; Rose & Nicholl, 1997)

Table 2 - 22 shows differing percentages of remembering based on the method of information acquisition, processing and presentation with reading being the least effective, and 'saying, doing, seeing and hearing' most effective. In a *multimedia* environment learners 'see' and 'hear', and 'see and hear'. In an *interactive* digital educational environment learners 'say and do' (Rosario, n.d.) Hence, based on the percentages above, working in a hypermedia interactive digital environment contributes to information acquisition, processing and presentation.

The following section will report on the results of a literature review on the acquisition, processing and presentation of information in an *educational* digital environment.

5.3 Interacting with information in an educational digital environment

In an educational environment learners are expected to acquire information, process it and present the results. In a digital environment information acquired is usually of a digital nature, and the method of presentation would involve a digital input. The information is processed as it is acquired *and* presented. The following will discuss how the digital environment influences the interaction with information in an *educational* environment.

5.3.1 Cognitive aspects

The study of cognition can be subdivided into problem solving, error, skill acquisition, reasoning and memory (Dix, 1998, p. 36). Information is cognitively processed in an educational digital environment and in the creation of or working with hypermedia and multimedia projects as tabulated in Table 2 - 23 based on the divisions of problem solving, error, skills, reasoning and memory from Dix (1998, p. 36).

Table 2 - 23 Cognitive information processing in an educational digital environment

Process	Activity
Problem solving	<ul style="list-style-type: none"> • Working in a technology enriched learning environment, <i>Evaluation</i> of information measured against Bloom's Cognitive Taxonomy was found to be significantly higher, and <i>Analysis</i> and <i>Synthesis</i> of information were found to be generally higher. • Creativity by learners exploring the unknown, taking individual initiative to find solutions, was also exhibited.
Error	<ul style="list-style-type: none"> • Acceptance of error and resolving of errors is part of work in a digital environment where errors can be quickly resolved.
Skills	<ul style="list-style-type: none"> • Skills gained in the technical field are continually challenged, the limits being pushed with the available software. It is not clear if technical skills learned, using for example the computer, are transferred to fields such as the video or mobile phone, but it is presumed they are. • Learners use skills of previewing, skimming, checking and rereading while browsing online. It has not been established through a literature review whether learners transfer those skills to their reading of paper-based material. • In the creation of multimedia projects learners use project management, research, organisation and representation, presentation and reflection skills.
Reasoning	<ul style="list-style-type: none"> • Reasoning skills are used while working with multimedia, to transform an object from one sign system and recast it in terms of the content and expression of another sign system, or transmediation. • Intertwining of many perspectives from multiple media sources to create new meaningful forms requires many forms of reasoning. • Authentic language is used as part of the reasoning process, in collaboration with peers.
Memory	<ul style="list-style-type: none"> • Sensory (graphic, auditory, kinetic) features of digital environment can assist short-term memory. • Sensory overload can overwhelm, depending on the level of media literacy. • Organisation or structure of digital environment assists in long-term memory.

(Carver *et al*, 1992; Coiro, 2000; Hopson, 1998; Leland & Harste, 1994; Shenk, 1997)

Table 2 - 23 summarised and tabulated cognitive information processing in an educational digital information environment based on the divisions of Dix (1998, p. 36).

5.3.2 Affective aspects

The educational digital information environment influences the processing of information by means of motivation and by developing a spirit of community as discussed in Table 2 - 24.

Table 2 - 24 Affective information processing in an educational digital environment

Process	Activity
Motivation	<ul style="list-style-type: none"> • Extrinsic motivation in improved information processing, i.e. learning and better marks. • Intrinsic motivation in more enjoyable information processing, i.e. teaching and learning. • Unceasing effort, perseverance, a sense of empowerment, confidence, excitement and on-task engagement.
Spirit of community	<ul style="list-style-type: none"> • Collaboration or cooperation and group ownership of work. • Conventional communication patterns transformed; learners teach and learn from each other. • More honesty, less fear, less shyness and less aggressive domination of peer-to-peer discussion.

(Bump, 1999; Clifford, Friesen & Jacobsen, 1998; Coiro, 2000; Hopson, 1998; Tuman, 1992; Wishart & Blease, 1999)

The motivational aspects of working in a digital information environment are noted as well as the positive spirit of community in Table 2 - 24.

5.3.3 Physical aspects

The educational digital environment influences the physical activities of learners, tabulated in Table 2 - 25, as the learner clicks, scrolls, surfs, communicates, downloads, examines, jumps, loses sight of time, moves, redoes, talks and focuses on the computer while working in a digital information environment.

The activities described in Table 2 - 25 indicate how learners physically process information in a digital information environment, information processing activities unique to a digital information environment.

Table 2 - 25 Physical information processing in an educational digital environment

Process	Activity
Click, scroll, surf	Continually active, clicks the mouse, surfs web sites, scrolls up and down, always moving.
Communicate	Communicates with other learners showing and sharing work.
Download	Downloads large amounts of information always looking for more facts.
Examine	Examines animated images, sound, video clips and images before reading text.
Jump	Jumps from hyperlink to hyperlink, never satisfied with what is available.
Lose sight of time	Not able to plan use of time, work always handed in late, always under pressure, always trying to do better.
Move	Moves quickly onto the next graphic or screen, looking for the elusive piece of information, not processing what is there.
Redo	Redoes multimedia projects, never satisfied with what has been created.
Talk	Discusses information, thereby processing information.
Focus on	Looks at computer monitor and interacts with fellow learners.

(Africa, 2001; Yeo *et al*, 1998)

5.4 Perspectives on the interaction

In the preceding section the formats of information found in a digital environment and then how that environment influences the interaction with information were discussed. The discussion ended by indicating how a digital environment influences information processing in an educational digital environment.

6 Synthesis and profile of a South African Further Education and Training learner in an educational digital environment

Chapter 2 commenced by defining and discussing a digital environment. The dynamics between modern South African society and FET learners were discussed with reference to the way in which the interaction of FET learners with information is influenced. This was followed with a discussion of how learners process information in an educational digital environment.

Based on the preceding literature review, a profile of a South African FET learner in a digital environment was created and then used in the field as a basis for the creation of a fuller profile. To facilitate the development of the profile, the South African FET learner's behaviours or activities when interacting with information in an educational digital environment is divided into three different perspectives, i.e.

cognitive, affective and physical. Tables 2 - 26, 2 - 27 and 2 - 28 synthesise material discussed in preceding sections and tables and attempts to create the profile based on the literature review.

Table 2 - 26 below describes the way in which learners interact with information from a cognitive perspective based on the literature examining how they acquire, recall, process and plan, and present information. The table references in Tables 2 - 26, 2 - 27 and 2 - 28 are not directly correlated to the specifically behaviour or activity, but to the behaviours or activities as a whole in each perspective.

Table 2 - 26 Cognitive profile of a South African FET learner interacting with information in a digital environment based on the literature review

Cognitive perspective	Cognitive behaviour or activity	Table reference
Acquiring information	<ul style="list-style-type: none"> • Able to source material in digital environment with sophisticated search strategies • Absorbs material quickly as individual learner is accommodated • Critical of content of resource material • Prefers acquiring information from graphic images as opposed to text • Knows where to find information on a screen 	Table 2 - 12 Table 2 - 18 Table 2 - 19 Table 2 - 20
Recalling information	<ul style="list-style-type: none"> • Recall of screen-based material is difficult • Short term memory assisted by sensory features of digital environment • Recalls text on screen in chunks and not with the bigger picture • Is literate in non-verbal environment • Long term memory is assisted by organisation of digital environment 	Table 2 - 15 Table 2 - 18 Table 2 - 23
Processing / planning information	<ul style="list-style-type: none"> • Plans the creation of digital projects • Builds mental models of the learning material • Uses higher-level thinking skills • Visually processes a number of programs at once 	Table 2 - 18 Table 2 - 19 Table 2 - 23 Table 2 - 24
Presenting information	<ul style="list-style-type: none"> • Cognitive processing of screen-based material is superficial • Is able to communicate understanding of the subject matter in multiple formats • Develops own symbols and abbreviations for communicating • Transfer of learning to other contexts takes place • Uses authentic language in developing digital projects which assists information processing 	Table 2 - 15 Table 2 - 18 Table 2 - 19 Table 2 - 23

The preceding table tabulated behaviours or activities that illustrate how learners interact with information from a cognitive perspective. Table 2 - 27 tabulates

behaviours or activities from the literature when a learner interacts with information from an affective perspective looking at motivation, the influence of peers, management of time and their mental state.

Table 2 - 27 Affective profile of a South African FET learner interacting with information in a digital environment based on the literature review

Affective perspective	Affective behaviour or activity	Table reference
Motivation	<ul style="list-style-type: none"> • Intrinsically motivated • Extrinsically motivated 	Table 2 - 12 Table 2 - 18 Table 2 - 19 Table 2 - 24
Influence of peers	<ul style="list-style-type: none"> • Learns in a positive social environment • Critical of own digital creations, i.e. wants to correct and redo, to impress peers • Learns with group ownership • Wants the independence to find / create own learning resources 	Table 2 - 12 Table 2 - 20 Table 2 - 24
Management of time	<ul style="list-style-type: none"> • Wants useful, relevant information • Wants fast access to information resources 	Table 2 - 12 Table 2 - 19 Table 2 - 20
Mental state	<ul style="list-style-type: none"> • Does not suffer from computer anxiety • Willing to try a number of options and accept error • Adventurous, creative, ready to explore the digital unknown 	Table 2 - 12 Table 2 - 17 Table 2 - 23

Behaviours or activities with reference to motivation, the influence of peers, management of time and the learner's mental state are tabulated in Table 2 - 27.

The following table tabulates how learners physically interact with information when they acquire and process information in a digital environment based on the literature.

Table 2 - 28 Physical profile of a South African FET learner interacting with information in a digital environment based on the literature review

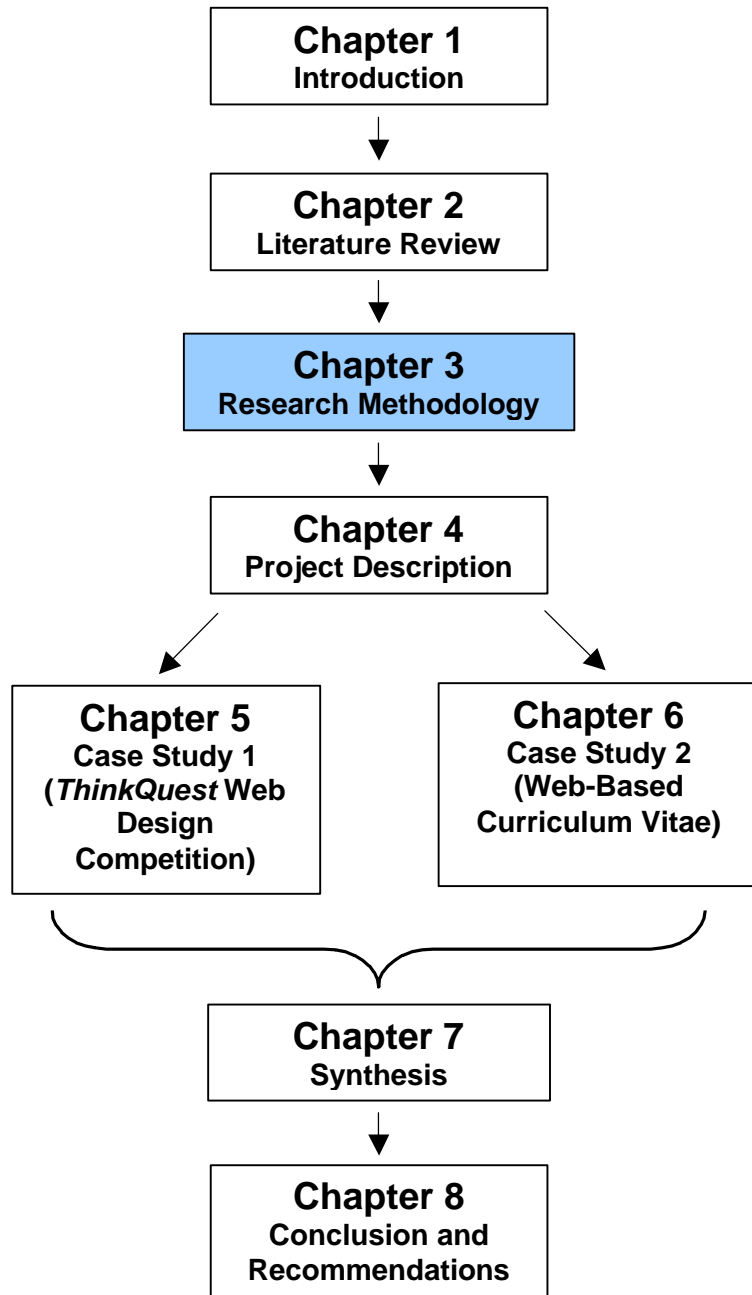
Physical perspective	Physical behaviour or activity	Table reference
Acquiring information	<ul style="list-style-type: none"> • Looks for required data using digital features • Moves continually onto a new feature in the digital environment, continuing the flow state • Reads certain areas of the screen first in preference to others • Reads text in a digital environment relatively slowly • Skims and rereads certain portions of the screen 	Table 2 - 18 Table 2 - 15 Table 2 - 23
Processing information	<ul style="list-style-type: none"> • Works / learns actively doing things • Works / learns in a group with talking • Works with partner, shares ideas and copies work 	Table 2 - 12 Table 2 - 25

Table 2 - 28 lists activities found when learners interact with information in a digital environment based on the literature. The three preceding tables summarise the findings in the literature of how South African FET learners interact with information in a digitally enabled environment.

7 Summary

Chapter 2 developed a profile of a South African FET learner in a digital information environment based on the literature review. The profile described how learners interact with information from cognitive, affective and physical perspectives as they acquire, recall, process and present information motivated, influenced by peers, management of time and their mental state. This profile will be used as a basis for the case studies. The methodology used in the research is discussed in Chapter 3.

Chapter 3



Chapter 3 Research Methodology

1 Introduction

This chapter describes the methodology used, the stages of the research and measures taken in order to ensure validity and reliability.

2 Epistemology

This research follows the action research process and a case study methodology:

- Action research is intended to produce both change (action) and understanding (research) (Dick, 1997, online) and uses progressive cycles (Robertson, Trotman & Galbraith, 1997, p. 22).
- A typical case study approach is one in which a single bounded or limited (Merriam, 1998, p. 27) case is studied in depth as it occurs in a natural situation, and the data consists of rich verbal descriptions (McMillan & Schumacher, 1993, p. 37).

The following topics describe the joint action research process and case study approach based on Dick, McMillan and Schumacher and Merriam.

2.1 Methods

The methodology followed, namely repeated cycles of plan and action, data collection, analysis and reflection, and data redefinition, lead to improved information processing in the digital information environment. The data and interpretations were adequately validated and authenticated using the cycle methodology by participant verification and peer review.

2.2 Participants

The participants in the research, the learners, took part in the case studies. They did the work, completed the questionnaires, and then checked the data collected and the interpretations. Whole classes were used for the research: no learners were deliberately excluded in the specific classes that completed the case studies. Three of the six classes participated directly in the research with all the classes acting as

context for the research problem. The participants are described in this thesis where it is relevant, tabulated in Table 3 - 1.

Table 3 - 1 Location of description of participants

Chapter	Section	Type of description
4	4	Computer Studies SG learners in Grades 10-12: <ul style="list-style-type: none"> • Subject choice of the A and D groups • Gender, racial and academic performance distributions • Ownership of and ability to use digital equipment
5	2	Learners in Grades 10D and 11D who took part in <i>ThinkQuest</i> web design competition: <ul style="list-style-type: none"> • Gender and racial distribution • Distribution of learners who completed their web entries in time • Ownership of and ability to use digital equipment
6	2	Learners in Grade 11A and 11D who created web-based CVs: <ul style="list-style-type: none"> • Gender and racial distribution • Distribution of learners who completed their web entries in time • Ownership of and ability to use digital equipment

2.3 Literature

The literature was consulted to provide the background to the subject and to identify a problem which had not been covered (Merriam, 1998, p. 53). The literature review was written up in themes relevant to the study (Merriam, 1998, p. 55).

The literature was consulted to investigate how learners interact with information in a digital information environment. After the first case study, the data from the literature was found to be inadequate and the second case study or action cycle was implemented. The literature was continually consulted to try to find a better way of getting the learners to interact with information in a digital environment.

Case study and action research literature was consulted in an endeavour to find a way of describing how learners interact with information in a digital environment. The solution to the research problem 'How South African Further Education and Training learners acquire, recall, process and present information in a digitally enabled environment?' was a set of case studies in a natural situation against a background of usual class activities, using the action research methodology to compare the data collected in every cycle with that from the initial literature review and then finally synthesising them into one profile of how learners interact with information in a digitally enabled environment.

2.4 Cycles

There were two iterations of plan and action, data collection, analysis and reflection, and data redefinition. Each case study was a bound unit within the scope of usual class work. The two iterations lead to a clearer understanding of the research problem.

2.5 Documentation and reporting

The data collected by observation and description in the case studies is corroborated by facts and figures and statistically illustrated in charts and tables. The profiles of how the learners interact with information, gleaned from the literature review and the case studies, are tabulated and comparisons are made at the end of every case study and synthesised at the end of the thesis.

3 Stages of the research

The research followed the stages illustrated in Figure 3 - 1 and described in Table 3 - 2: Preliminary stage, Cycle 1 and Cycle 2.

Figure 3 - 1 Stages of the research

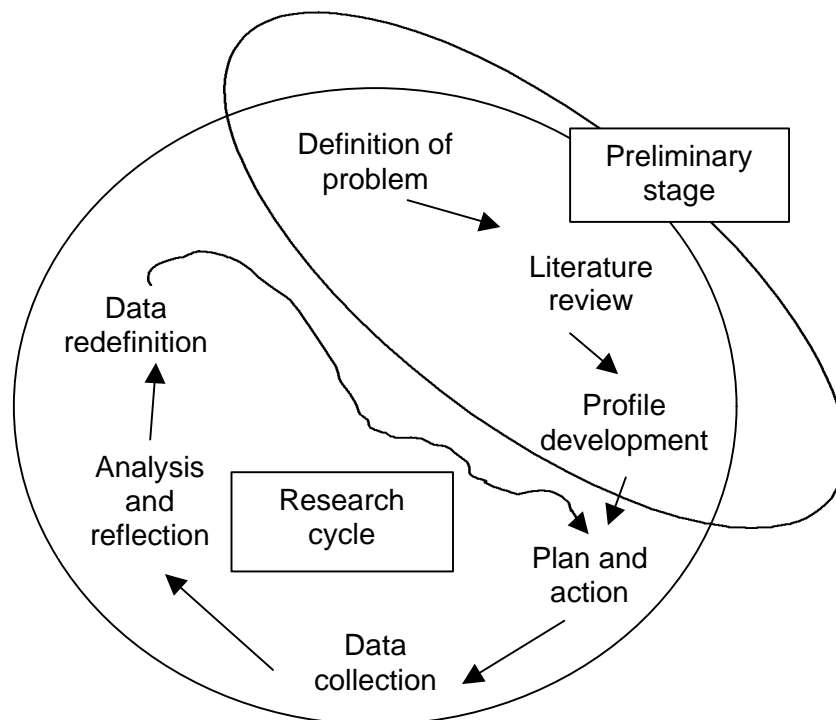


Table 3 - 2 Stages of the research

Stage		Activity
Preliminary stage	Definition of problem	<ul style="list-style-type: none"> Problem recognised in 1997: Learners at Pinelands High School (PHS) in Computer Studies Standard Grade (SG) interacted with information in the digital environment in a different way to that of the usual 'chalk and talk' classroom.
	Literature study	<ul style="list-style-type: none"> The Nexus database search revealed nothing with respect to the information processing of South African learners in a digital environment. A literature study was undertaken to find out what has already been written in the field of information processing by FET learners in a digital educational environment.
	Profile development	<ul style="list-style-type: none"> On completion of the literature study, a profile of the South African FET learner in a digital educational environment was developed, demonstrating how the learner interacts with information from cognitive, affective and physical perspectives.
Cycle 1	Plan and action	<ul style="list-style-type: none"> Learners given usual class activity, Case Study 1, to complete.
	Data collection	<p>On completion of Case Study 1</p> <ul style="list-style-type: none"> Learners completed a questionnaire, eliciting their responses to topics raised in the literature study. Data collected by examining the product created in Case Study 1. Learners observed. Event log kept. Parents interviewed.
	Analysis and reflection	<ul style="list-style-type: none"> Data collected in Case Study 1 analysed on the basis of the profile developed in the literature study.
	Data redefinition	<ul style="list-style-type: none"> Data collected in Case Study 1 redefined.
Cycle 2	Plan and action	<ul style="list-style-type: none"> Utilising data elicited from Case Study 1, a usual class activity, Case Study 2 was given to the learners.
	Data collection	<p>On completion of Case Study 2</p> <ul style="list-style-type: none"> Data collected by examining the product created in Case Study 2. Learners observed. Event log kept.
	Analysis and reflection	<ul style="list-style-type: none"> Data collected in Case Study 2 analysed on the basis of the profile developed in the literature study.
	Data redefinition	<ul style="list-style-type: none"> Two case studies synthesised and activities revealed how South African learners interact with information from cognitive, affective and physical perspectives.

3.1 Preliminary stage

Recognition of a problem, conducting a literature review and the development of a profile were the preliminary steps in finding the focus of this research. By the end of this stage the main problem and research questions were defined. The next task was how to test if the profile based on the literature was any different from that of a learner in an educational digital environment of a South African FET institution.

3.1.1 Definition of problem

The researcher recognised a problem at PHS in the computer laboratory while teaching Computer Studies SG and wondered if the same problem occurred in other South African educational institutions in the digital environments of their computer laboratories. The learners were observed and significant behaviours noted. Books, journals and the Internet was browsed to find a focus to the problem.

3.1.2 Literature review

The Nexus database was consulted in an endeavour to shed light on the problem but to no avail. Books by Rushkoff (1999) and then Tapscott (1999a) were the triggers that focused the search for a solution. A literature search on the topics below in books, journals and digital resources lead to the decision to investigate how South African FET learners interact with information from cognitive, affective and physical perspectives in a digital environment:

- Digital literacy, electronic literacy, information literacy, literacy.
- *00 Generation, Children of Chaos, Digital Age, Generation X, Generation Y, Information Age, Millennial Generation, Net Generation, Nintendo Generation, Oh-Oh teens, Technological Age.*
- Computer anxiety, technological anxiety, technophobia.
- Information, information acquisition, information overload, information processing, learning.
- Hypermedia, hypertext, interactivity, multimedia, virtual environment.

The literature review developed into the research problem for this investigation, viz.: 'How do South African FET learners acquire, recall, process and present information in a digitally enabled environment?' with the research questions:

- What is an educational digital environment?

- How has a changing society and technology influenced the way South African FET learners interact with information in an educational environment?
- What is meant by cognitive, affective and physical perspectives with reference to interaction with information?

1. How do South African FET learners interact with information in a digital environment from cognitive, affective and physical perspectives?

3.1.3 Profile development

In order to describe how the South African FET learners in an educational digital environment interact with information from cognitive, affective and physical perspectives, a profile was developed to be compared with that of learners in the digital environment of the computer laboratory at PHS. The literature search and review, Chapter 2, helped refine and define the profile into perspectives, and each perspective was further divided to see how they were manifested in the learners' information processing as manifested in Table 3 - 3.

Table 3 - 3 Perspectives and processes used in the analysis

Perspective	Process
Cognitive	Acquiring information
	Recalling information
	Processing and planning information
	Presenting information
Affective	Motivation
	Influence of peers
	Managing time
	Mental state
Physical	Acquiring information
	Recalling information
	Processing and planning information
	Presenting information

The process of how learners interact with information is tabulated in Table 3 - 3 based on the perspective. The aim was to investigate how learners acquired, recalled, processed and planned and presented information from a cognitive perspective; how they were motivated, influenced by peers, managed time and their mental state from an affective perspective; and how they acquired, recalled, processed and planned and presented information from a physical perspective.

3.2 Cycle 1

The research in Cycle 1, Chapter 5, had the dual purpose of trying to find out how the learners interacted with information when they created a web entry for a competition, and finding a better way of managing or giving a project to learners. The project was given to the learners in September (Grade 11D) and January (Grade 10D) as part of their usual class work, with no thought of data collection or this research project. As the data from the literature review was analysed and reviewed, the research plan developed and the method of collecting data via the questionnaire was planned. The analysis of the data from the questionnaire and the web site product analysis led to a clearer idea of how learners interacted with information.

3.2.1 Plan and action

Against the background of all the work done by the six FET Grades 10 to 12 classes at PHS taught in the digital environment of the computer laboratory, a project was selected as being representative of usual work. This project, Appendix E, was used as Case Study 1 as a means to collect data from two classes. Case Study 1 was the creation of a web site for a *ThinkQuest* competition.

3.2.2 Data collection

The *ThinkQuest* web design competition project was given to Grades 10D and 11D with one grade being new to web-authoring and the other relatively experienced. The following discussion will report on the research methodology used to collect and analyse the data in Case Study 1. The perspective and processes used in the analysis, Table 3 - 3, were suggested by the literature review. These perspectives and processes were kept in mind in the development of the questionnaire, Appendix I, which helped analyse the process of creating the *ThinkQuest* entry and contributed to the body of information on how the learners interacted with information in the digital environment. The questionnaire elicited data mainly of cognitive, affective and physical processes. The products of the project, the *ThinkQuest* web entries, mainly elicited data of a cognitive nature.

3.2.2.1 Data collection of the process - Questionnaire

The questionnaire, Appendix I, used to collect data, was given to the two classes, Grades 10D and Grade 11D who created the *ThinkQuest* competition entries, and

Grade 11A who created the Red Cross Hospital Primary School activity book although only the questionnaire of those learners who completed the *ThinkQuest* entry were analysed. Details about the questionnaire, the questions and the manner in which the data was collected, are tabulated in Table 3 - 4.

Table 3 - 4 Use of the project questionnaire

Unit	Detail
Questionnaire	<ul style="list-style-type: none"> • The learners completed the questionnaire in class time in secrecy. • There was no limit on the time used to complete it. • The aim of the questionnaire was to gather data on how the learners created their Red Cross activity book and <i>ThinkQuest</i> competition entry projects.
Questions	<ul style="list-style-type: none"> • The questions were open-ended in the hope that the learners would feel free to discuss the topic without restriction. • The questions were based on topics brought out in the literature review and through observation.
Data	<ul style="list-style-type: none"> • Only the data from the questionnaires of those learners who entered the <i>ThinkQuest</i> competition was used. • Unclear data was made clear with the supporting questions, and those of the partners. • Interviews were conducted to clarify very few details. • Some of the data was not directly used in any chart or table in Chapter 5 - Case Study 1, but all the data helped create a profile of how the learners interacted with information in the digital environment while creating their project. • Data collected in the questionnaire was analysed and used as a basis for the way in which the next project, the PowerPoint tutorial with Visual Basic for Applications (VBA) on computer networks, Appendix G, was given to Grade 11. The success of the PowerPoint presentation led to the web-based CV, Case Study 2.

The questionnaire is examined in the following section noting the perspectives and domain it aimed to illuminate. The responses from a few questions were not used as the answers were not clear. The results of the analysis are discussed in Chapter 5 under the perspective and processing headings.

3.2.2.1.1 Cognitive perspective

I looked for information of how the learners worked with information from a cognitive perspective. These are the things I focused on:

- Where the learners recalled the web-authoring skills
- Where they found the information for their web entries

3.2.2.1.2 Affective perspective

One of the aims of the questionnaire was to elicit information on how the learners worked with each other and information. Many of the questions were focused on motivation, the influence of peers, the management of time and the learners' mental state. I looked for information on the following matters.

The questions on motivation focused on:

- Why they put so much or so little effort into their project
- What their parents / guardians thought of the project
- How they felt when strangers looked at the project

The questions on the influence of peers focused on working with partners in a group from the point of view of:

- Selection of partners
- Working with partners
- Managing conflict in the group
- Allocating marks to a partner
- Learning from others

The questions on the management of time focused on:

- Whether the learners had sufficient time for the project
- When they started the project
- When they did most of their work
- Whether they project planned their work

The questions on the learners' mental state focused on:

- What the learners were most proud of
- How they coped with technical problems

3.2.2.1.3 Physical perspective

The questions relating to the physical creation of the web entries focused on the processing and planning of the entry:

- Where and why they worked in a particular place

3.2.2.2 Data collection of the product - *ThinkQuest* web entries

Data about the web site was collected by examining each site individually and looking for certain features. The results of the examination were entered into a spreadsheet for statistical analysis, Appendix K. All 25 entries, with the exception of one totally incomplete and one not saved for research purposes, were analysed and certain features were counted and noted.

The following features that I looked for were assumed to be indicators of cognitive manifestations of the processing, planning, structuring and amount of information:

- Amount of information
- Clear structure
- Frames
- Image map
- Levels of information
- Shared borders

The following features that I looked for were assumed to be indicators of cognitive manifestations of presenting information:

- Animated gif made with *CoffeeCup Firestarter* or *Flash*
- Animated gif made with *Gif Animator* or similar
- Animated gif, clipart
- Background image
- Crossword puzzle
- Drop down box
- Feedback form
- Guest book
- Jigsaw puzzle
- Mouse over
- Picture, not interactive
- Quiz
- Sound clip
- Spelling mistake
- Thumbnail
- Tile puzzle
- Video clip

3.2.3 Analysis and reflection

The data collected about the *ThinkQuest* web entry was analysed and presented as percentages in charts and tables in Chapter 5, comparing the two classes where possible. The profile developed in the literature review, Chapter 2, assisted in the analysis. The collected data indicated that there was something 'missing' in the way the site was created. The learners were not aware of anything 'wrong' but in general they were not good web sites as they were not interactive but merely presented information.

3.2.4 Data defined

After the analysis, usual class activities continued. When Grade 11 learners created a PowerPoint tutorial with VBA on networks in class, Appendix G, the 'missing' something became clearer. Plans were put in action to give the learners a web task that would result in a better web with more learners completing the task.

The information collected in the questionnaire and in the product of the web had made it clearer how learners worked in a digital environment and what was required in the teaching process to make a wonderful interactive web site. The data is tabulated in Section 5.4, *Conclusion of the analysis*, in Chapter 5.

3.3 Cycle 2

The analysis of the process and product of the web-based curricula vitae were based on observation and analysis of the learners' web-based CVs, reported in Chapter 6. The plan of how to do the work was based on reflections after Case Study 1 and the PowerPoint tutorial. Data was collected by examining the product of the CV and analysed.

3.3.1 Plan and action

During Case Study 1 data was collected and analysed. After reflection and further usual class activities in the digital environment of the computer laboratory, the learners took part in another project, the PowerPoint tutorial on networks, Appendix G. During the PowerPoint work the profile was again redefined and on that basis the next iteration, a web-based CV project, Appendix H, was given to the learners. This project was meant to be representative of usual work in a digital

environment. The two groups who undertook this project were one class that had taken part in Case Study 1, and a new class. This was part of Case Study 2.

3.3.2 Data collection of the process and product - Web-based CV

Grade 11A and 11D created web-based CVs in Case Study 2, note the differences in the classes in Table 3 - 5. The following will report on the research methodology used to collect and analyse the data in Case Study 2.

Once the web-based CV was complete, data about the web site was collected. Each site was examined individually while looking for certain features. The results of the examination were entered into a spreadsheet for statistical analysis, Appendix L. The learners were observed working on their CV in the class environment and behaviour was noted in an event log.

The following features that I looked for with both affective and physical perspectives were assumed to be indicators of the influence of peers while processing information:

- Animated gif made with *CoffeeCup Firestarter* or *Flash*
- Animated gif made with *Gif Animator* or similar
- Animated gif, clipart
- Crossword puzzle
- Frames
- Mouse over
- Quiz
- Thumbnail

3.3.3 Analysis and reflection

The analysis of the web-based CV was done in the same way as the *ThinkQuest* web entry in Cycle 1. The work is presented mostly in charts and tables as percentages comparing the two classes. When the features were entered onto a chart showing the seating positions of the learners in the class, then processes in the affective domain were noted. One was able to see who sits next to whom and what influence they probably had on each other. Having observed these learners over a course of two full years, and analysing the data collected via the analysis of

the web-based CV product as well as looking at cognitive and affective processes, a new profile was developed and defined.

3.3.4 Summary of the research plan

To summarise and conclude the research plan:

- A problem was observed in the digital environment of the computer laboratory while teaching South African FET learners at PHS.
- The Literature Review was based on the problem observed in the class.
- A profile was developed based on the Literature Review.
- Data was collected in Cycle 1 - Case Study 1 and developed into a profile that was compared with that of the Literature Review.
- Information obtained from Cycle 1 - Case Study 1 was used as a basis for the work in Cycle 2 - Case Study 2.
- Data was collected in Cycle 2 - Case Study 2 and developed into a profile that was compared with that of the Literature Review.
- Information obtained in Case Study 1 was synthesised with that of Case Study 2 to create a new profile of how South African FET learners in a digital environment interact with information from cognitive, affective and physical perspectives while *successfully* acquiring, recalling, processing and presenting information.

4 Measures to ensure validity and reliability

There are multiple views of reality (Merriam, 1998, p. 212) and according to Derrida, many 'things ... do not have definable meaning' (Caputo, 1997, p. 31). The following discussion will show the attempts made to produce valid, authentic and reliable meaning and knowledge about how South African FET learners at PHS work in a digital environment, which is then compared with the literature to create a profile on how South African FET learners interact with information in a digital environment from cognitive, affective and physical perspectives.

4.1 Internal validity

In research, internal validity is concerned with how the research findings match reality (Merriam, 1998, p. 211). The strategies used in this thesis to defend internal validity are triangulation, member checks, long-term observation, peer examination, expert review, participatory mode of research and taking note of researcher's bias

are those from Merriam (1998, p. 204). The goal of these strategies were to produce valid and authentic findings.

4.1.1 Triangulation

The project used multiple ways of looking at how the learners interacted with information in the digital environment. In the case studies tabulated in Table 3 - 5, different groups were used in different grades, with different academic abilities, with different prior teaching, at a distance and in contact situations. The case studies themselves were representative of usual work done in an educational digital environment. It is believed that the case studies will provide a holistic understanding of how the FET learners at PHS interact with information in a digital environment.

In Table 3 - 5 the ✓ symbol indicated that there were similarities between the two groups. The X symbol indicated that there were differences between the two groups.

Table 3 - 5 Similarities and differences in the three groups who created web sites for the two case studies

Case Study	Grade 10D 26 learners		Grade 11D 30 / 29 learners		Grade 11A 30 learners
Case Study 1	Academically strong	✓	Academically strong		
	Had one week introduction of web-authoring lessons	X	Had one term instruction of web-authoring lessons		
	At a distance	✓	At a distance		
Case Study 2			Academically strong	X	Academically challenged
			Had one term instruction of web-authoring lessons	✓	Had one term instruction of web-authoring lessons
			Web-authoring experience, i.e. <i>ThinkQuest</i>	X	No formal web-authoring experience
			Contact	✓	Contact

4.1.2 Member checks

The members or subjects of the research regularly checked the research as it was written up. Discussions often took place with the learners on the best way to teach in a computer laboratory. They wanted their time spent in class to be beneficial so

that they could obtain high marks as a result of effective teaching. They questioned the results of the analysis of Case Study 1, but they did agree that the analysis was correct. They were not really interested in the analysis of Case Study 2 as their work and their marks were already so good. I have to interpret their lack of interest in that, once success had been achieved in the digital environment of the computer laboratory, that was the end of their concern.

4.1.3 Long-term observation

The learners at PHS in the digital environment of the computer laboratory have been observed since 1997. During this time they all did similar work and the problems were noted. The main research project of Cycles 1 and 2 was conducted over a period in 2001. The writing up of the case studies in Chapters 5 and 6 was completed during 2001 and 2002. The participants in the case study regularly checked the writing as it took place during 2001 and 2002.

4.1.4 Informal peer review

The profile developed during the literature review were presented at the 'Africa Connects Conference' (Africa, 2001). The audience concurred with the profile as it was then and added many new physical manifestations of how learners interact with information in a digital environment. Colleagues have read the research as it has developed offering few comments, apart from those of Neil Eddy in Case Study 2.

4.1.5 Informal expert review

The informal reviews of a number of people have contributed to the validity of the findings. Their observations were followed up with interviews via telephone and email.

- My supervisor spent a day in the computer laboratory interacting with my learners and has reviewed and commented on the work as it has progressed, based on knowledge of the learners and the environment.
- Annette de Jager, a fellow doctoral student in the field of computer-assisted education, spent time observing the learners in the computer laboratory and has reviewed the findings offering comments as it progressed.
- Fellow doctoral student in the field of computer-assisted education, Jean Slabbert, critically reviewed the findings on the basis of knowledge of happenings

in the computer laboratory and expert knowledge of the field of computers and education.

4.1.6 Participatory mode of research

The learners did not seem to mind being involved in the research about how they worked in the computer laboratory in the subject Computer Studies SG. They knew the work had to be done while the applications and theory were learned and taught. They knew that their school and computer department were well known for being successful. They wanted good marks. They trusted me. They knew that working in a computer laboratory or digital environment was new. They accepted that research had to take place to find the optimum way of working in such an environment. At PHS the learners often complete questionnaires as part of Total Quality Management. They participated in the research with enthusiasm.

The data collected from the learners was part of the usual work of the class. They completed the questionnaire in Cycle 1 - Case Study 1 as a means of evaluating the work of their partners and the process of creating the web site. The product of the web entry was examined and data was collected for grading purposes which is a usual event. The data collected from the product of the web-based CV was also examined and data collected for grading purposes, a usual event.

4.1.7 Researcher's bias

I have a bias. I want to understand the dynamics between the digital information environment and the learners in my computer laboratory in order that work done there can be successful. I have a personal interest in the research. As I spend all day, every teaching day of the year, in a digital environment, I want to find out how learners work with information in this environment, in order to make my work easier and more successful.

As the teacher and researcher I was very involved. My role has been made obvious and clear throughout this report. I may be seeing things that are not there but I checked my vision by using member checks, peer examination, expert review, participatory mode of research just discussed and being aware of my own bias.

4.2 External validity

For the purposes of this qualitative research, external validity means that there is a detailed enough description of the context of the research for the reader to compare it with other situations. The goal is to show the rich diversity in order to illustrate the commonalities. To enhance the ability of a reader to make the results of this qualitative research applicably generalisable to other situations, the following strategies from Merriam (1998, p. 211) were used: a rich, thick description and a multisite design.

4.2.1 Rich, thick description

The work of the learners in the digital environment is described showing the complexities and dynamic nature of the interaction with information, in the context of the school. Chapter 4 describes the research site as fully as possible by

- discussing the school in general terms and the language, gender, race or culture distributions as well those who commute to school;
- examining the digital architecture of the school and the digital environment or computer laboratory in which the research is done;
- studying the approximately 180 participants in the research per grade with respect gender, race or culture distributions and familiarity with a digital environment;
- describing the type of work done in the digital environment or computer laboratory as well as discussing certain projects per grade; and
- comparing two individual case studies with respect to management of the project.

4.2.2 Multisite design

This research looks at how a group of 180 learners interact with information in a digital environment and uses two case studies to gain data. These case studies look, in particular, at three different groups doing similar work at different stages with different requisites, see Table 3 - 5, as part of usual class activities.

4.3 Reliability

In order to ensure that the data recording, data analysis and interpretation of the analysis are reliable, consistent and dependable, the following methodologies from McMillan and Schumacher (1993. p. 386) were applied. It is believed that the data

is reliable in the context of the PHS computer laboratory digital environment in 2001. Every aspect of the data recording, collection, analysis and interpretation is done as far as possible with socially responsible actions.

4.3.1 Data recording

The data was collected in written format so that, should it be misinterpreted, it could be checked. The learners checked my interpretation of the data.

4.3.2 Data analysis

The method of analysing the data is described in the study to facilitate the checking and methodology. Peers checked the data analysis.

4.3.3 Interpretation of the data

The participants in the research, the learners, checked the interpretation of the research.

5 Ethics

The purpose of the study is to describe how South African FET learners interact with information in a digital environment. There was no clash of ethics in the data collection or the research project.

5.1 Protection of identities

Pseudonyms have been used to keep the identities of the learners anonymous. The participants in the research took part in the research as it took place. In Case Study 1 no names of learners are attributed to the quotations, only their gender and grade. In Case Study 2 names are used to identify learners. Although the learners' real names were used when they checked the Case Study 2 report, the names have been changed in keeping with their gender and cultural background. Girl's names have been replaced with other girl's names and boy's names have been replaced with boy's names. Those from an Afrikaans, English, Moslem, Sotho, Russian or Xhosa background have had their names replaced with others from the same cultural background respectively in order to protect their identities but still maintain their cultural identity. All the names selected were five letters long or less.

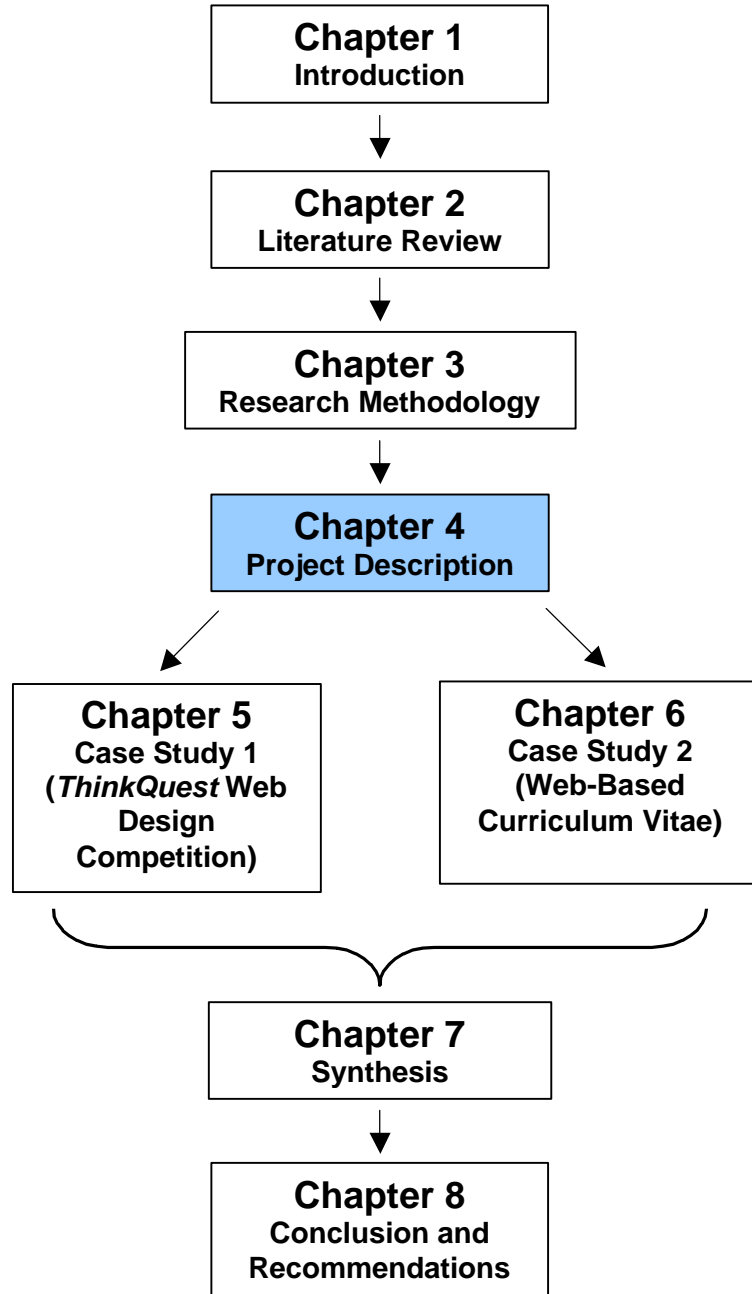
5.2 Consent

This thesis *reported* on how the participants interacted with information in their regular classroom practice hence it could not have been harmful in any way as they were not subject to any treatment. I had informal consent of the participants and their parents. I had official sanction of my headmaster, Dave Arguile, to do research in the school.

6 Summary

This chapter has described the research methodology that was followed, the action research process and a case study methodology, the stages of the research and the methods taken to ensure validity and reliability. Measures taken to preserve the anonymity of the learners were described as well as the ethical nature of the research.

Chapter 4



Chapter 4 Project Description

1 Introduction

The methodology of this research required that the problem design was determined and an intervention implemented to collect and analyse data. In action research, the project is *part* of the methodology and hence this Project Description is discussed after the chapter on Research Methodology.

Two cases were used to collect data for this research. These cases are two projects completed by learners at Pinelands High School (PHS) in their Computer Studies Standard Grade (SG) classes. The case studies are contextualised here against the background of the school and the usual work done in Computer Studies SG in the computer laboratory.

The research is based on the activities in the computer laboratory of FET learners at Pinelands High School in 2001. This chapter examines the

- school by discussing it in general terms;
- digital architecture of the school and the digital environment or computer laboratory in which the research was done;
- participants in the research;
- type of work done in the digital environment or computer laboratory in Computer Studies SG; and
- two individual case studies.

Finally, the chapter compares the two case studies from cognitive, affective and physical perspectives suggested by the literature review discussed in Chapter 2.

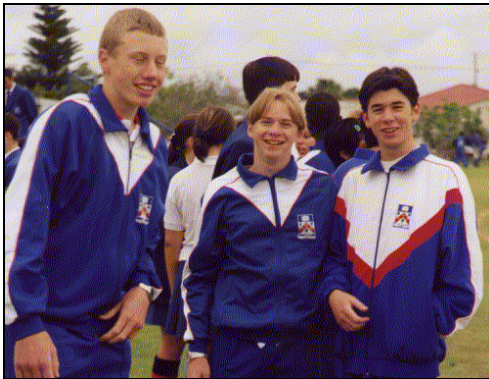
The following section shows the diversity at PHS. From the rich and thick description, including graphs and pictures, it can be seen that PHS contains elements of South African FET learners. The aim of this research is to find the commonality in diversity in a digital environment.

2 General overview of Pinelands High School

Pinelands High School is a government institution falling under the Western Cape Education Department (WCED) and educates learners in two bands: General Education and Training (GET Grades 8 - 9) and Further Education and Training (FET Grades 10 -12). In order to seek commonality in diversity the following is a short description of the school:

- In 2001 the teaching staff numbered 39 full-time members, 28 of whom were paid by the WCED. The school governing body paid the other 11 teaching staff members from school fees.
- English is the medium of instruction.
- The learners have diverse home languages. Approximately 90% have English as a home language and 9% Xhosa as a home language. These official language statistics may not be 100% correct as they do not allow for homes where more than one language is spoken.
- The school is co-educational.
- The racial or cultural groupings of the learners represent the four main South African groups, see Figure 4 - 2.
- The gender distribution is approximately 46% males and 54% females in most grades.
- Co-operative learning and group work takes place in many subjects.
- The teaching staff is representative of the religious, cultural and gender diversity of South Africa.
- Academic subjects offered for the Matriculation examination at the end of the FET phase include Accounting, Afrikaans, Art, Biology, Ceramics, Computer Studies, English, Geography, Graphic Design, History, Home Economics, Mathematics, Music, Physical Science, Travel and Tourism, Woodwork and Xhosa.
- Organised extra-curricular activities include athletics, basketball, chess, choir, Christian Students Association, cricket, debating society, drama, hockey, film society, indoor hockey, interact, music, Muslim Students Association, netball, poetry society, rugby, surfing, swimming, tennis, water polo and writers' club.
- Learners come from a range of economic backgrounds. Parents pay school fees of R4800 per year.
- The school follows the tenets of Total Quality Management.

Figure 4 - 1 Images of Pinelands High School



The school is situated in the suburb of Pinelands in the metropolitan city of Cape Town. Pinelands is a traditional White suburb of middle to upper class inhabitants but is changing to represent the different cultural groups found in South Africa.

Figure 4 - 2 Racial groups of all PHS learners

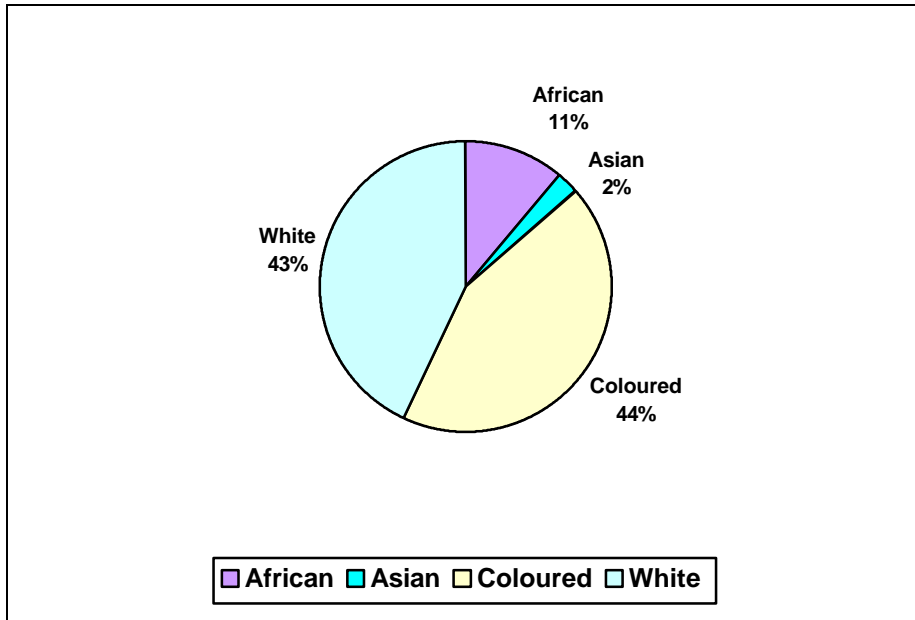


Figure 4 - 2 illustrates the racial grouping of the school and shows that Coloured learners are in the majority.

Figure 4 - 3 Learners who live more than 5 km from the school

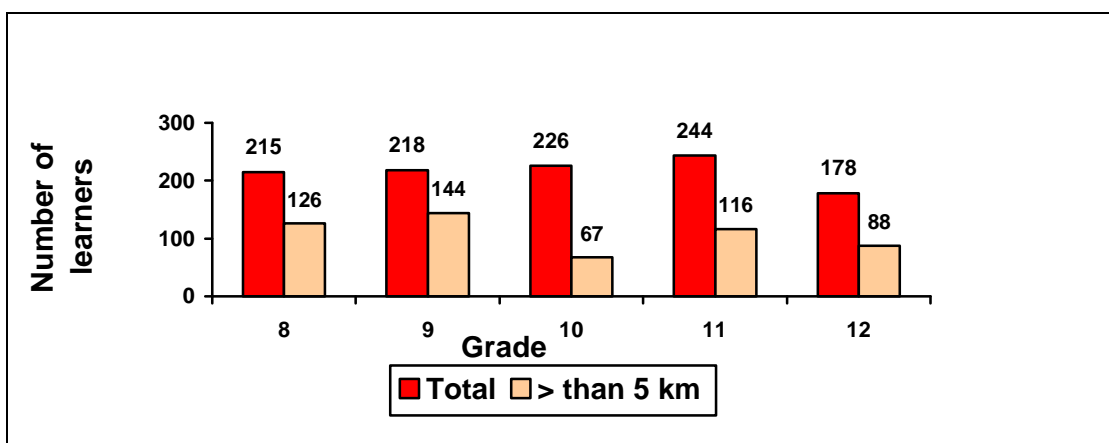


Figure 4 - 3 shows the proportion of learners who live more than 5 km away from the school. This would indicate that many learners are drawn from the neighbouring suburbs of Thornton, Kensington and Langa³.

3 Digital architecture of Pinelands High School

In its efforts to support a world-class digital architecture (www.wcape.school.za/phs/) the school in 2001 comprised the following:

- Two computer laboratories, one of which is used for Computer Studies SG and the other for general school use.
- The issue system of the library is computerised and during the course of the year, four computers in the library gained World Wide Web access.
- Teaching staff are able to use four computers in a staff work room.
- The school report system is computerised.
- Most of the administrative functions of the school are computerised.
- All the computers available to learners and staff from anywhere in the school are networked and linked to the school's Pentium 2 450 mhz server.
- During the course of the year, network cabling was extended and computers in Physical Science, Mathematics and Geography classes were added to the network.

3.1 Learner access and use

All learners have their own login to the network and their own email address. All learners sign an *acceptable use* policy document prescribing good behaviour. The general computer laboratory is open for learner use during breaks and after school until about 16h00 under the supervision of a learner custodian. Teachers book periods in the general computer laboratory for computer-assisted lessons in various subjects. Only learners taking Computer Studies SG as a subject are permitted to use the facilities of the Computer Studies SG computer laboratory. Access to the World Wide Web is available from the library and my workstation in the Computer Studies SG computer laboratory. There are a total of five computers available for learners' Internet use.

³ Thornton, a neighbouring suburb which does not have its own high school and has 'down market' housing compared to Pinelands; Kensington and Athlone, medium to lower income traditionally Coloured areas; and Langa, a traditionally Black, low-income Xhosa-speaking township.

The following images from the Computer Studies SG computer laboratory show learners at work. Note the liberal physical space between the learners, between the rows and in the keyboard area, the concentration of the learners working as well as the relaxed atmosphere.

Figure 4 - 4 Images from the computer laboratory



Space for books on the desktop



Learner is bending forward intensely working



Learners discussing matters on monitors



Wide aisle



Space for files on the desktop while learner relaxes as she is working



Able to walk around in wide rows and aisle

3.2 Hardware and software accessible to learners

All learners have access to the general computer laboratory while the Computer Studies SG computer laboratory is restricted to those learners taking the subject. All learners have 4 MG storage space reserved on the network but the Computer Studies SG learners have an additional 16 MG space.

Similar software is available in both computer laboratories and includes *MS Access 97, MS Excel 97, MS FrontPage 97, Internet Explorer, MS PowerPoint 97, MS Publisher, MS Word 97, Windows 95, Geometer's Sketchpad, Inspiration, PaintShop Pro, Pegasus Mail, Spex and Tabs.*

Table 4 - 1 Hardware and software accessible to learners

Type	General laboratory	Library	Computer Studies SG laboratory
No of working computers ⁴	23-30	4-6	33-35
Type of computers	486	486	Celeron 366
Laser scanner	Yes	Yes	Yes
Inkjet printer	No	No	Yes
Scanner	No	No	Yes

3.3 Costs

Learners do not pay any additional fees for using the computers or for accessing the World Wide Web. Printing is not charged for although it is controlled. Learners taking Computer Studies SG pay a levy for the subject, as do all learners for all subjects.

4 Participants in the research

The following section gives an overview of the six classes that take Computer Studies SG with respect to numbers, gender, racial groupings, academic performance; and then familiarity with the digital environment. Although the two case studies are based on the activities of three classes, Grades 10D, 11A and 11D in 2001, all six classes are described in order to see the context of the research problem.

⁴ The numbers range as many are often not working, the Computer Studies SG computer laboratory receiving the newest computers and the old computers being distributed around the school.

4.1 Overview of the six classes from Grades 10 to 12

Learners at Pinelands High School who take Computer Studies Standard Grade (SG) are the participants in this research. These learners are taught the subject Computer Studies SG in a computer laboratory once a day for three consecutive years, from Grade 10 through to Grade 12, when they matriculate and leave school. There are two classes per grade. The learners move into the A or D groups at the start of the FET band when they select their subjects.

All the learners in Grades 10 to 12 take two languages and a selection of four other subjects. The learners in the A and D groups all take Computer Studies SG. Learners are placed in the A or D group according to their selection of these four subjects. Only the learners in the D group take Mathematics.

Table 4 - 2 Subject choices of the learners for the FET phase

D group	A group
<ul style="list-style-type: none"> • In addition to two languages and Computer Studies SG, the learners take Mathematics and two other subjects. • This group is always oversubscribed with learners in Grade 10. • An analysis of school records indicates that the learners who take Mathematics and are in this group are academically stronger than the non-Mathematics or A group. • These learners seem to know a great deal about computers. 	<ul style="list-style-type: none"> • In addition to two languages and Computer Studies SG, instead of Mathematics the learners select subjects from a choice of Home Economics, Ceramics, Art, Graphic Design, Woodwork or Travel and Tourism; plus two other subjects. • This group has never been oversubscribed. • An analysis of school records indicates that these learners are weaker academically than the Mathematics or D group. • These learners seem to know little about computers.

The gender and racial distributions of Computer Studies SG learners are graphically presented in Figure 4 - 5 and Figure 4 - 6 respectively.

Figure 4 - 5 Gender distribution of learners

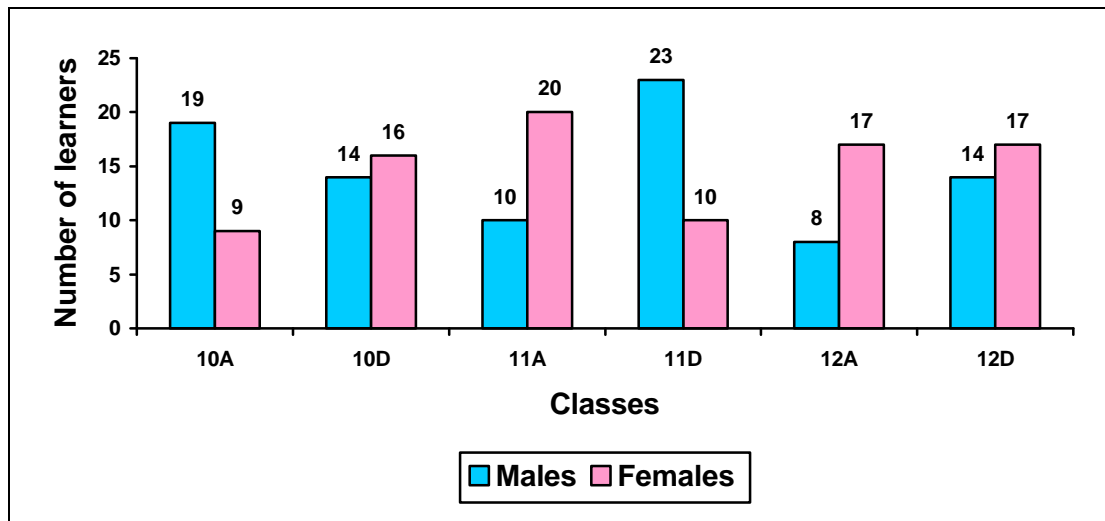


Figure 4 - 5 illustrates the distribution of learners per grade based on their gender. There is no pattern of more males or females in any grade.

Figure 4 - 6 Racial distribution of learners

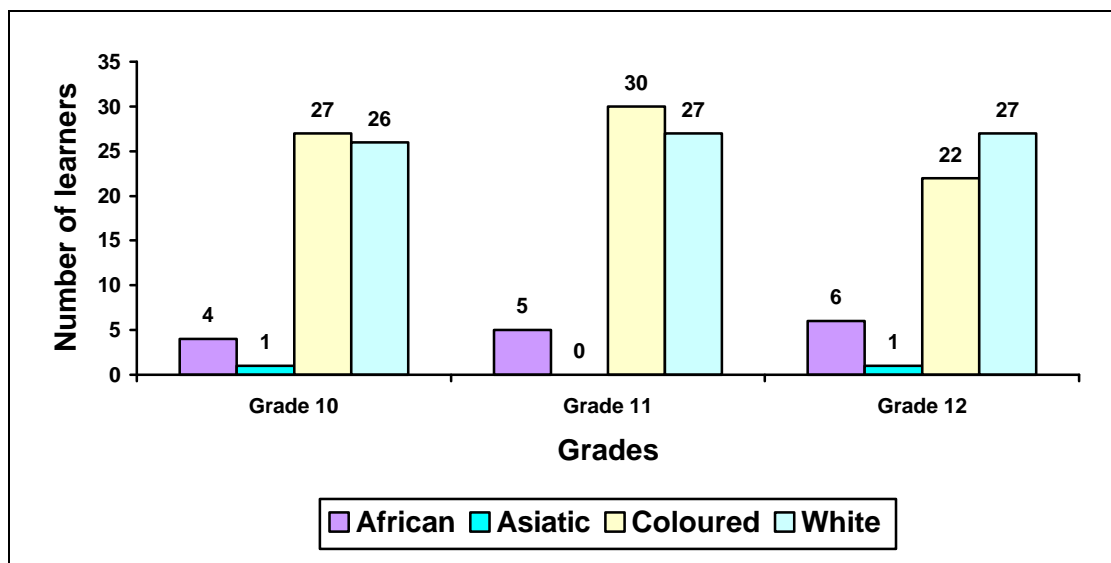


Figure 4 - 6 illustrates the diverse racial distribution of learners.

Figure 4 - 7 Academic performance of learners

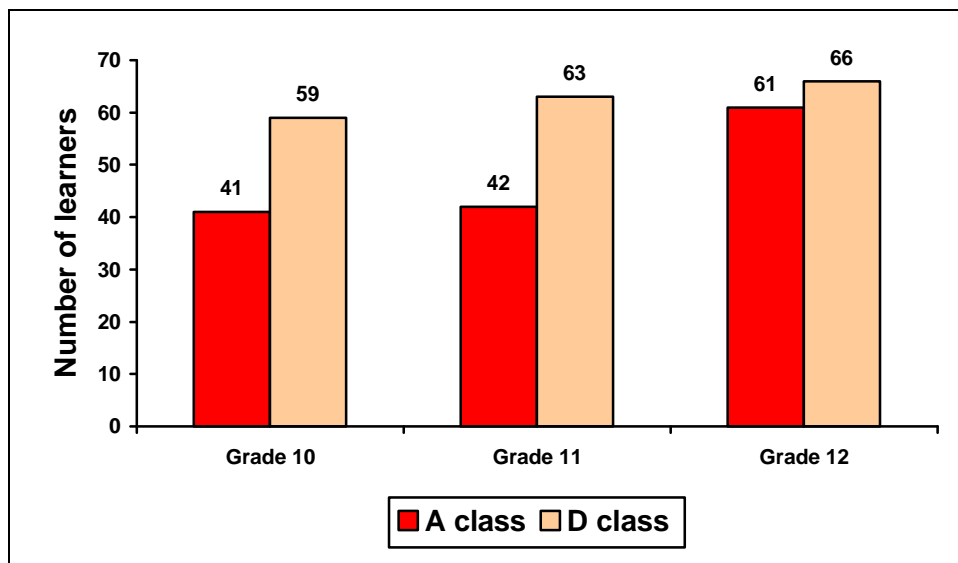


Figure 4 - 7 illustrates the 2001 end of year marks in Computer Studies SG for the grades involved in the research. The marks of the Grades 10 and 11 are determined by internal examinations and class work. The marks of Grade 12 are determined mainly by an external examination set by the Western Cape Education Department. It can be seen from Figure 4 - 7 that the learners in the A classes are academically weaker than those in the D classes.

4.2 Familiarity with the digital environment

To investigate how familiar the learners are with digital resources the *I own* and the *I can* surveys were used, see Appendix J. These surveys examined the ownership and the ability to use digital equipment in the three classes involved in the research. The term 'I own' is used loosely as the item could be *owned* or *freely accessible* after school hours. The *I own* survey should be viewed with the *I can* survey to gain a full picture of the learners' familiarity with digital information environment.

4.2.1 The *I own* survey

The *I own* survey indicates that of the six surveyed classes, out of a possible 24 items, the

- average number owned is 13;
- maximum number owned is 22;
- minimum number owned is three; and the
- range of ownership is almost equal between the gender and racial groups.

Table 4 - 3 Ownership by Grades 10 to 12 learners of 24 items of digital equipment based on gender distribution

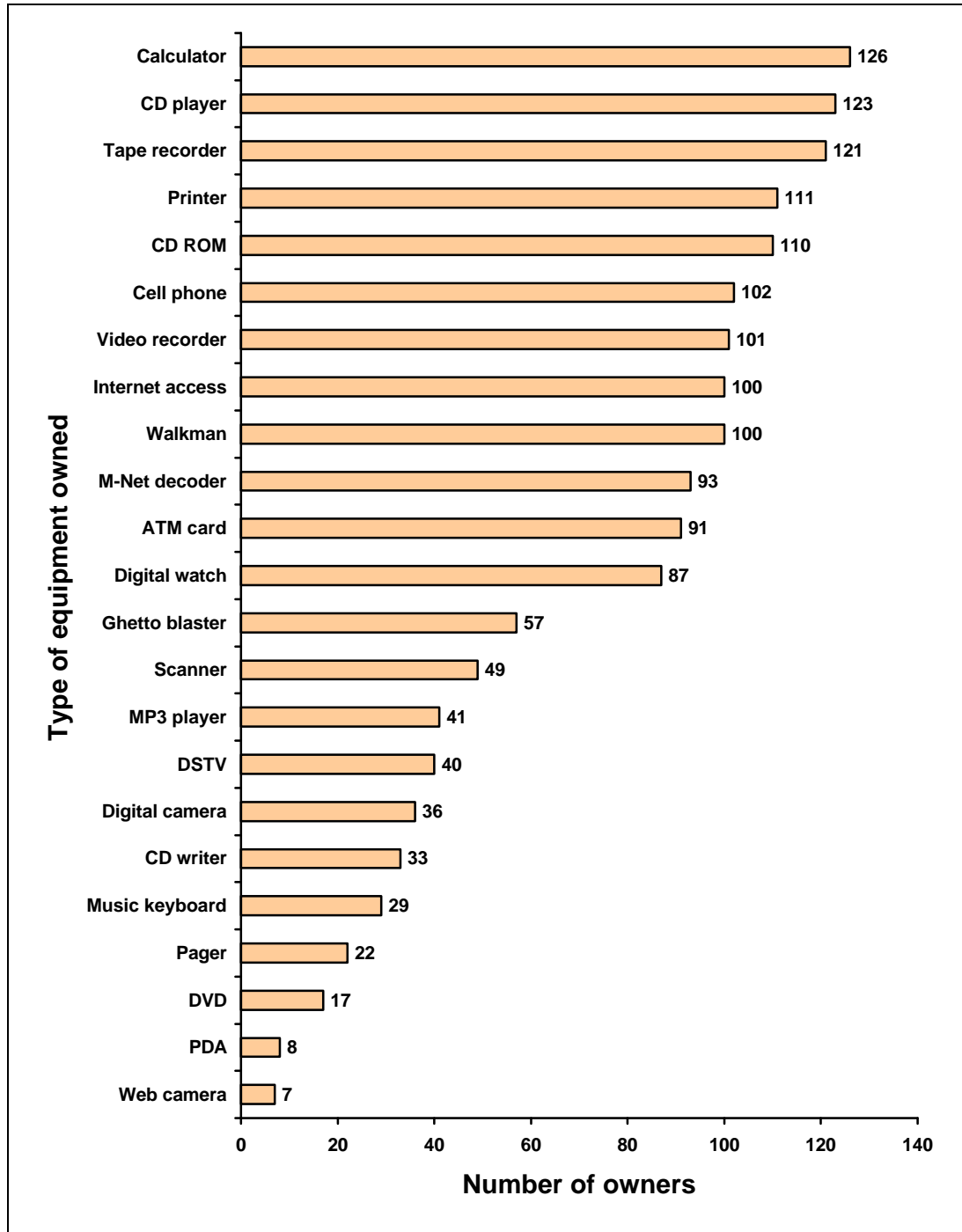
Gender	Average	Maximum	Minimum	Total learners surveyed
Females	12	21	3	65
Males	14	22	5	62

Table 4 - 4 Ownership by Grades 10 to 12 learners of 24 items of digital equipment based on racial distribution

Racial group	Average	Maximum	Minimum	Total learners surveyed
African	12	22	3	12
Asian	11	12	10	2
Coloured	13	19	5	55
White	13	21	5	58

The 24 items analysed in Table 4 - 3 and Table 4 - 4 and illustrated in Figure 4 - 8 are those of interest to young people.

Figure 4 - 8 Ownership by 127 learners in Grades 10 to 12 of 24 items of digital equipment



4.2.2 The *I can* survey

The *I can* survey, indicates that of the six surveyed classes, out of a possible 16, the

- average number of activities which can be performed is ten;
- maximum number which can be performed is 16;

- minimum number is three; and the
- number of activities able to be performed is almost equal between the gender (Table 4 - 5) and racial groups (Table 4 - 6)

Table 4 - 5 Ability of gender based groups of Grades 10 to 12 learners to perform digital activities

Gender	Average	Maximum	Minimum	Total learners surveyed
Females	9	16	3	65
Males	11	16	4	62

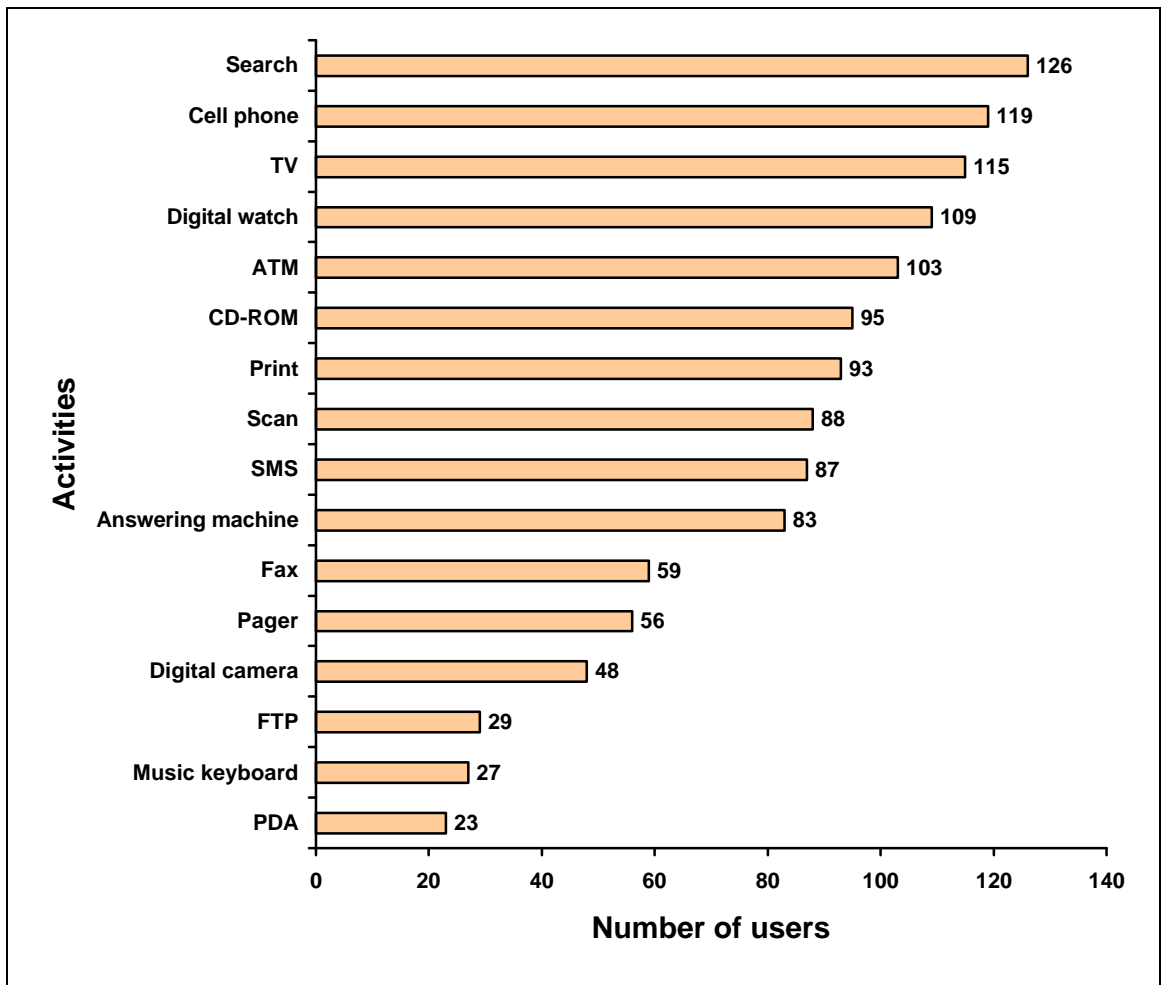
Table 4 - 6 Ability of racially based groups of Grades 10 to 12 learners to perform digital activities

Racial group	Average	Maximum	Minimum	Total learners surveyed
African	10	14	3	12
Asian	10	10	10	2
Coloured	9	15	8	55
White	11	16	4	58

The ability of the learners to perform activities referred to in Table 4 - 5 and Table 4 - 6 and illustrated in Figure 4 - 9 are itemised below in the order of that ability:

- *Search* through a CD for a given track
- Store phone numbers using a *cell phone*
- Use a video recorder to program and record a *TV* program to play at a later date
- Set the alarm on a *digital watch*
- Draw cash from an *ATM*
- Copy files from a *CD-ROM* onto a hard drive
- *Print* in landscape orientation
- *Scan* an image
- Send an *SMS*
- Replay old messages using an *answering machine*
- Send a *fax*
- Remove old messages from a *pager*
- View the images of a *digital camera* before printing
- Connect to an *FTP* server
- Connect a *music keyboard* to the computer
- Connect to the Internet using a *PDA*

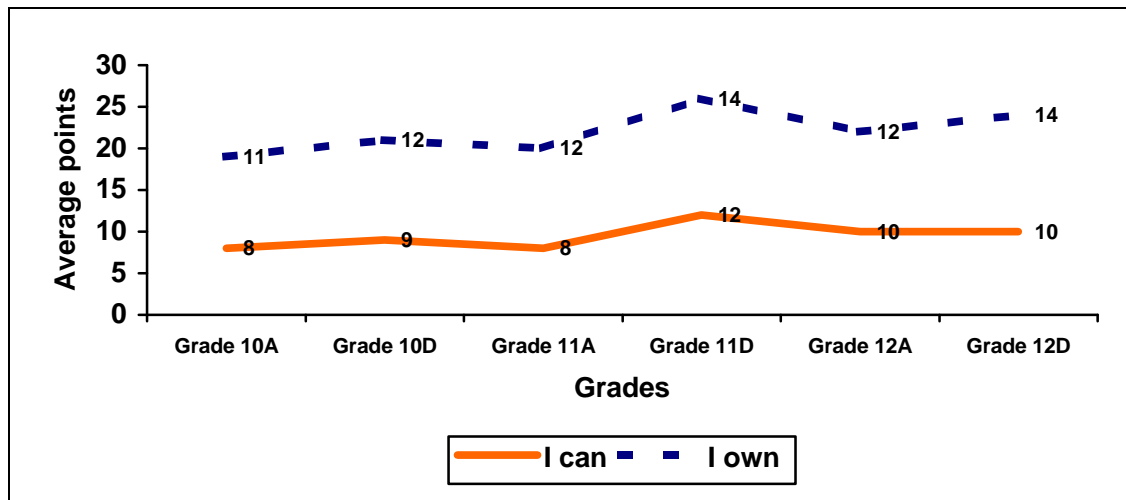
Figure 4 - 9 Ability of 127 learners in Grades 10 to 12 to perform digital activities



4.2.3 *I own* and *I can* surveys per grade linked to academic performance

In Grades 10 and 11 the D classes score slightly higher on the *I can* survey. In all three grades the D classes score slightly higher on the *I own* survey. This is illustrated in Figure 4 - 10.

Figure 4 - 10 Relationship between the ownership and ability to use digital equipment in Grades 10 to 12



5 Type of work done in the digital environment or computer laboratory

The learners are taught Computer Studies SG in the computer laboratory as described in the following sections - what they are taught, the theory and the application, as well as the methodology. This is followed by a discussion of features unique to each grade with reference to theory, applications, methodology of teaching the subject and annual project. The projects done in Grades 10 and 11 were selected as the case studies. The purpose of this section is to establish context to the case studies.

The topics in Table 4 - 7 cover the theory taught to Grades 10 to 12 over the three years they take Computer Studies SG.

Table 4 - 7 Topics taught in Computer Studies SG

Topics	Grade 10	Grade 11	Grade 12
Electronic mail	x		
Computer architecture	x	x	x
System software	x	x	x
Data communications, networking and the Internet	x	x	x
Trends		x	
Social and ethical implications of the computer	x	x	x
Development of the computer	x		
Careers in informatics		x	

Advanced features of database management, spreadsheets and word processing are required to be taught in the practical aspect of the subject, plus another application from the *Microsoft Office* environment, tabulated in Table 4 - 8. The learners do not study any programming language.

Table 4 - 8 Applications taught in Computer Studies SG

Application	Software	Grade 10	Grade 11	Grade 12
Advanced databases	<i>MS Access 2000</i>	x	x	x
Advanced spreadsheets	<i>MS Excel 2000</i>	x	x	x
Advanced word processing	<i>MS Word 2000</i>	x	x	x
Desktop publishing	<i>MS Publisher 2000</i>		x	x
Graphics	<i>Paintbrush / Paint and PaintShop Pro</i>	x	x	x
Mindmapping	<i>Inspiration 6</i>	x	x	x
Multimedia design	<i>MS PowerPoint 2000</i>	x	x	x
System software	<i>Windows 95 or higher</i>	x	x	x
Webpage authoring	<i>MS FrontPage 2000 or HotDog Pro</i>		x	x

In order to teach the learners the theory, applications are used as far as possible. Learners use word processing, tables, graphs, spreadsheets, databases, etc. in the collection, processing and presentation of information about aspects of theory. As a teacher I facilitate the learners acquiring the information on the topics. I seldom, if ever, stand up and teach theory or applications. Every lesson requires that learners do practical work using the computer, scanner, digital camera or cell phone.

In each class there are learners who do not come from a digital home environment and need to acquire a great deal of information and skills. In all classes there are learners whose mother tongue is not English. In order to assist them hear the computer terms in their own language, I have designed the lessons so that the learners have to communicate with each other about the theory. The theoretical content is also made into visual images, animations, tables and graphs, expressing the content in another sign system. In the process of transmediation (movement between and among communication systems) it is intended that the learners acquire the theoretical content as well as learning the applications.

All the work done in the computer laboratory is assessed and the grades are used for the term and year-end marks. It has been found that the only way to make the learners do homework is to assess the work for the term grades, so theoretical work

is given as homework. All the learners' marks are found in a spreadsheet on the network, available to the learners and updated weekly.

During the course of the three years the learners have to learn all the applications: Grade 10 learners use all the applications; Grade 11 focuses on desktop publishing and web-authoring; and Grade 12 learners focus on spreadsheets and databases. Most of the tasks require that the learners work with a partner, to encourage discussion of the work. There used to be one major task per week but during the course of 2001 it was decided to give the learners smaller but more frequent tasks. Should learners wish to do work at home they are free to do so, provided it is handed in on time. No late work of any kind is permitted unless the learners provide a medical certificate. All the lessons are of a digital nature and found on the World Wide Web and the school's network. All the digital lessons have links to the necessary tip sheets.

The work of the Grades 10 to 11 classes during the year was used as the context for the case studies.

5.1 Grade 10

Learners commence the Computer Studies SG course in Grade 10, writing their Matriculation examination three years later in Grade 12. The course is usually oversubscribed in Grade 10 in the D group. The learners are quite apprehensive about the subject as they do not know much about the required level of competence, the amount and kind of theory, and the practical software applications. All the work, which they do during the year, counts for cumulative assessment. They write two examinations with practical and theory components, one in May and the other in November.

One of the main features of the Grade 10 year is to introduce the learners to computers and teach them to explore the applications without anxiety. The initial tasks using *Inspiration*, *Tabs* and *PowerPoint* set the tone of exploration for the year. I have endeavoured to establish the ethos of working with a partner, helping each other, working without fear, handing work in on time and processing the material by discussion.

5.1.1 Usual class work

The work for the year is found in Appendix A where all the tasks and tests are listed by week and term. They are available for the learners in digital format on the network and the Internet. The aim with the practical aspect is that the major applications are covered in the first year at beginner level, going into intermediate and advanced levels in Grades 11 and 12. The theoretical aspect covers basic features of hardware, software, data communication and development of computers. The annual project was the *Use of Information and Communication Technology (ICT) in a business: A case study* (Appendix D) or the *ThinkQuest* project (Appendix E). These two projects are discussed highlighting certain aspects.

5.1.2 Project - Use of Information and Communication Technology (ICT) in a ... business: A case study

The *Use of Information and Communication Technology (ICT) in a ... business: A case study* (Appendix D) was given to Grade 10A learners in the middle of the first term in 2001, in print and digital format, on the network and the World Wide Web. The requirements of the project were discussed and suggestions made of suitable businesses, particularly to those learners who did not come from a business background. The learners were shown projects made the previous year. They were expected to work on their own on the projects, completing the work at home, and were not given class time to do the work.

In the middle of the second term the learners were expected to submit the first part of the three-part project, the use of Communication in their chosen business. This part was chosen as the initial submission as learners had just finished learning about email and the Internet and were expected to find information on those aspects in their chosen business. Only four learners handed in material. That material was corrected and comments made. It was returned to the learners to correct and submit in the final complete project. No learners handed in material for the second date. It was hoped that the learners would hand in their work on time and they were reminded repeatedly to work on the project.

As the submission date drew near, it became apparent that a number of learners had not started their work. They were given time in class to work on the project.

This project was not successful:

- Nine learners did not hand in any work.
- Two projects were not on the topic.
- Two learners handed in work which was not their own.
- Fifteen learners correctly handed in their work.
- Although the learners were told to work alone, two learners worked together and produced a good piece of work.

5.1.3 Project - *ThinkQuest* web design competition

This class activity was selected for the case study. Details of this project done with the Grade 10 learners are found later in this chapter, Section 6, *Two case studies* and in Chapter 5.

5.2 Grade 11

The Grade 11 year is the middle year of a three-year course in Computer Studies SG. In Grade 10 the learners are introduced to computer classes. In Grade 11 the amount of work done is increased and the theoretical work becomes appreciably more abstract. By Grade 11 the learners know the amount and type of work required in the course and they appear to have become more appreciative of the visual aspect of the presentation of information.

5.2.1 Usual class work

The Grade 11s study the applications taught in Grade 10 plus web-authoring and desktop publishing. The work for the year is found on the computer network at school and on the Internet, Appendix B. The learners write two major examinations, one in May and the other in November. The practical examinations are based on class practical work, and the theoretical examinations are about computer architecture, system software, data communication, social aspects and careers in computing. The learners are expected to submit work every week, all the marks or grades contributing to their cumulative assessment. The annual web-authoring or desktop publishing project counts 1/6 of the final mark.

5.2.2 Project - Red Cross Children's Hospital activity book

The Red Cross Children's Hospital activity book project, Appendix F, was given to Grade 11A in the first week of the first term in 2001, in print and in digital format on the network and the World Wide Web. The requirements of the project were discussed as well as its potential social value. The annual project is meant to be completed entirely by the learners without teacher assistance.

At the beginning of the second term, the learners were meant to hand in 20 pages of content and ideas for the book but as that time drew nearer it became apparent that many of the learners had not collected any information on which to base their ideas. In class, from my workstation, groups of learners went on the World Wide Web and searched for sites that contained the required information. This information was put on the network at school for the other learners to see and select their own suitable content.

As the submission date drew nearer in August it again became apparent that many learners had done little work. The work for the term had to be rescheduled in order to give the learners the opportunity to work at school, as they seemed to be unwilling or unable to work at home. Two weeks were used to do the work at school in class time. I realised that it was useless becoming angry with this academically challenged class as the learners could or would not do the work on their own at home and could possibly forfeit the marks for the project. As the project counted 50 of the 300 marks for the subject, the extra time was created and the subsequent Matriculation project in Grade 12 rethought. Despite the extra time in class, some learners even had to deliver their project to my home in order for them to be submitted on the required date.

The learners had been shown activity books made the previous year. They could work on their own or with a partner. They were given nine months to complete the project.

5.2.3 Project - *ThinkQuest* web design competition

This usual class activity was chosen for the case study as it can be examined as a bounded unit. Details of this project done with the Grade 11 learners are found later in this chapter, Section 6, *Two case studies* and in Chapter 5.

5.2.4 PowerPoint tutorial with Visual Basic for Applications on networks

I saw some graduate students at the University of Pretoria create *PowerPoint* tutorials with *Visual Basic for Applications (VBA)*. With great excitement I demonstrated working with *PowerPoint* and *VBA* to the learners. It seemed such an easy way to use *PowerPoint* and create something quite powerful and unique. These simple tutorials made by the University of Pretoria M.Ed. students were shown to the learners and placed on the network for the learners to view. The class initially made silly *PowerPoint* 'tutorials' about themselves in a similar way to the examples.

In order to learn theoretical content about computer networks and advanced features of *PowerPoint*, the learners were given the task of creating a *PowerPoint* tutorial with *VBA* on computer networks as found in Appendix G. The digital lesson sheet had hyperlinks to tip sheets on *VBA* specific to the features they were required to use. The tips sheets were placed on the computer network as well as the World Wide Web, and read through with the learners.

The learners were encouraged to obtain the theoretical content from their textbook, and copy it word for word, if so desired. They were challenged to create text tips, illustrations and quizzes on their own to 'teach' the content for the tutorial. The work was done at school during class time, and some learners worked at home. The learners had one week to complete the tutorial and had to work with a partner. They were examined on the theory of computer networks in their final end of year examination.

The task was fairly successful with Grade 11A producing better work than they had in the Red Cross activity booklet, and a greater submission rate as tabulated in Table 4 - 9. However the quality of the Grade 11A learners' work was still very much below that of Grade 11D. The consequence of this relatively successful task is shown in Section 6, *Two case studies*.

Table 4 - 9 Completion rate for the PowerPoint tutorials on networks

Stages of completion	Grade 11A	Grade 11D
Completed work on time	21	25
Submitted work late	0	2
Did not submit work	8	2
No of learners in class	29	29

5.2.5 Project - Web-based curriculum vitae

Details of this usual Grade 11 class activity are found in this chapter at Section 6, *Two case studies* and in Chapter 6.

5.3 Grade 12

Grade 12 is the final year of the three-year FET Matriculation course that culminates in the highest external school-leaving examination set on all the work covered during the course. The aim of the Computer Studies SG lessons is to revise all the applications taught and take them to an advanced level. The theoretical aspect covers computer architecture, system software, data communication and social implications of the computer. Classes cease at the end of the third term when the learners leave school to prepare at home for the final examinations that begin early in the fourth term.

5.3.1 Usual class work

Usual class work for the year is found in Appendix C where all the tasks and tests are listed by week and term. They are available for the learners in digital format on the network and the Internet. The aim is to teach the learners advanced features of applications to use in their project, at the same time as teaching them theoretical content. As they learn the advanced application features they are examined on those features, the marks contributing to the learners' continuous assessment marks which are submitted for part of the Matriculation examination grades.

5.3.2 Project - Matriculation project

The Matriculation project is a huge project, done during the course of the learners' final year at school. The learners are required to create an integrated project⁵ showing advanced features of the *MS Office* suite. The learners are required to complete their project at home without my assistance. They are shown examples of previous projects to give them ideas but it is always problematic as they leave it too late, and do not have the skills to conceptualise a large project using integrated and advanced features of the *MS Office* suite.

⁵ The instructions from the Department of Education were too vague in 2001, and hence meaningless to put in this research project as an appendix. In addition my instructions are too long and depend on too much verbal explanation to include as an appendix.

6 Two case studies

This section introduces the two case studies that form the basis of the research. A problem was noted in the digital environment of the computer laboratory. I wanted to understand the dynamics between the digital environment and the learners' interaction with information. After reading and developing a profile of how learners interact with information in a digital environment (Tables 2-26, 2 - 27 and 2- 28), I decided to use the questionnaire (Appendix I) to be completed by the learners at the end of Case Study 1 - *ThinkQuest* web design competition entry, to collect information to develop a new profile.

As a result of the analysis of Case Study 1, I had ideas of how to manage the activities of the learners better to enhance their information interaction in the digital environment. After a further small project, the *PowerPoint* presentation on networks, and much reflection, it was decided to do the CV as a further web-based activity. The CV was selected as Case Study 2 as it used a similar application to that in Case Study 1 and could also be analysed as a bounded unit situated in usual class work. The two case studies are synthesised in Chapter 7 to describe the dynamics between the digital environment and the learners' information processing.

6.1 Case Study 1: *ThinkQuest* web design competition (Chapter 5)

ThinkQuest <http://www.thinkquest.org/> is an international web design competition aimed at K-12 learners that offers \$500 000 in prize money. Learners work in teams with two to four learners, under the guidance of one to three coaches, to create an educational web site. The learners are meant to be at a distance from each other so that their site is created in the 'Internet Style of participatory, active learning by users' (ThinkQuest, 2001, online) using IRC, email, ICQ, Internet chat, etc. The web site is meant to fulfil certain criteria. It must:

- have educational value and interest;
- grow in content;
- be interactive;
- show team collaboration;
- be unique;
- be factually correct;
- be technically correct;
- have two languages (specifically for the South African *ThinkQuest* competition);

- show a complete bibliography; and
- have permissions for use of material.

This competition draws learners from around the world. In 2001 the participating learners numbered 5147, 3017 from outside the USA (Beglarian, 2001, online). Of the total learners who entered, 1586 completed their entries. The following were ranked the top countries according to the number of learners who completed their entries:

1. USA - 423 learners
2. Singapore - 242 learners
3. South Africa - 143 learners

The numbers of PHS learners who participated in 2001 are shown in Table 4 - 10. The total of 42 learners who worked in teams which successfully completed their entries from a national total of 143, indicates that the South African entry for the competition had a proportionally large number from PHS.

Table 4 - 10 PHS learners who participated in *ThinkQuest*

Grade	Completed	Incomplete	Total
10D	17	9	26
11D	25	5	29
Total	42	14	55

The full description of the process of creating the web entry, and the analysis of the product is found in Chapter 5.

6.2 Case Study 2: Web-based curriculum vitae (Chapter 6)

The Matriculation project was discussed with the Grade 11s at the beginning of the fourth term. After having read the data collected in the *Project* questionnaire (Appendix I) at the completion of the *ThinkQuest* and Red Cross projects, it was put to Grade 11 that it would be a good idea to start their Matriculation project early, with short lead times, and small projects culminating in the large project. The Matriculation Computer Studies SG project is meant to be a sophisticated integrated package showing the integration of applications in the *MS Office* suite. As the learners had not yet decided on the topic of their Matriculation project, it was decided to create a web-based curriculum vitae (CV), see Appendix H, which could be used as part of the final Matriculation project.

The learners were given two weeks in which to complete the project and they had to work alone. It was mainly done at school in the computer laboratory during class time. Those who wanted to, could do the work at home with any web editor software. They had an example of my web-based curriculum vitae to look at, mock and improve upon. The learners scanned photographs and created animations with *PaintShop Pro* and *Gif Construction Set* to make their work more visually attractive and interactive. They were free to discuss matters pertaining to web page design and the contents of a curriculum vitae with fellow learners or me. As learners added interesting features to their webs at home, there was discussion of those features. As a result, the additional applications of *CoffeeCup Firestarter* from the *ThinkQuest* CD-ROM and *Crossword Compiler* from <http://www.x-word.com>, were installed as demonstration shareware on the network for use by the learners.

The curriculum vitae created by each learner was handed in as a CD-ROM, on 3 ½" disks or just transferred via the network to my hard drive. The submission rate illustrated in Table 4 - 11 illustrates the success of the approach as a result of the research cycle of the two case studies.

Table 4 - 11 Grade 11 learners who completed their web-based CVs

Grade	Submitted	Did not submit	Total
11A	26	4	30
11D	26	3	29
Total	52	7	59

The full description of the process of creating the web-based CV, and the analysis of the product is found in Chapter 6.

6.3 Comparison of the two case studies

As a greater number of learners completed their project in Case Study 2 than in Case Study 1, it would seem that the management or organisation of the teaching of the project was more effective. The following section examines the differences in the organisation of teaching / facilitating of the projects.

Two different grades and three different classes were involved in the case studies. Their range of abilities and experiences were wide as discussed in Chapter 3, *Triangulation*.

The teaching of the two case studies had a number of similarities and differences with respect to their management. Table 4 - 12 compares the two cases studies looking at content, examples and instructions under the cognitive perspective; motivation and the influence of peers under the affective perspective; and the software, submission, physical proximity, place of work and time under the physical perspective.

Table 4 - 12 Management of the two case studies

Perspective	Management factor	Case Study 1 - <i>ThinkQuest</i> web entry	Case Study 2 - Web-based CV
Cognitive	Content	<ul style="list-style-type: none"> Had to source the content from books, World Wide Web, or create it. 	<ul style="list-style-type: none"> Knew the content.
	Examples	<ul style="list-style-type: none"> Had examples of previous winners to view on the <i>ThinkQuest</i> web site and CD-ROM. 	<ul style="list-style-type: none"> Had my CV to look at and improve upon. Had the structure of my CV to copy. Had examples of features on the network to look at.
	Instructions	<ul style="list-style-type: none"> Given fairly broad list of requirements. 	<ul style="list-style-type: none"> Given specific list of features to select from for inclusion.
Affective	Motivation	<ul style="list-style-type: none"> Extrinsically motivated by obtaining a prize in the competition and making web site of importance. Extrinsically motivated by obtaining marks for the annual project. Intrinsically motivated by a topic of importance to team. 	<ul style="list-style-type: none"> Extrinsically motivated by obtaining marks for the important Matriculation project. Intrinsically motivated by making a web site about self. Intrinsically motivated by a topic of personal importance.
	Peers	<ul style="list-style-type: none"> Meant to be done in a group. Could discuss matters with fellow team members at a distance via telephone, email or the following day in class, with slow responses. Based their team on relationships developed in class. 	<ul style="list-style-type: none"> Meant to be done alone. Could discuss matters with fellow learners or myself face to face with quick responses. Had length of time to develop relationships in class environment but essentially worked alone.
Physical	Software	<ul style="list-style-type: none"> Responsible for obtaining own software. 	<ul style="list-style-type: none"> Software could be shared on the network but some learners preferred to use own software.
	Submission	<ul style="list-style-type: none"> Had to upload web entry to <i>ThinkQuest</i> server. 	<ul style="list-style-type: none"> Had to submit CV on CD-ROM or 3 ½ disk.
	Physical proximity	<ul style="list-style-type: none"> Physically meant to be apart. Meant to be created at a distance where peer support is available via telephone or digital means. 	<ul style="list-style-type: none"> Physically close to each other. Created in a contact environment with peer support available physically nearby.
	Place	<ul style="list-style-type: none"> Meant to be done at home. 	<ul style="list-style-type: none"> Mainly done at school, although some preferred to work at home.
	Time	<ul style="list-style-type: none"> Had a great deal of time, about nine months. No structured time for working. 	<ul style="list-style-type: none"> Time limited to two weeks. Structured class time for working on the CV.

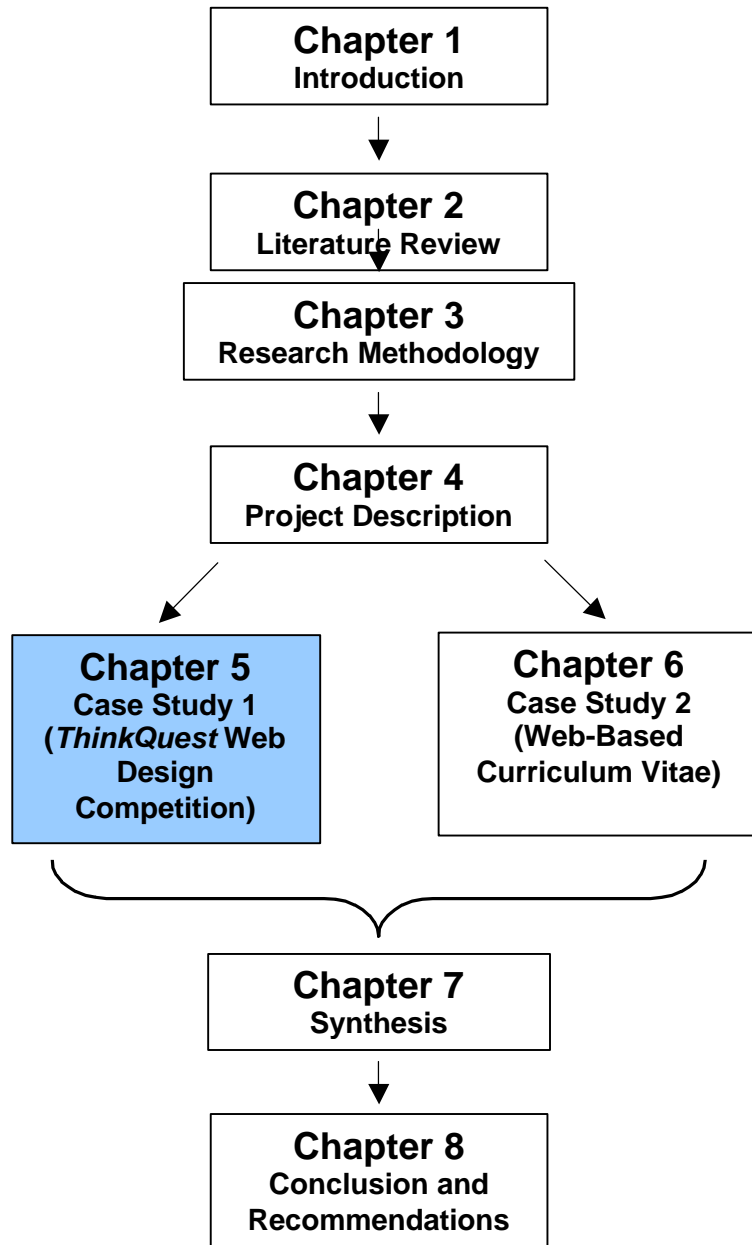
There were differences of management between the two case studies based on reflection after Case Study 1 with the result that the product created in Case Study 2 indicated a greater interaction with information and a better web site. In Case Study 2, the web-based CV, the learners knew the topic, had examples to use and stimulate their thoughts, were motivated by writing about themselves, were given specific instructions, could get help with fast response time from myself or peers, the software was readily available, time was specifically set aside for the work and submission was relatively easy.

7 Summary

This chapter examined the school, the digital architecture of the school, the digital environment of the computer laboratory, the participants in the research, the work done in usual schoolwork and two individual case studies.

Chapters 5 and 6 examine the two case studies in detail. Chapter 7 synthesises the results of the case studies from cognitive, affective and physical perspectives. Also in Chapter 7 a profile is developed of the PHS FET learner interacting with information in a digital environment from cognitive, affective and physical perspectives.

Chapter 5

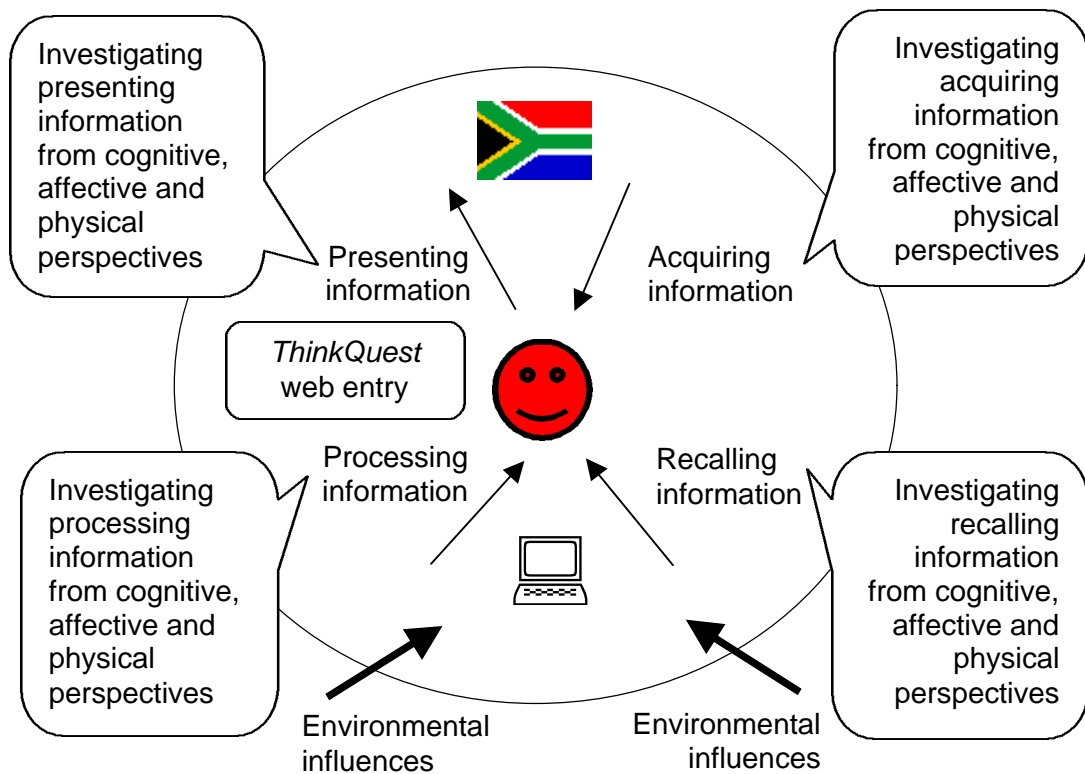


Chapter 5 Case Study 1 - *Thinkquest* Web Design Competition

1 Introduction

This case study describes how learners interacted with information in a digital environment *at a distance* when they created entries for the *ThinkQuest* web design competition. The *ThinkQuest* web site was completed by a team, members of whom far apart or *at a distance*, hence collaboration was by digital means such as email, chat, IRC, ICQ, etc. The profile for the analysis of the *ThinkQuest* web entry and the process of creating it comes from the profile developed and tabulated at the conclusion of Chapter 2, Tables 2 - 26, 2 - 27 and 2 - 28. The aim of the research is to report on how South African Further Education and Training (FET) learners acquire, recall, process and present information in a digital environment from cognitive, affective and physical perspectives. Figure 5 - 1 illustrates the investigation in this chapter as the PHS learners in a digital environment create their *ThinkQuest* web sites influenced by external forces.

Figure 5 - 1 Interaction with information as the learners create their *ThinkQuest* web entries



This chapter

- examines the participants of the case study, the data collection methods and the process of creating the *ThinkQuest* entry;
- analyses the completed entries;
- describes the measures taken to ensure validity and reliability; and
- concludes with a summary of the whole case study.

2 Participants

This section provides statistical data on the entrants who took part in the *ThinkQuest* web design competition. The diversity among the learners is shown in this statistical data. The following are discussed:

- Numbers of learners who completed the entry and questionnaire
- Distribution of learners by race and gender
- Numbers of learners who submitted their entries
- Ownership and use of digital devices

The learners who took part in the competition at Pinelands High School (PHS) were members of two classes, Grade 10D and 11D. Both classes were compelled to complete a project as it contributed to their year mark for Computer Studies Standard Grade (SG). Grade 11D were encouraged to take part in *ThinkQuest* but those who wished to were permitted to do the Red Cross Children's Hospital activity book instead. Learners in Grade 10D requested to take part in *ThinkQuest* although some chose to do the *Use of Information and Technology (ICT) in a ... business: A case study* instead. The numbers of learners in this chapter refer to those who participated in the competition only.

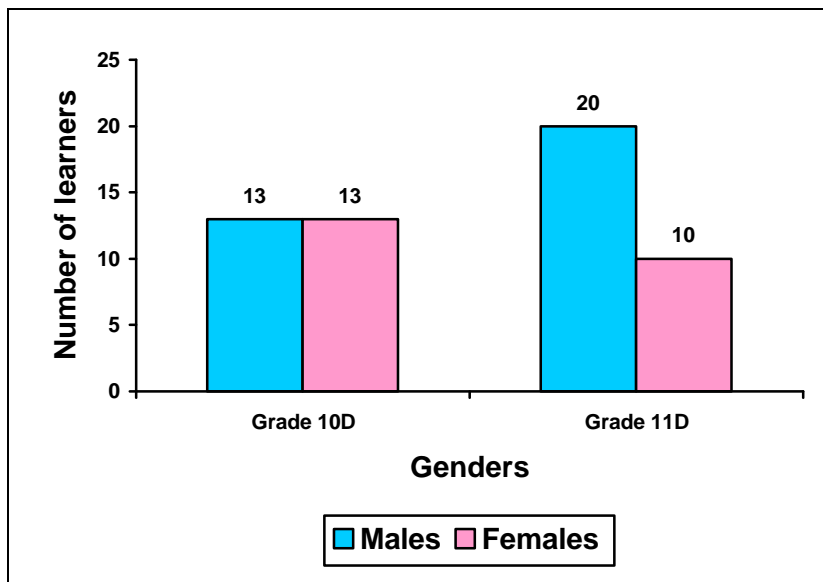
After completion of their web entry they had to complete a questionnaire (Appendix I) describing their experience in creating the site. Much of the data in this case study was collected from this questionnaire and their direct words are quoted. The numbers of learners completing the different parts are tabulated in Table 5 - 1.

Table 5 - 1 Number of learners who completed *ThinkQuest* and questionnaire

Completed ...	Class	No of learners	%
Web site ⁶	10D	17	65
	11D	25	83
	Total	42	75
Questionnaire <i>about</i> the process of creating the web site	10D	25	96
	11D	29	96
	Total	54	96

The genders of the learners in the two classes are illustrated in Figure 5 - 2. Grade 10D had an equal number of males and females. Grade 11D had more males than females.

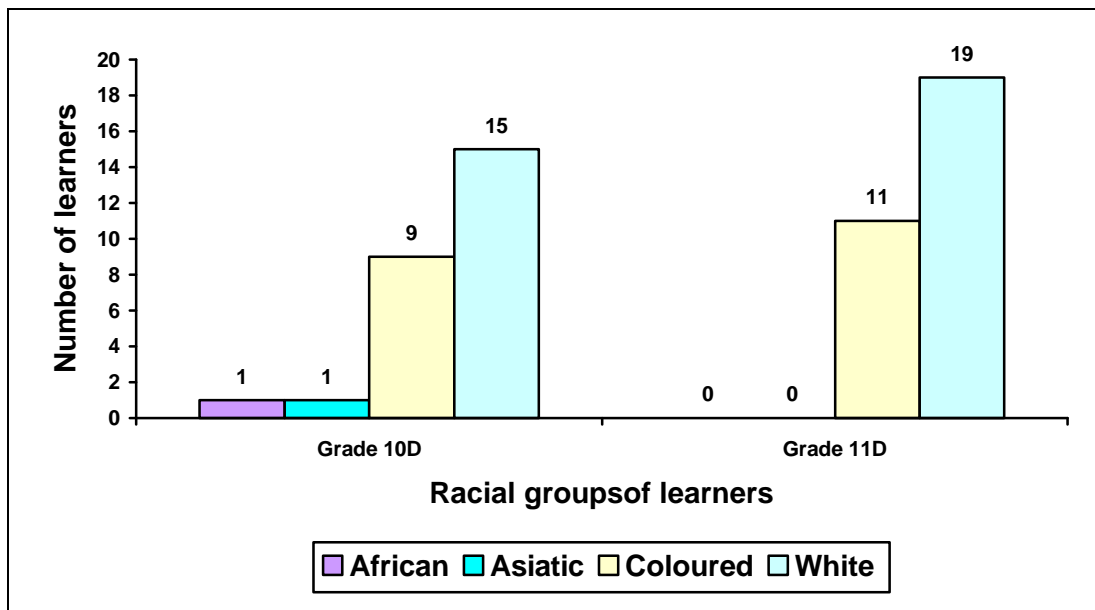
Figure 5 - 2 Gender distribution by class



The racial distribution of the two classes whose learners took part in the competition is illustrated in Figure 5 - 3. By far the largest racial group in both grades 10D and 11D is White.

⁶ Completion of the web entry means completing and uploading it within the competition time constraints.

Figure 5 - 3 Racial distribution by class



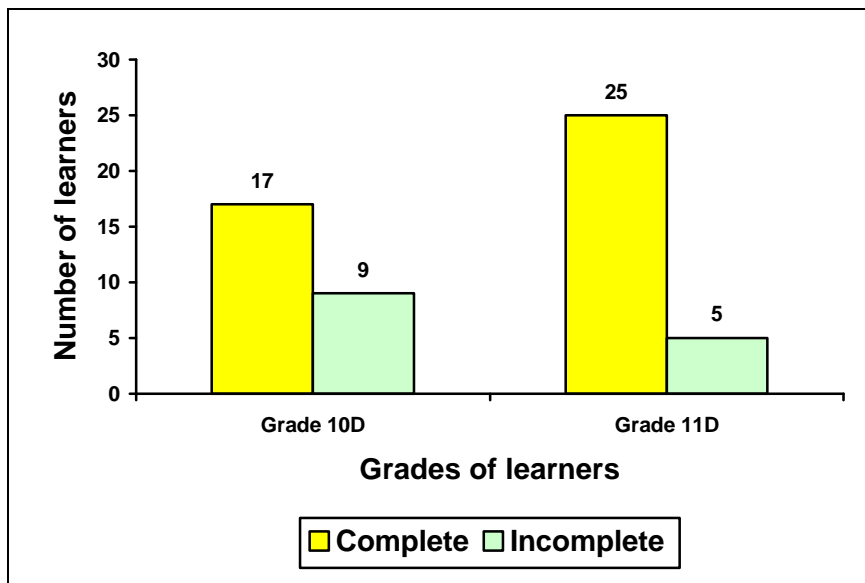
The genders and racial distributions are tabulated in Table 5 - 2. Of the two grades by far the largest racial group is White, whilst in Grade 11D males outnumber the females.

Table 5 - 2 Gender and racial distributions of learners

			African	Asiatic	Coloured	White
Grade 10D	Male	13	1	1	3	8
	Female	13	0	0	6	7
	Total	26	1	1	9	15
Grade 11D	Male	20	0	0	8	12
	Female	10	0	0	3	7
	Total	30	0	0	11	19
Total		56	1	1	20	34

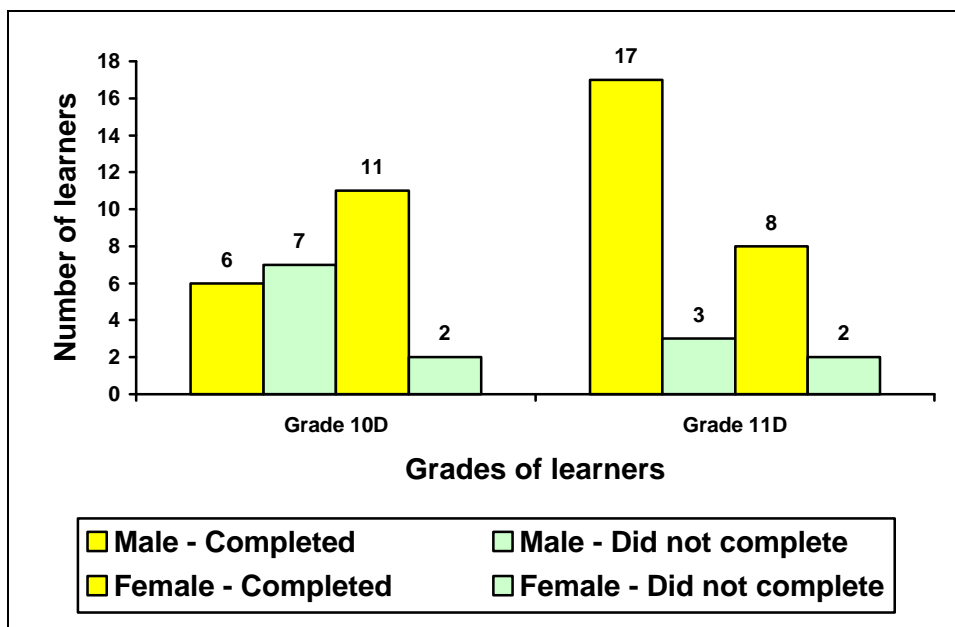
The numbers of learners who successfully completed and submitted their web entries are illustrated in Figure 5 - 4. Completed entries means completed and uploaded to the *ThinkQuest* web server in time. There is a large difference between the classes in the numbers of learners who successfully completed their entries.

Figure 5 - 4 Learners who completed their entry in time



As illustrated in Figure 5 - 5, proportionally more males than females in Grade 10D did not complete their entry. In Grade 11D the proportion between males and females not completing the entry, is almost equal.

Figure 5 - 5 Genders of learners who completed their entry



The number of complete and incomplete team entries is illustrated per grade in Figure 5 - 6. The incomplete entries are those that were not uploaded to the *ThinkQuest* server before the closing time, although they were completed and stored

on the school's network within a few days of the cut off. Only one of the initial entries was never completed.

Figure 5 - 6 Number of completed team entries per grade

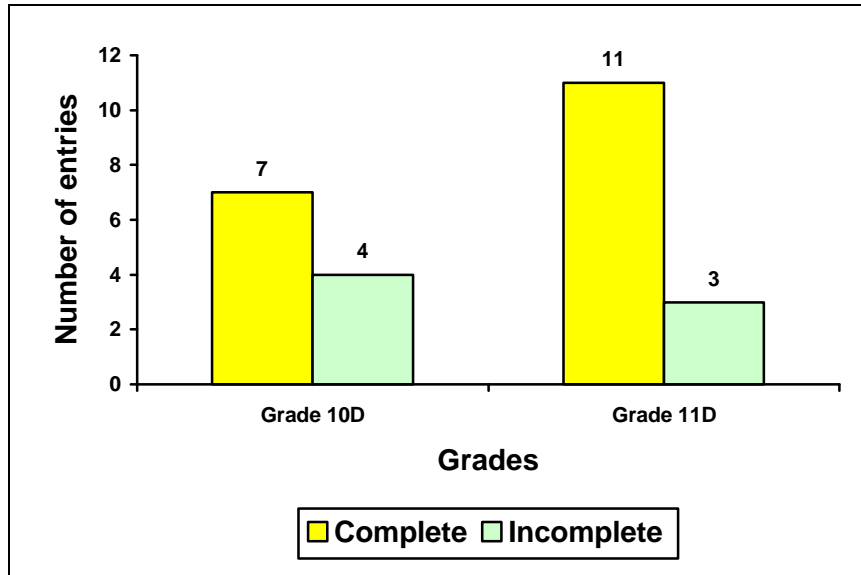


Table 5 - 3 and Table 5 - 4 illustrate how digitally experienced the learners are. They completed the *I own* and *I can* survey discussed in Chapter 4, indicating how many digital devices they owned and how many activities they were able to perform. The data below does not reflect the digital abilities of all the learners who took part in the *ThinkQuest* web design competition but sufficient data is provided to indicate that these learners are familiar with popular digital devices and activities. There is not an appreciable difference between the two classes although they are a year apart in age.

Table 5 - 3 Digital devices owned, out of a maximum of 24

Grade	Average	Maximum	Minimum	Total learners surveyed
10D	12 devices or 50%	19	5	22
11D	14 devices or 58%	21	10	19
Average	13 devices or 54%	20	8	21

Table 5 - 4 Digital activities able to be performed, out of a maximum of 16

Grade	Average	Maximum	Minimum	Total learners surveyed
10D	9 activities or 56%	14	4	22
11D	12 activities or 75%	16	9	19
Average	11 activities or 68%	15	7	21

3 Data collection methods

In order to ensure reliability, consistency and dependability of the results, multiple methods of data collection were used, tabulated in Table 5 - 5. The instruments used to collect the data were observation, an event log, the questionnaire, digital document analysis and interviews.

Table 5 - 5 Data collection methods

Instrument	Activity
Observation	<ul style="list-style-type: none"> • The learners were observed in the computer laboratory during the discussion of the topic. • The learners were observed in the computer laboratory during the final days before uploading.
Event log	<p>The following were noted:</p> <ul style="list-style-type: none"> • Learners who emailed me and the reason. • Learners who phoned me on my cell phone before the uploading. • Mothers who discussed their children's lack of work during the year.
Questionnaire	<ul style="list-style-type: none"> • On submission of the entries the 54 learners who had complete or incomplete entries were asked to complete a questionnaire, Appendix I, evaluating their partner(s) and the management of the project with particular reference to team work, marks, computer skills used, time management, place of work, sourcing and using material, giving and receiving assistance, pride, motivation and technical problems. • The questionnaire was examined and the information keyed into a database that was then analysed and queried. The results are statistically presented throughout this chapter to illustrate how the learners interacted with the information.
Digital document analysis	<p>All the complete and incomplete web entries were collated and put onto a CD and the network for closer examination and analysis by learners and myself. The entries or digital documents were systematically examined using the Windows Find function and the eye, by the learners and myself and detailed in a spreadsheet, Appendix K. The following were counted:</p> <ul style="list-style-type: none"> • Every animated gif made with <i>CoffeeCup Firestarter</i> or <i>Flash</i>, animated gif made with <i>Gif Animator</i> or similar, drop down box, feedback form, guest book, jigsaw puzzle, quiz, rollover, thumbnail, tile puzzle and crossword; • Every animated clipart gif, static pictures, sound clip, video clip and graphic background; • Shared borders, frames and image maps were noted; and • Spelling mistakes, levels of information, structure, amount of information and technical quality were noted.
Interviews	<ul style="list-style-type: none"> • Parents were interviewed at parents' meetings informing them of the importance of the competition and urged to encourage their children.

The web entries were systematically documented and analysed through the various data collection instruments.

4 Process of creating the *ThinkQuest* entries

The case study focuses on how learners interacted with information when they created an entry for the *ThinkQuest* web design competition with respect to cognitive, affective and physical perspectives. The following section discusses the process of creating the entry, viz. introducing it to the learners, their registration and progress and the final submission. The description of the process is limited as the learners were meant to create the entry at home without my assistance. The full analysis based on the learners' experiences and documented via the questionnaire (Appendix I) follows this section.

4.1 Background

The *ThinkQuest* web design competition was given to Grade 11D as their annual project at the beginning of the 2001 school year together with all their tasks and tests for the first term, see Appendix B. Grade 10 were given their term work and project at the beginning of the term, see Appendix A, but learners in Grade 10D asked if they could enter *ThinkQuest* as they had heard of it the previous year when two learners from Grade 10 had taken part in the competition and reached the international semi-finals.

There was excitement and trepidation on the part of the two classes, Grade 10D as they knew nothing about the World Wide Web; and Grade 11D as they had an inkling of the work ahead. The learners were told a number of times that the web site

- had to be done without teacher involvement;
- had to be completed on time;
- had to be completed in the learners' own time; and
- had to be created at home, as most of the computers at school available to learners did not have access to the World Wide Web.

The learners had to

- form teams of two or three, preferably with those from different cultural groups or *at a distance*;
- find coaches to guide them in the making of the entry;

- create an entry on a topic concerned with Cape Town;
- officially enter their team on the *ThinkQuest* web site; and
- upload their completed entry to the *ThinkQuest* server.

Conditions discussed with the learners included the following:

- I refused to be a coach to any *one* specific team.
- Although my computer had access to the World Wide Web, I have never been able to upload or FTP any page from that computer hence it was not really available for the project.
- Working *at a distance* was problematic, so the learners were encouraged to make teams with those who lived nearby or within local telephonic distance.
- I stipulated that the topic of the entry had to be about Cape Town. It was felt that it was a known topic and the teams could help publicise their own city. Various possible topics were discussed with the learners.

The instruction sheet, Appendix E, was given to the two classes, and the same instructions put on the school network and uploaded to the Internet. For a number of the learners the hyperlinked lessons and tasks on the school computer network were the only 'web sites' they had ever seen. In hindsight the learners were very adventurous, as more than nine tenths of the learners had not ever made a web page before.

4.2 Start

The registration of the entry had to take place by the third week of the second term. Registration was problematic as the *ThinkQuest* site was difficult to navigate and unclear in many respects, and learners underestimated the level of detail required in registering. The two learners who had taken part in the competition the previous year helped their classmates navigate the site during Computer Studies class time on my computer that was linked to the Internet. My computer had poor access speed but a number of teams did manage to register during class time. After half completing their registration many of the teams came prepared with parent and coach details, registering their coaches on their behalf. It became apparent that parents were inveigled into being coaches, although they did not know about the Internet or the responsibilities as coaches. Two teams from Grade 10D were unable to complete their team registration at the *ThinkQuest* site as they left it too late.

They were then told to have their sites hosted at Geocities, a server where web sites

could be hosted at no expense. All Grade 11D learners managed to complete their team registration in time.

4.3 In progress

Once the hurdle of entry registration was over, time should have been put to good use to collect data for the sites. The learners were informed that they had to hand in ten typed pages of content early in the second term although only three teams did so.

The term progressed and the learners were gently reminded at irregular intervals to work on their web sites. No checks were made as to how they were progressing. The Grade 10D learners were given one week or five lessons tuition in *FrontPage*. The Grade 11D learners had been taught *FrontPage* in many guises during the first term, see Appendix B and Table 5 - 6.

Table 5 - 6 Web-authoring skills learned by Grade 11D

Skills learned	Task number	Task name
Learned how to make a simple web site	Task 2	Web site about Yourself
Learned how to add hyperlinks and bookmarks within a page	Task 5	Creation of an HTM or HTML glossary
Adapted a previously made <i>JavaScript</i> quiz to create their own quiz	Task 6	Web-based quiz (<i>JavaScript</i>)
Added a previously made <i>JavaScript</i> -class file and image to a page to create a puzzle	Task 8A	Puzzle (<i>JavaScript</i>)
Created animations with <i>Gif Construction Set</i> and <i>PaintShopPro</i>	Task 8B	Gif animations
Created a data <i>Access</i> page suitable for adding material or comments	Task 8C	Data access page
Revised web-based skills	Test 11	Practical examination on web-authoring

The year progressed, the autumn break came and went, the mid-year winter holiday loomed and the learners were again gently reminded to work on their *ThinkQuest* entry that was due in August.

4.4 Submission

In the last week before the cut-off date the Grade 11Ds were away from school doing job shadow⁷ and the Grade 10Ds at a school camp. I checked the entries on the web, and in horror frantically brought problems to the attention of some of the learners by email. I had a total of six cell phone calls after hours and four during the school day and 14 email messages to my home or school email address, concerning how to upload the web site. The *ThinkQuest* closing date was extended⁸ at the time the learners returned from their week away which gave them time to sort out problems. The learners had a great deal of trouble uploading their sites. The three girls and two boys from 10D stayed away from school desperately trying to complete and upload their sites. One learner in Grade 11D stayed away from school, hurriedly working at home to finish his site.

When the Grade 10D and 11D classes had uploaded their sites there was a collective sigh of relief. It had been extremely stressful as it had been left so late by most learners, and many had had technical problems with uploading. Table 5 - 7 is a list of the completed entries and their URLs plus the number of Grade 10D and 11D learners per team.

'Completed entries' means completed and uploaded to the *ThinkQuest* web server in time.

⁷ Grade 11 learners spend one week shadowing a person in the employment market, watching them do their work and getting an idea of what it is like in the working world.

⁸ There was a power failure in the Pinelands area, and as a result the *ThinkQuest* organisers gave those teams from Cape Town extra time.

Table 5 - 7 Completed entries

Class	Title	No of learners per team	URL
10D	<i>BMXing in South Africa</i>	2	http://library.thinkquest.org/C0123623/
10D	<i>Dance clubs in Cape Town</i>	3	http://library.thinkquest.org/C0123624/
10D	<i>Foetal alcohol syndrome</i>	1	http://library.thinkquest.org/C0127302/
10D	<i>Restaurant guide to Cape Town</i>	2	http://library.thinkquest.org/C0129748/
10D	<i>Special needs schools in Cape Town</i>	3	http://library.thinkquest.org/C0122631/
10D	<i>Tales @ the table</i>	3	http://library.thinkquest.org/C0123626/
10D	<i>Tourist guide to Cape Town</i>	3	http://library.thinkquest.org/C0125940/
11D	<i>Beaches in Cape Town</i>	2	http://library.thinkquest.org/C0122101/
11D	<i>Genesis animation</i>	1	http://library.thinkquest.org/C0111614/
11D	<i>Kramats of the Western Cape</i>	1	http://library.thinkquest.org/C0120708/
11D	<i>Planet Mars</i>	3	http://library.thinkquest.org/C0122083/
11D	<i>Sculpture in Cape Town</i>	1	http://library.thinkquest.org/C0122583/
11D	<i>Soul of District Six</i>	2	http://library.thinkquest.org/C0118982/
11D	<i>Teen hair of Cape Town</i>	2	http://library.thinkquest.org/C0120888/
11D	<i>Tourism and whaling in Hermanus</i>	2	http://library.thinkquest.org/C0121860/
11D	<i>V & A Waterfront</i>	2	http://library.thinkquest.org/C0122349/
11D	<i>Where eagles fly: the South African airforce in 2001</i>	3	http://library.thinkquest.org/C0110164/
11D	<i>Xtreme sports in South Africa</i>	3	http://library.thinkquest.org/C0119007/

A number of teams did not manage to complete their entry, see Table 5 - 8, although their entries were used for the analysis.

Table 5 - 8 Incomplete entries

Grade	Title	No of learners
10D	<i>Cape drugs</i>	3
10D	<i>Cape Town: The Mother City</i>	2
10D	<i>Hiking trails in the Western Cape</i>	2
10D	<i>Sportsman's guide to the Western Cape</i>	2
11D	<i>Cape cuisine</i>	2
11D	<i>Lifestyles of three typical teenagers in Cape Town</i>	3
11D	<i>Old Mutual</i>	3

Table 5 - 9 tabulates the problems of the Grade 10D and 11D teams that did not manage to complete their entries. Other teams had problems but managed to upload their entries whether complete or incomplete, well done or poorly done.

Table 5 - 9 Reasons for not completing their entries

Grade	Team specific reasons for not completing the entry
Grade 10D	<ul style="list-style-type: none"> • Working as a team, uploading the site, working with frames, lack of motivation • Team problems and lack of motivation • Incorrectly naming the index file 'homepage' and having files hyperlinked back to it; and when that problem was corrected and the site worked well, the <i>ThinkQuest</i> technical people did not move the entry to the permanent server correctly and the whole site disappeared. • Sickness in the family and lack of motivation
Grade 11D	<ul style="list-style-type: none"> • Team problems • Motivation • Hyperlink problems to do with frames

Many of the joys and frustrations of the learners became apparent in the questionnaire (Appendix I) about their experience of taking part in the competition. As tabulated in Table 5 - 9 lack of motivation and team problems were given as the major reason for incompleteness of entries. There was much excitement when *Sculpture in Cape Town*, one of the entries, reached the international semi finals although it did not reach the finals.

5 Analysis of the process and product of the *ThinkQuest* entries

The aim of this chapter is to investigate how FET learners interact with information in a digital environment, *at a distance*, in this case create a web site. The perspectives of acquiring, recalling, processing and planning, and presenting information come from the behaviours and activities discussed in Section 6, *Synthesis and profile*, in Chapter 2.

5.1 Cognitive perspective

The following section examines how the learners interact with information in a digital environment from a cognitive perspective particularly looking at acquiring, recalling, processing or planning, and presenting information while creating an entry for a web design competition, *at a distance*.

5.1.1 Acquiring information

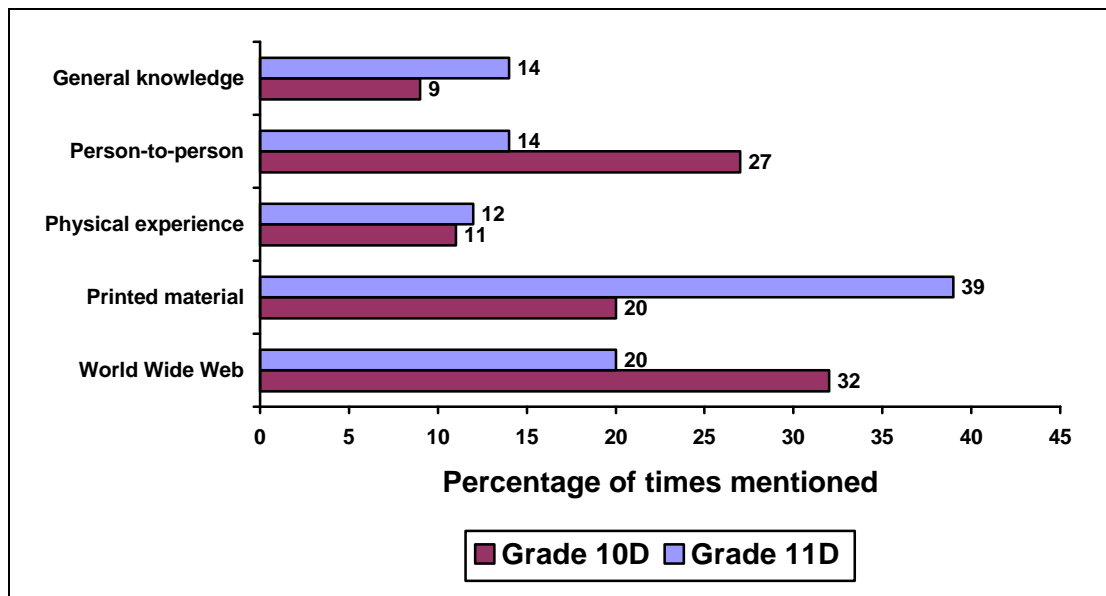
The learners acquired factual content in order to create the web entry, acquired web-authoring skills and recalled previously taught web-authoring skills.

5.1.1.1 Acquiring factual content

The learners acquired their information from a variety of sources ranging from personal general knowledge, asking knowledgeable people, visiting the subject areas and browsing the World Wide Web, to using a variety of printed sources. The sources of information of the two classes are graphically described in Figure 5 - 7.

- Grade 10D - More learners from this grade used the World Wide Web as a source and asked knowledgeable people, than Grade 11D.
- Grade 11D - Used a great deal of printed sources which was a bit surprising as the learners were meant to create new innovative sites about unique topics, not put printed material, i.e. books, on the World Wide Web.

Figure 5 - 7 Sources of information used by learners in creating their web sites



One of the features of and rationales for *ThinkQuest* was to create in web format information not currently found on the Internet; hence the learners collected their own information or copied it from a variety of print sources. Perhaps the reason that so few learners used the Internet to collect information was because they did not have access to the World Wide Web in class, had no model to follow and the high cost of accessing the World Wide Web from home. Many of the learners used print material, as it was easy to obtain. Other learners created their own information

through physically visiting places and interviews. Those new to web-authoring used information mainly from the World Wide Web and those experienced in web-authoring from printed resources.

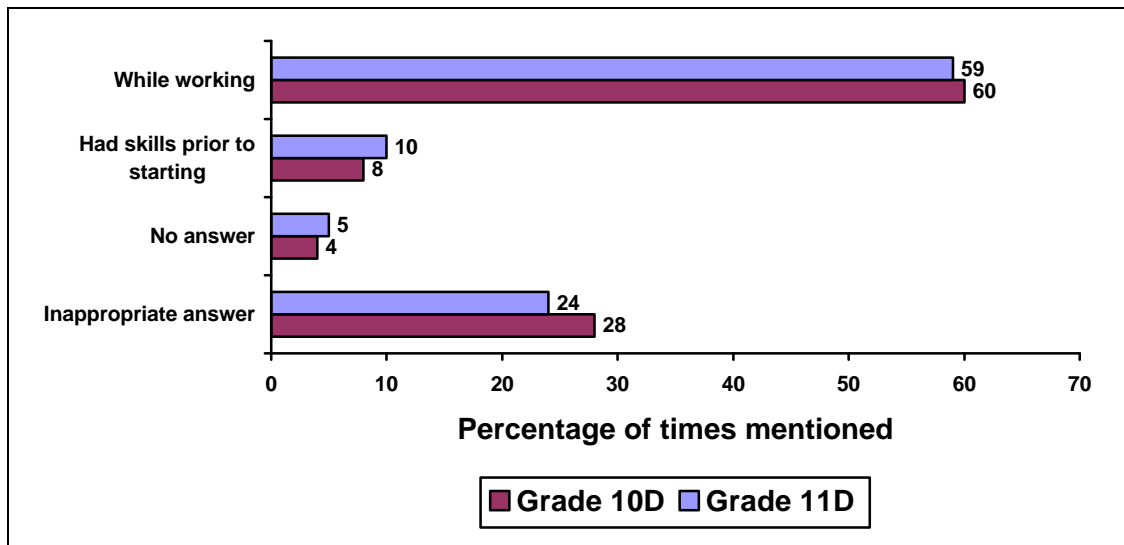
The excerpts below illustrate the learners' use of information sources:

- We have been on the hikes, so we new most of the info. (Grade 10D male)
- We phoned people who knew or we found out ourselves. (Grade 10D female)
- On the Internet and from the guides at the places also in one or two books. (Grade 10D male)
- The information I get came from the Internet. XXX got a booklet all about the Cape. XXX was meant to get photographs but in stead she came with pamphlets. (Grade 10D female)
- We used maps, went to the beaches and looked on the Internet. (Grade 11D male)
- I went to see most of the sculptures in Cape Town, took photos and looked the sculptors up in books and wrote about their particular works. I didn't find much information on the internet but the Frank Joubert Art Center's Library has a lot of modern books on Art. They were a great help. (Grade 11D female)
- Mainly the Gov. SANDF web site and books on the subject. (Grade 11D male)
- I got the information from brochure that I found on Hermanus and also because I have been there so many times that I knew a lot about Hermanus. (Grade 11D female)

5.1.1.2 Acquiring web-authoring skills

At the commencement of the project many learners did not know how to use web-authoring software. The learners were creating the web entry on their own under the guidance of their coaches but, from the questionnaire it was apparent from the responses about 'Help' that their coaches had few computer skills and gave very little technical support. The majority of the learners in both classes acquired the skills to use the software as they designed their web pages, illustrated in Figure 5 - 8.

Figure 5 - 8 Acquiring web-authoring skills



- Grade 10D - The two learners who indicated they had web-authoring skills prior to creating the site may have misinterpreted the question.
- Grade 11D - The four learners who thought they had the skills prior to commencing the web site, were all male - their comments are below. An interesting observation was that three of these four learners did not produce entries of quality in terms of skills. They seem to have not exerted themselves to learn interesting new skills as seen by their comments below:
 - I had all the skills that were required. (Grade 11D male)
 - I already had all the skills and didn't learn anything in terms of skills. (Grade 11D male)
 - I did have most of the skills. I could have done (and I think I have) the whole thing by myself. I learnt new design tactics (Concepts) from other people, mostly people I shadowed (Grade 11D male)
 - I did it last year and therefore already had all the skills. (Grade 11D male)

5.1.2 Recalling information

The learners did not have to recall information but rather create information. They did have to recall the skills about how to author a web site from lessons learnt earlier in the year.

- Grade 10D - The learners recalled their short one week session of lessons on web-authoring
- Grade 11D - The learners recalled the many lessons in web-authoring taught in the first term, illustrated in Table 5 - 6.

5.1.3 Processing, planning, structuring and amount of information

The ways in which the learners planned the web site with reference to the structure used and the amount of information included are examined in the following section.

5.1.3.1 Model or structure

The web entry was structured in the following way:

- Information was arranged on pages under titles. The learners divided the content into manageable amounts for each page. Similar types of information were found on each page.
- The entries had a clear logical structure as the sites were of known and understandable topics.
- Information arranged at two or more levels, a fairly sophisticated feature, was used in nearly all the sites. Two entries in Grade 10D and two in 11D did not structure their entry on two levels. A web site with two levels means an initial Home page with links to, for example, Topic1, Topic2, Topic3, and then links from a Topic page to a Subtopic page and so forth.
- Frames were not used successfully by any group in Grade 10D but instead caused many problems. Most of the Grade 11D web sites used frames. Frames had not been taught in class to any group.
- Image maps were only found on two web entries, one to point users from a signpost to a beach (*Beaches in Cape Town*) and the other to point users from a map to kramats in the Peninsula (*Kramats of the Western Cape*).

5.1.3.2 Amount of information

Most of the web sites had a great deal of information and the learners appeared to have taken much trouble to create their own content or source it from somewhere else. The Grade 11D learners had more content in their web sites than the Grade 10D learners.

- Grade 10D - Three of the 10 web sites had a great deal of information, two probably copied their information from print or web sources, but one site (*Special needs schools in Cape Town*) was created and sourced from scratch.
- Grade 11D - Six of the thirteen sites had a great deal of information: one site looked as if was a copy from a book and the remaining five looked as if they were created from a number of sources and transmediated from other media forms. The two web sites on *Planet Mars* and *Xtreme sports in South Africa* had very little content.

5.1.4 Presenting information

The following section will discuss how the learners presented information looking at the surface features of the entries with reference to spelling, the look of the pages, the tone of the sites and the multimedia features used.

5.1.4.1 Spelling

There were spelling errors in a few entries. It would appear that the coaches corrected the worst of the errors or the learners working in groups saw the errors and corrected them themselves before uploading. The worst errors were found in *BMXing in South Africa*, *Dance clubs in Cape Town* and *Lifestyles of three typical teenagers in Cape Town*, sites that did not have much coach involvement.

5.1.4.2 Pages

Information was presented on pages in the following ways:

- The entries were made up of hyperlinked pages from the main, home or index page to other pages.
- Each web consisted of from seven (*Planet Mars*) to more than 100 (*Sculpture in Cape Town*) pages.
- In addition to text, most pages had illustrations in the form of scanned pictures and thumbnails as well as a few interactive features such as quizzes or animations.
- The length of the individual pages was not too long and did not require much scrolling down.
- Most of the pages were full of images and / or text.

5.1.4.3 Tone

The learners were positive about their topics and wrote with conviction. They had been charged with making web sites about their city and country and there was a sense of pride in most of the entries.

- The topics were important to most of the learners and their enthusiasm was evident. The two entries that showed the most enthusiasm were *Teen hair of Cape Town* and *Special needs schools in Cape Town*. Only two entries were not about Cape Town or South Africa, and they were *Genesis Animation* and *Planet Mars*.
- The learners endeavoured to be politically sensitive and wrote with the American browser in mind. There was some confusion in trying to explain 'Coloured'

people and other racial or cultural groups. The creators of the site on *Dance clubs in Cape Town* tried to indicate the racial or cultural group which frequented specific clubs: They called Coloured people 'Indian' which is not correct. The creators of the site wanted to be politically and culturally correct but did not succeed.

- The creators of the site on *Cape Cuisine* had much difficulty explaining the different racial or cultural groups and their distinct gastronomic preferences. They did not want to offend anyone but wanted the information to be culturally correct. They spent so much time worrying about this aspect of the site they did not get their frames correct.

5.1.4.4 Presenting information

The following section will examine how the learners presented information in various multimedia formats including graphic, static and interactive features developed by the learners. This data is based on all but two of the sites created for the competition, even though not all were uploaded in time. *Old Mutual* and *Foetal alcohol syndrome* are not included in this analysis.

5.1.4.4.1 Graphic features

The learners were challenged by the topic of the web entry and used images to add content. In general, the entries had a suitable balance of images to text.

- Original, specially selected photographed and scanned images were used in *Beaches in Cape Town*, *Teen hair of Cape Town*, *Tourism and whaling in Hermanus*, *Special needs schools in Cape Town*, *Tourist guide to Cape Town* and *Lifestyles of three typical teenagers in Cape Town*.
- Photographs taken with a digital camera were used in *Hiking Trails in the Western Cape*.
- Scanned images from books were used and collages created in *Where eagles fly: the South African airforce in 2001*.
- Images from books and web sites were used in *Soul of District Six* and *Kramats of the Western Cape* to create *Shockwave* or *CoffeeCup Firestarter* type animated images.
- No clipart images were observed.

Figure 5 - 9 Home pages from the *ThinkQuest* sites

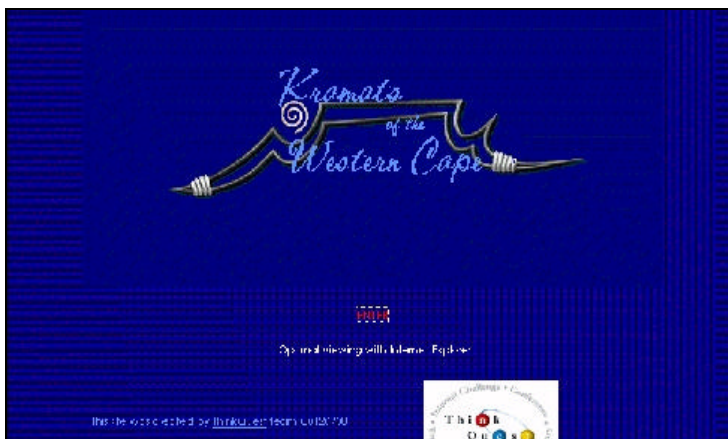
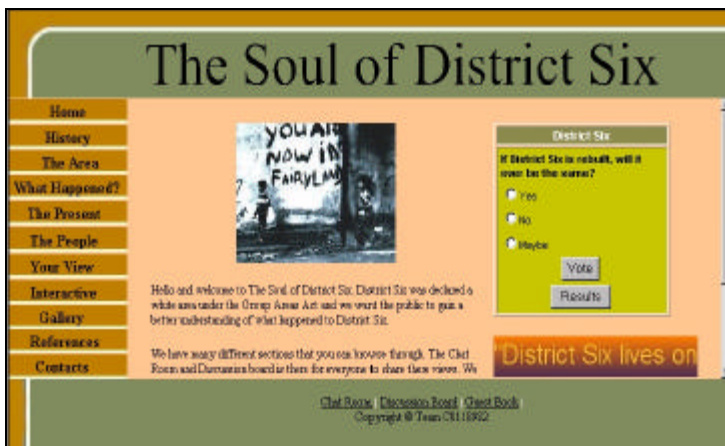


Figure 5 - 10 Images from the *ThinkQuest* web sites

		<p>Click on a picture to enlarge it:</p>
<p>Links in a frame</p>	<p>Tile puzzle</p>	<p>Links to enlarged pictures Soul of District Six</p>

	<p>This is the average length and took 12 hours to put in.</p>
<p>Mouse over links to files</p>	<p>Scanned image Teen hair of Cape Town</p>

<p>Interactive crossword puzzle</p>	<p>Quiz Kramats of the Western Cape</p>

5.1.4.4.2 Static features

Static or very easy to insert features found in the entries were:

- Illustrations used by every entry.
- A video clip unsuccessfully used in one entry.
- Sound clips used in one entry (*Tourism and whaling in Hermanus*)
- Background colours used in most entries. One site, *Lifestyles of three typical teenagers in Cape Town*, used animated images as a background.
- Animated clipart pictures were not observed in the entries.

5.1.4.4.3 Interactive features

One of the aims of the competition was to create a web site with interactivity. This proved difficult, as none of the learners knew programming languages that facilitate real interactivity. In this context, interactive features refer to features that react to input and were developed by the learner. Interactive features therefore do not include animated clipart images although, technically, they are interactive.

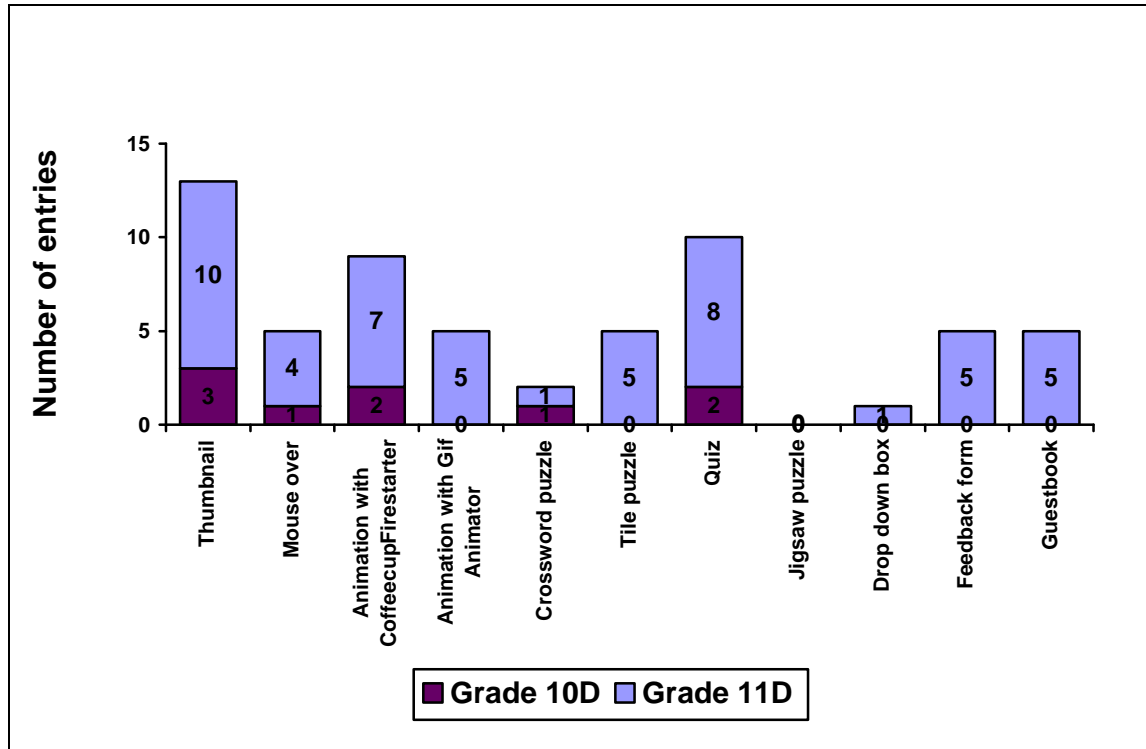
The interactive features complemented the text and content of the entry. Apart from the thumbnail, in general the learners did not use many interactive features in their entries as seen in Table 5 - 10.

Table 5 - 10 Use of interactive features by Grades 10D and 11D

Feature	Total number used ⁹	Average number used per entry
Thumbnail	413	17.96
Mouse over	23	1.00
Animated gif made with <i>CoffeeCup Firestarter</i> or <i>Flash</i>	23	1.00
Animated gif made with <i>Gif Animator</i> or similar	8	0.35
Crossword puzzle	2	0.09
Tile puzzle	5	0.22
Quiz	10	0.43
Jigsaw puzzle	0	0.00
Drop down box	1	0.04
Feedback form	5	0.22
Guest book	5	0.22

The most commonly used interactive feature was the thumbnail followed by the quiz, tabulated in Table 5 - 10 and illustrated in Figure 5 - 11.

Figure 5 - 11 Numbers of entries who used the interactive features



As seen in Figure 5 - 11 the learners used many images in the form of thumbnails, mouse overs, animations and tile puzzles probably because they enjoyed looking at the graphics and making the interactive features. Grade 11D used more features because they had been taught how to make them. JavaScript quizzes were used by Grade 11D because they were encouraged to add interactivity in as many ways as possible, and these learners had been taught how to make quizzes.

5.1.5 Summary of interaction with information from a cognitive perspective

The manner in which the learners cognitively interacted with information while involved in the process of creating their entries *at a distance* was discussed in the preceding section. The findings are summarised and tabulated in Table 5 - 11.

⁹ The numbers may not be totally accurate although they were checked by teams of learners.

Table 5 - 11 How the learners cognitively interacted with information during the process of creating the *ThinkQuest* entry

Cognitive perspective	Cognitive interaction
Acquiring information	<ul style="list-style-type: none"> • Learners used a variety of sources to acquire information for the entries. • Learners gained web-authoring skills while they created the entries.
Recalling information	<ul style="list-style-type: none"> • Learners recalled their web-authoring skills in order to commence creating their entries.
Processing / planning information	<ul style="list-style-type: none"> • Learners modeled or structured their entries logically. • Most of the learners created entries arranged with pages and hyperlinks at two levels using higher-level thinking skills. • Frames were not used successfully by Grade 10D, although Grade 11D learners used them successfully. • Few learners used image maps. • Learners were able to create the text-based information and content required.
Presenting information	<ul style="list-style-type: none"> • There were relatively few spelling errors. • Entries were made up of a number of illustrated and linked pages of text. • Graphic and interactive features complemented the content. • Entries exhibited pride and enthusiasm for the topics. • There were relatively few interactive features in the entries. • Entries created by Grade 11D had more interactive features than Grade 10D.

Table 5 - 11 summarises how the learners cognitively interacted with information when creating the *ThinkQuest* web site *at a distance*. There is little data either on how the learners acquired information, as they were not observed as they created the web site or on how they recalled web-authoring skills. The learners created and presented web sites with a usual structure, with sufficient information, with relatively few exciting interactive features.

Table 5 - 12 indicates where the cognitive behaviours and activities tabulated in the literature review, Table 2 - 26 in Chapter 2, and the way in which the learners created the web sentries *at a distance*, have common ground:

- ✓ indicates where the literature review and the activity concur.
- X indicates where the literature and the activity do not concur.
- ⇒ indicates where the activity was not found in the literature.
- NA indicates where it was not applicable in this situation.

In Table 5 - 12 the behaviours and activities of acquiring, recalling, processing and planning, and presenting information and the form of cognitive behaviour or activity

come from the behaviours and activities discussed in Chapter 2, in Section 6, *Synthesis and profile*. They are then compared with the way in which the learners created their *ThinkQuest* web entries.

Table 5 - 12 Comparing cognitive behaviour or activity from the literature with the way in which the learners created their *ThinkQuest* web entries

Cognitive perspective	Cognitive behaviour or activity from the literature review	Common ground	Interaction with information while creating the <i>ThinkQuest</i> web entry
Acquiring information	<ul style="list-style-type: none"> • Able to source material in digital environment with sophisticated search strategies 	NA	<ul style="list-style-type: none"> • No data on how the learners sourced material.
	<ul style="list-style-type: none"> • Absorb material quickly as individual learners are accommodated 	NA	<ul style="list-style-type: none"> • Learners were not required to learn material.
	<ul style="list-style-type: none"> • Critical of content of resource material 	NA	<ul style="list-style-type: none"> • Learners did not exhibit critical evaluation of resource material although the material selected for their entries was usually well selected.
	<ul style="list-style-type: none"> • Prefer acquiring information from graphic images in preference to text 	NA	<ul style="list-style-type: none"> • No data on the resources from which the learners acquired information.
	<ul style="list-style-type: none"> • Know where to find information on a screen 	NA	<ul style="list-style-type: none"> • No data on where the learners found information on a screen.
	<ul style="list-style-type: none"> • Not found in the literature review 	⇒	<ul style="list-style-type: none"> • Learners gained web-authoring skills as they created the entries.
	<ul style="list-style-type: none"> • Not found in the literature review 	⇒	<ul style="list-style-type: none"> • Learners used a variety of resources to obtain information, those new to web-authoring mainly from the World Wide Web and those experienced in web-authoring from printed resources.
Recalling information	<ul style="list-style-type: none"> • Recall of screen-based material difficult 	NA	<ul style="list-style-type: none"> • Learners were not required to recall screen-based material.
	<ul style="list-style-type: none"> • Short term memory assisted by sensory features of digital environment 	NA	<ul style="list-style-type: none"> • Learners were not required to remember content, apart for the skills for the development of the CV.
	<ul style="list-style-type: none"> • Recall text on screen in chunks and not with the bigger picture 	NA	<ul style="list-style-type: none"> • Learners were not required to remember text on screen.
	<ul style="list-style-type: none"> • Literate in non-verbal environment 	NA	<ul style="list-style-type: none"> • Learners were not required to recall information in a verbal or non-verbal environment.

Cognitive perspective	Cognitive behaviour or activity from the literature review	Common ground	Interaction with information while creating the <i>ThinkQuest</i> web entry
	<ul style="list-style-type: none"> Long term memory assisted by organisation of digital environment 	<p>NA</p> <p>X</p> <p>NA</p>	<ul style="list-style-type: none"> Learners were required to recall web-authoring skills but it is not sure how those skills were recalled. Grade 11D learners seemed not to have recalled the multimedia features taught in class. Not clear how the learners recalled web-authoring skills as the web was created <i>at a distance</i>.
Processing and planning information	<ul style="list-style-type: none"> Plan creating digital projects 	✓	<ul style="list-style-type: none"> Structure of the entries does suggest planning.
	<ul style="list-style-type: none"> Build mental models of the learning material 	NA	<ul style="list-style-type: none"> Learners were not required to learn material.
	<ul style="list-style-type: none"> Use higher-level thinking skills 	✓	<ul style="list-style-type: none"> Higher-level thinking skills were used in structuring the webs on two levels, a format found in most webs. Frames, indicating higher-level thinking skills, were used by a number of learners although Grade 10D learners were not successful. Quizzes found in half of the entries indicated higher-level thinking.
	<ul style="list-style-type: none"> Visually process a number of programs at once 	NA	<ul style="list-style-type: none"> Not observed.
Presenting information	<ul style="list-style-type: none"> Cognitive processing of screen-based material superficial 	X	<ul style="list-style-type: none"> Few entries had spelling errors.
	<ul style="list-style-type: none"> Able to communicate their understanding of the subject matter in multiple formats 	X	<ul style="list-style-type: none"> Although one of the classes had been taught a number of different formats, the learners did not communicate their content in multiple formats as they did either did not know how or they did not think to do so. Learners were able to create text-based content.
	<ul style="list-style-type: none"> Develop own symbols and abbreviations for communicating 	NA	<ul style="list-style-type: none"> Not observed.
	<ul style="list-style-type: none"> Transfer of learning to other contexts takes place 	NA	<ul style="list-style-type: none"> Not certain if this has taken place.
	<ul style="list-style-type: none"> Use authentic language in developing digital projects which assists information processing 	NA	<ul style="list-style-type: none"> Could not be observed as the learners did not develop their projects where they could be observed.

As indicated in Table 5 - 12 very few of the behaviours or activities found in the literature review were *present* in the creation of the web site *at a distance*. The following behaviours or activities were those present in Table 2 - 26 where the cognitive profile of a South African FET learner in a digital environment was tabulated based on the literature review, and in the creation of the *ThinkQuest* web entry:

- Plan creating digital projects
- Use higher-level thinking skills
- Able to communicate their understanding of the subject matter in multiple formats

Cognitive behaviours or activities present in the *ThinkQuest* entries but *not found* in the literature review were:

- Learners gained web-authoring skills as they created the entries.
- Learners used a variety of resources to obtain information, novice users preferring the World Wide Web and experienced users print material.

Table 5 - 12 illustrates that there was little concurrence between the literature review and creation of the *ThinkQuest* web entry, however the process of the creation of the *ThinkQuest* web site did not exhibit many behaviours or activities that exhibited cognitive behaviour or activity.

5.2 Affective perspective

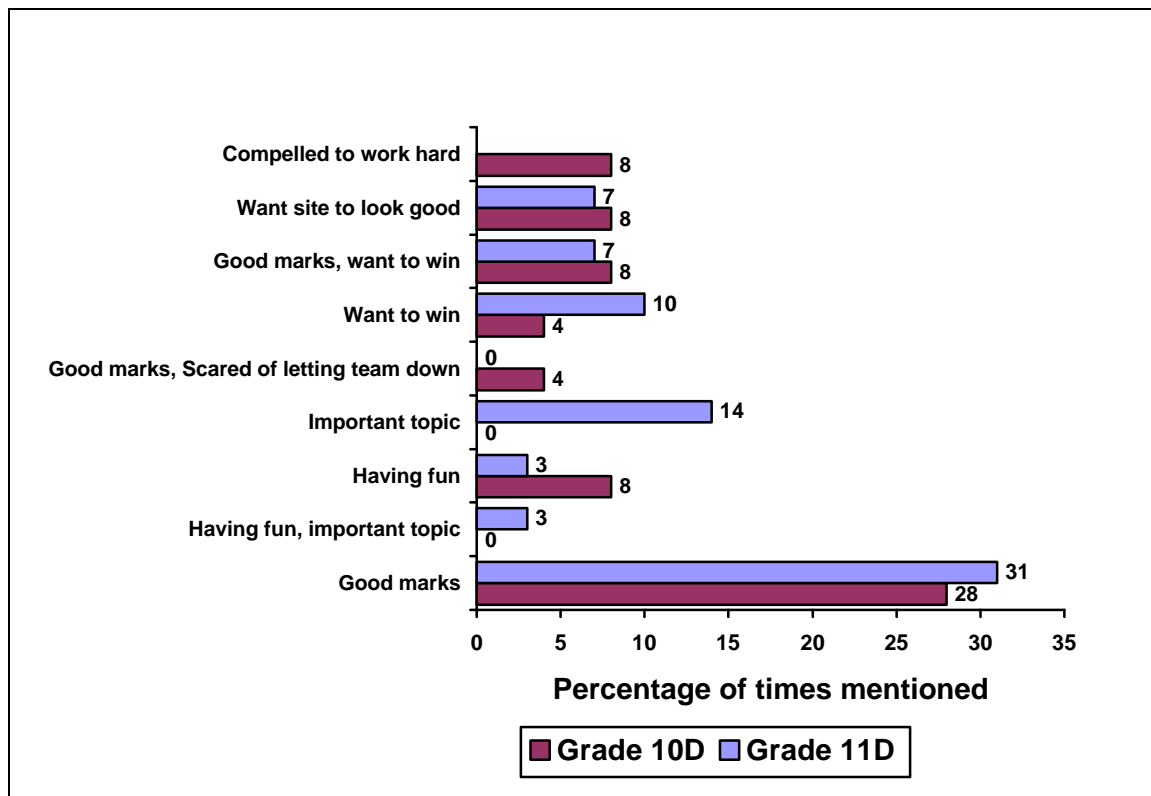
The following section will examine how the learners interact with information in a digital environment from an affective perspective, looking particularly at motivation, the influence of peers, time and mental state while creating their *ThinkQuest* web site. The web site was meant to be created *at a distance* which meant that the learners were not meant to have face-to-face contact when creating the site.

5.2.1 Motivation

Learners in both Grades 10D and 11D indicated that marks and grades were major factors in working so hard on their entries, illustrated in Figure 5 - 12.

- Grade 10D - The main motivating reasons of marks and grades were compromised by misunderstanding the question and providing inappropriate answers. It is not clear how so many learners misunderstood the question.
- Grade 11D - In addition to working hard for grades and marks they were also motivated by working on a topic they perceived as important.

Figure 5 - 12 Motivating factors

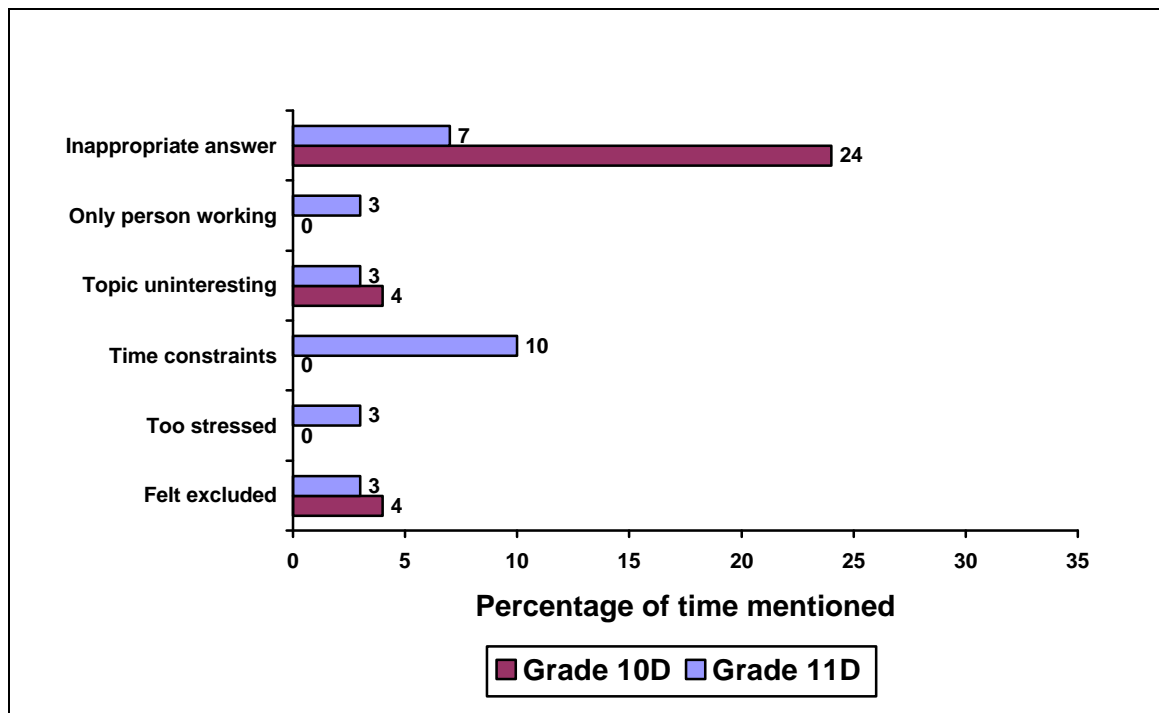


Comments from the learners concerning their reasons for working hard are given below:

- It is an important project as it counts for one fourth of the year mark and there is a chance of winning a lot of money. (Grade 10D male)
- It counted a lot of marks and I try my best to score high in projects as it is easy marks as they would say. (Grade 10D female)
- I put in this effort because it is for end of year marks. (Grade 11D male)
- Because I care very much about my marks and I know that I have to produce good work to get good marks. (Grade 11D female)
- It is a touchy subject for the people who lived there and now it is only memories. What we are trying is to put their memories on more than just paper. (Grade 11D male)
- XXX is one of my favourite topics, so it was a pleasure researching about it all. (Grade 11D female)

Figure 5 - 12 is not representative of all the learners in both classes, nor does it include the data of all the learners. Figure 5 - 13 provides data to complete the total number of learners. Figure 5 - 13 gives the reasons why some learners were not motivated while working on their *ThinkQuest* web entries. The high number of inappropriate answers is also indicated.

Figure 5 - 13 Reasons why learners were not motivated



Lack of motivation and negative feelings towards the competition were shown only by male learners:

- I put in enough effort, but because of the miss communication and the anti-socialisation it was not put to use. (Grade 10D male)
- Time was always a problem. Fitting thinkquest into a busy day was difficult. (Grade 11D male)

5.2.2 Influence of peers

The learners were meant to work in groups of two or three members. In an effort to describe the study, the following topics were considered:

- selection of team members;
- groupings of team membership;
- reasons for selecting team members;
- working with team members;
- team conflict;
- finding and giving assistance; and
- allocating marks to team members.

5.2.2.1 Selection of team members

The learners were able to have two or three partners. As seen in Table 5 - 13 most learners (13) took one partner, and 10 took two partners. The one-person teams

either had a partner *at a distance* which was not successful, or a silent partner at PHS.

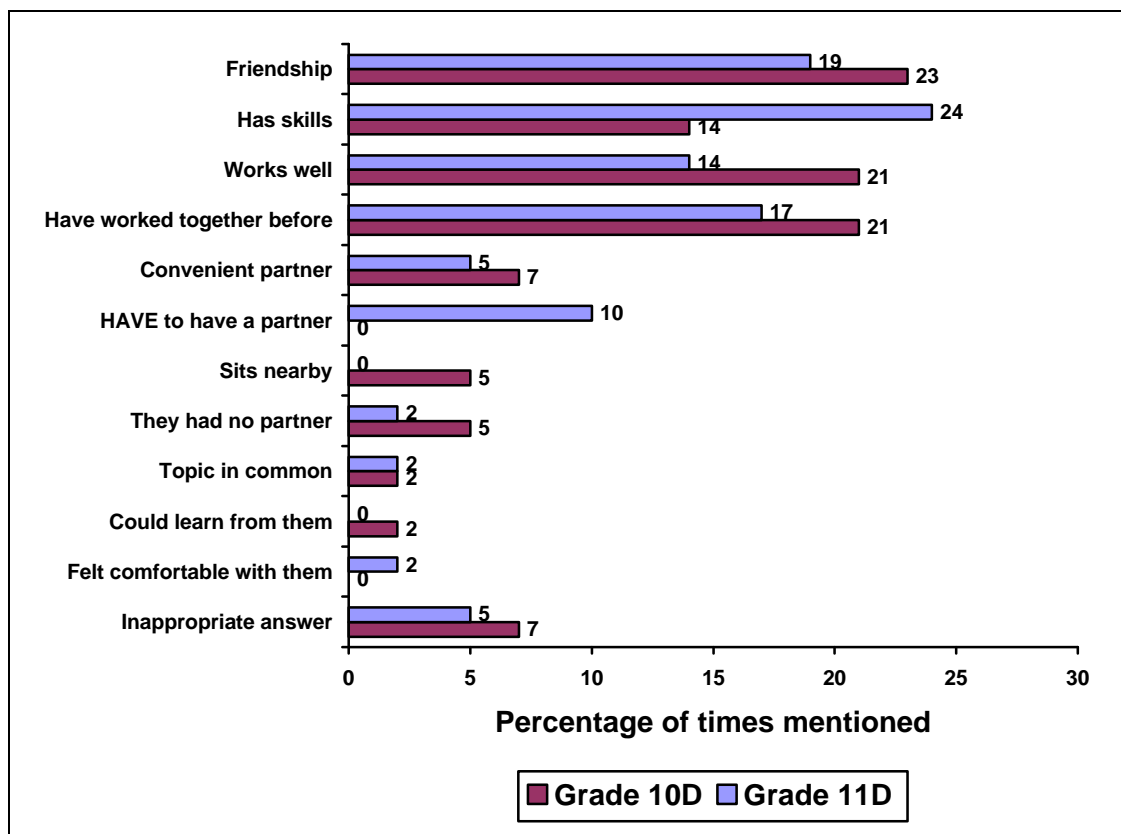
Table 5 - 13 Sizes of team entries

Team entries	One-person teams (officially had a partner)	Two-person teams	Three-person teams
Grade 10D	2	6	4
Grade 11D	3	7	6
Total	5	13	10

Figure 5 - 14 illustrates that the people who were selected for the team partners were friends, possessed the required skills, worked well and were known to the team members. Ranked the four most important factors in selecting team members were:

1. Friendship - 21%
2. Have required skills - 19%
3. Known to work well - 18%
4. Have worked together previously - 15%

Figure 5 - 14 Reasons for selecting a member for the team



5.2.2.2 Working with team members

The two classes doing *ThinkQuest* reported positive things about working with their team members.

- Grade 10D - The majority of the learners made positive comments about working with the partners in their teams. Three learners indicated they would never work with the same people again: from observations one male learner had great difficulty working in a team, and two female learners did not really commit themselves to the project. The learner who tried to work with a partner overseas was completely unsuccessful. The rest of the Grade 10D learners reported that they enjoyed working with their team members.
- Grade 11D - These learners reported similar findings. The majority of learners had positive things to say about working with their team members and cited various reasons. One male learner who was meant to work with an overseas team member did not have a good experience - there seems to have been a lack of communication.

5.2.2.3 Team conflict

Conflict experienced while creating the site was not reported nor brought into the classroom.

- Grade 10D - When asked if there had been any conflict and if so, how was it resolved, the learners indicated no conflict. However I observed that there could have been conflict in three of the 11 teams:
 - One male who did little work in his entry, was not admonished but just ignored.
 - One female who did no work was phoned and the required work explained to her. When no work resulted she was then ignored.
 - Another female learner was not admonished and continued with her lack of commitment.
- The lack of conflict or squabbles showed either lack of desire for conflict, or acceptance of team problems. No conflict was brought into the classroom. The other team members just shouldered the extra work on their own.
- Grade 11D - The questionnaire reported conflict in two Grade 11D teams. The responses in the data collected in the questionnaires did not reflect what I heard about the situations in one of those teams. I heard that they had a very unpleasant conflict which was most distressing to those who observed. In the computer laboratory that conflict was never observed, although the participants

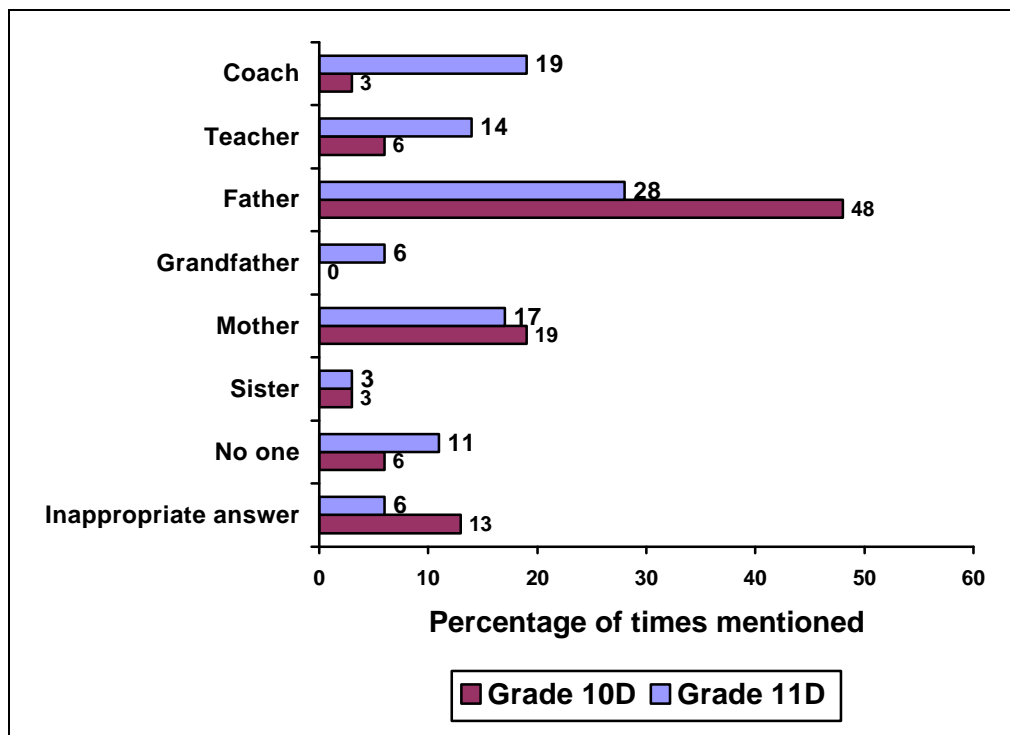
sat near each other. The group were the same gender and of the same racial grouping, so neither gender nor race was responsible for causing the conflict.

In all teams the stress or conflict experienced on working at weekends and after school on their *ThinkQuest* entry was not brought to the computer laboratory and did not appear to influence class work.

5.2.2.4 Finding and giving assistance

The *adults* who assisted the learners the most were parents. The parents assisted the learners more than the coaches, illustrated in Figure 5 - 15, although the assistance given was not of a technical nature.

Figure 5 - 15 Adults who helped the learners



The assistance given by adults was of a supportive non-technical nature as seen below:

- He helped me by telling me not to stress and relax. He also helped me handle stressful situations. (Grade 10D male)
- By motivating us to carry on trying and with the computer problems. (Grade 10D female)
- He gave me pointers, he got me some information and he even got me FrontPage 2000. (Grade 10D male)
- Interviews, views and layout suggestions. (Grade 11D male)
- If I was stuck, or had a major problem, he gave me suggestions and tips. Sometimes he showed me how to do things, but then I had to go and do

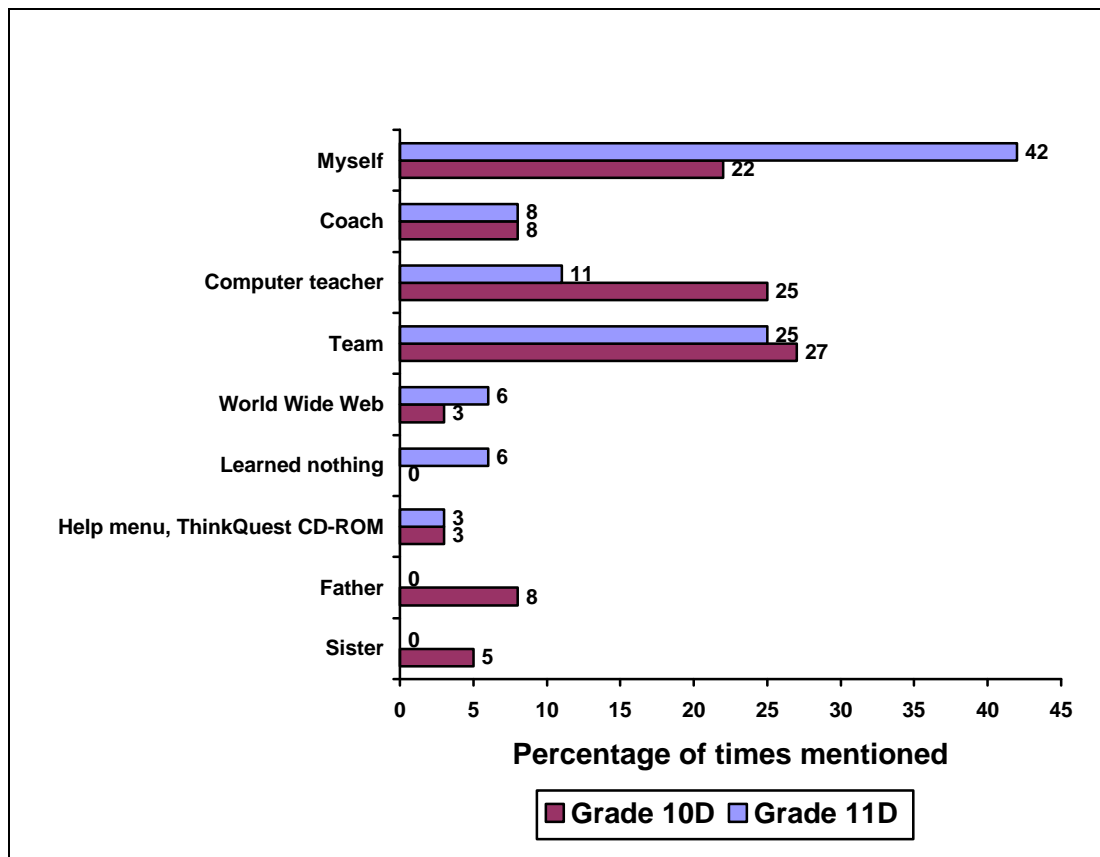
the actual thing myself. Nothing was done for me by him. (Grade 11D female)

- Transport, spell checker (Grade 11D male)

Those *features*, i.e. people, situations, etc. which helped the learners acquire extra computer skills are illustrated in Figure 5 - 16.

- Grade 10D - Learners new to computers depended on their team or teacher to teach them the new computer skills.
- Grade 11D - Experienced computer users taught themselves.

Figure 5 - 16 Features which helped learners acquire new computer skills



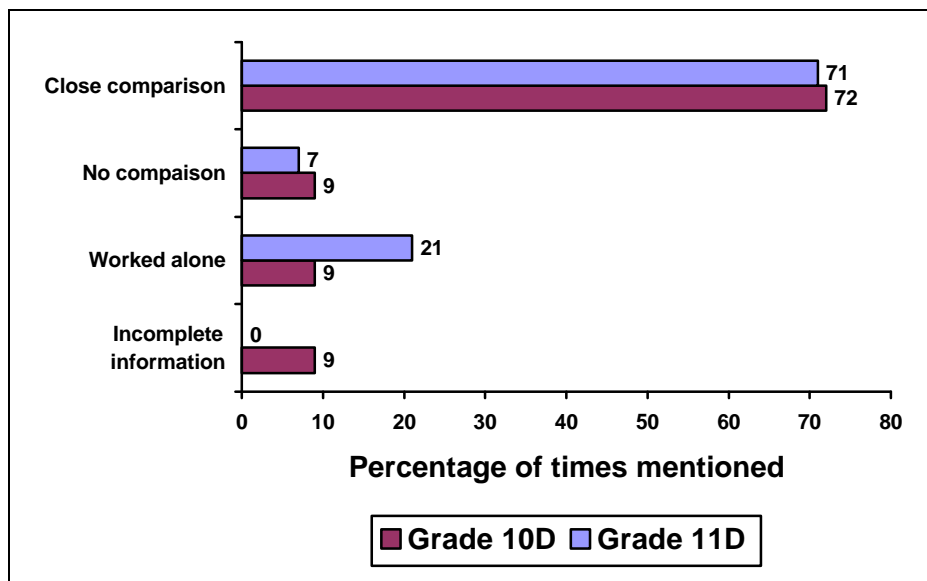
There was little competitiveness among the learners. The assistance given to fellow learners was noted as well as the lack of reciprocal requests for help or anything else - the learners shared what they knew, as illustrated in the quotations below:

- They are kind people and I asked them very nicely (Grade 10D male)
- Miss Miller taught us cause she's our computer teacher and this project was all her idea. My friends helped us because we asked. (Grade 10D female)
- I have no idea. Out of the kindness of their heart. (Grade 11D male)
- Iain [friend] helped me because I asked him to. He has a passion for web design. I taught myself because I had to! (Grade 11D female)

5.2.2.5 Allocating marks to partners

The learners had to allocate marks¹⁰ to their team members and themselves. Grades 10D and 11D indicated knowledge of their own skills and their input to the team effort, as well as those of their team. The marks they gave themselves compared closely with the marks given to them by their team members as tabulated in Figure 5 - 17. The marks of the learners were similar to my observations. In both grades one member of a team felt that they should get marks which differed markedly from the other team members.

Figure 5 - 17 Comparison of team members' marks



The learners were also very kindly disposed towards each other, for example, the learner who was hospitalised and not present for a large part of the work time, was awarded high marks despite her absence.

5.2.3 Managing time

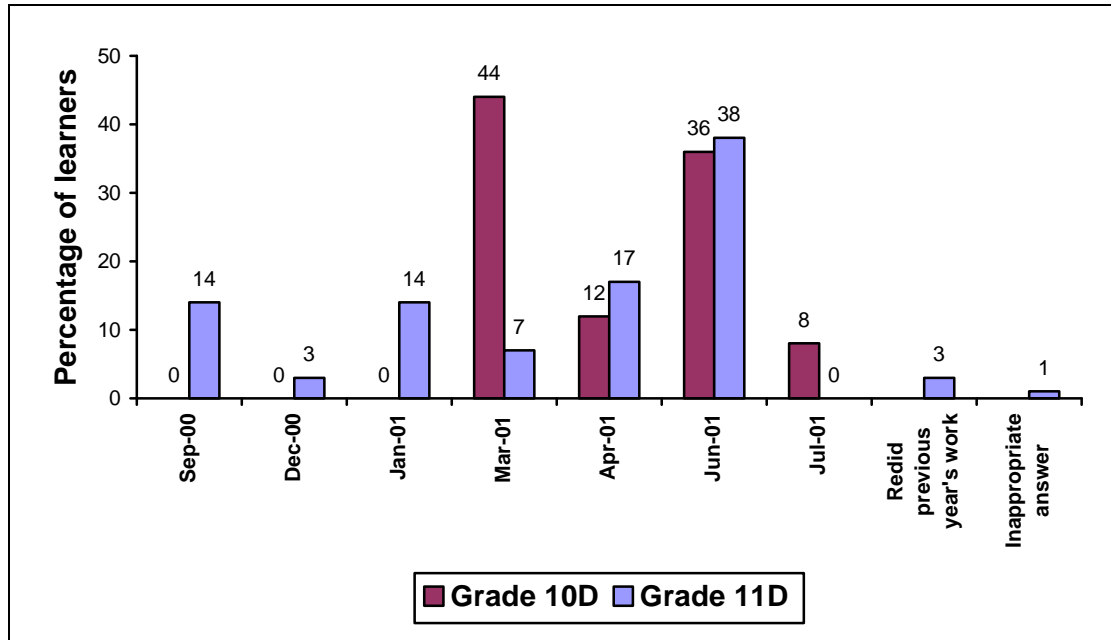
The issue of time was investigated. In Grade 10D 88% of the learners and in Grade 11D 79% of the learners, felt that they had had enough time to complete their entry but had procrastinated and not started when they should have done so.

The grades commenced work at different times, illustrated in Figure 5 - 18.

- Grade 10D - The majority (44%) of learners started work enthusiastically early in March although they were given the project in January.

- Grade 11D - The majority (38%) of learners started work in June although they were given the project the previous September.

Figure 5 - 18 Work commencement month for web entry



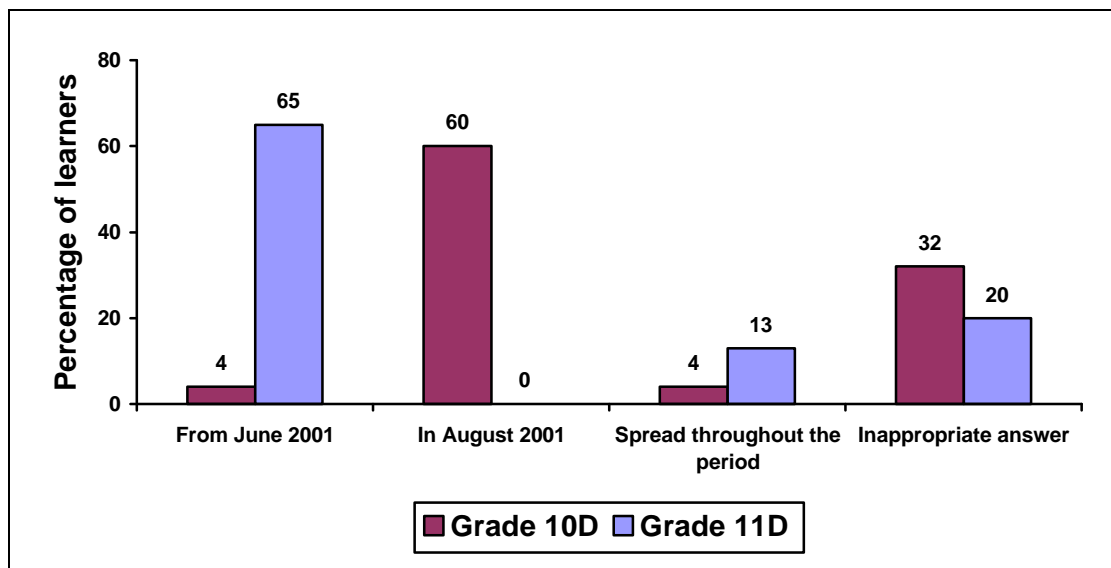
The period when the learners did most of their work is indicated in Figure 5 - 19.

The question was not clear to many learners but it is obvious that they left their work until very close to the due date and then did a great deal of work.

- Grade 10D - The learners did most of their work near the due date in August.
- Grade 11D - The majority of the learners did most of their work in June.

¹⁰ A mark is similar to a grade.

Figure 5 - 19 Period when most of the work was done



In general the learners showed a lack of planning and underestimated the length of time required to complete the web site. The learners do not seem to do project planning. About 50% of the learners did various forms of planning, to a greater and lesser extent, consisting of:

- I didn't I just made sure that I would have enough time to fall back on in case something went wrong. (Grade 10D male)
- We didn't really even plan it. We just worked as it came. Which was quite a wrong thing to do. (Grade 10D female)
- We did it in stages first gather the info and then put it on the site the make a few changes to the presentation of the site. (Grade 10D male)
- We planed that the month should have been enough time to get it up and working but due to the network misbehaving our time was shortened. (Grade 10D female)
- With web design, your template changes all the time, and you are constantly incorporating other ideas into your site. We estimated four months of planning and work. (Grade 11D male)
- We didn't really have much of a project plan in that sense. I just felt that by the end of the holidays, I wanted to have all the information and design of the web-site up, and it was. Everything else just followed. (Grade 11D female)
- We divided the work rate by weeks we had to do it. (Grade 11D male)
- When we both had time, we would get together and work on it. In the holidays, we got together when we were both free and went to the Waterfront for the day to take photos and get information. (Grade 11D female)
- We did not plan. We aimed to finish before the deadline. I was amazed that we were able to produce the results that we did. (Grade 11D male)
- We started quite far in advance and thought that we would be finished at the right time. We were finished about a week or two before the deadline but didn't realize that putting it up on the Net would be a problem. (Grade 11D female)

From the above it is apparent that in the creation of the *ThinkQuest* web site the learners

- started enthusiastically, particularly Grade 10D, but that enthusiasm ebbed quickly;
- did the majority of their work near the due date although both classes had more than seven months in which to create the site; and
- showed poor time management skills.

However, what was surprising was that the learner who reached the international semi-finals did most of her work in the last two months before the due date: She worked mainly alone and was passionate about her topic.

When the due date for the *ThinkQuest* web design project drew imminent it was apparent that many of the teams had still not completed their web site nor uploaded it to the *ThinkQuest* server. Only one web site was up with a day to spare, and many learners tried to upload it on the day it was due. On that day the suburb of Pinelands had a power failure so many of the sites did not get uploaded. The teams in the Cape Town area, including Pinelands, were given two extra days to enable them to complete their entries. Those extra days made it possible for all teams who were ready to upload their sites. Had the learners not had that extra time many would not have been able to complete their entry. Most of the last minute problems were caused by technical problems of uploading which had not been foreseen.

5.2.4 Mental state

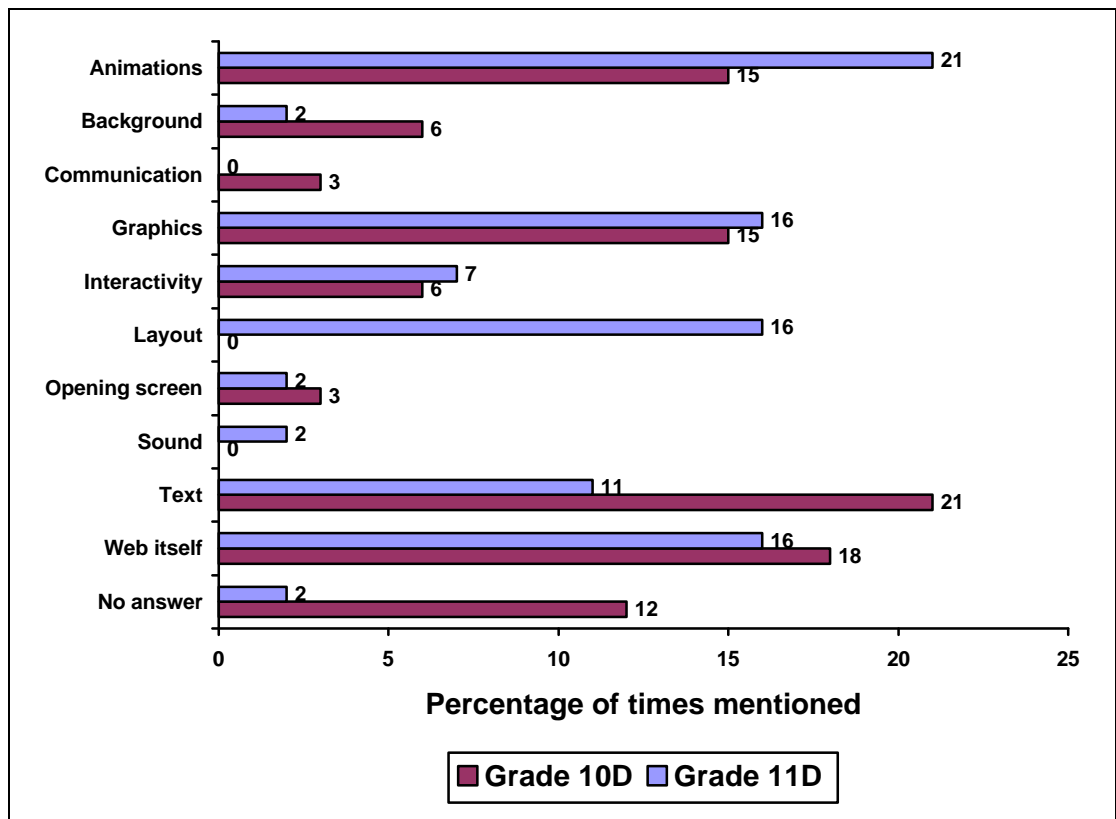
In the following section the joys and frustrations of creating a web site are discussed.

5.2.4.1 Pride and enjoyment

The learners enjoyed themselves creating their entries. Once the initial inertia was overcome they enthusiastically became involved with creating their web site. When they were finished they were asked what they were most proud of in the web site. The findings are illustrated in Figure 5 - 20.

- Grade 10D - The learners were most proud of the text and the information in their site, and the web itself.
- Grade 11D - The learners were most proud of the graphics, animations, layout and the web itself.

Figure 5 - 20 Features in their web sites of which the learners were proud



The enthusiasm, excitement and features that caused pride are exemplified in the following quotations:

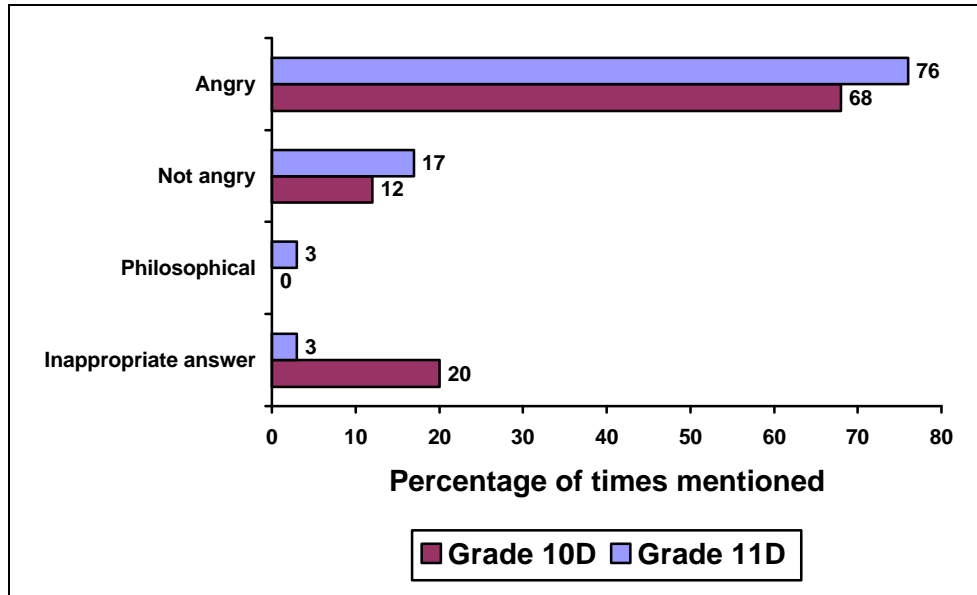
- The fact that we actually managed to make an entire website by our selves, I'm proud of everything. (Grade 10D male)
- Our background. (Grade 10D female)
- We tried our best to make the site and it is the first site we have ever made. (Grade 10D male)
- I think I am most proud of how much information we found about drugs. (Grade 10D female)
- The pictures of the beaches, the intro animation and the signpost. (Grade 11D male)
- The design. I learned so so so much doing this! (Grade 11D female)
- Interactivity. (Grade 11D male)
- Our text and the wonderful colour scheme. (Grade 11D female)

5.2.4.2 Technical problems

While creating the entry, learners in both grades expressed anger towards their computers and printers when they malfunctioned, as illustrated in Figure 5 - 21. The learners who did not experience technical problems with their computers were all male, probably because they managed their computers well and therefore had few malfunctions. The high number of inappropriate answers in Grade 10D may have

been the result of insufficient time to complete the last questions of the questionnaire.

Figure 5 - 21 Emotions expressed when computer malfunctioned



The following comments about malfunctioning printers and computers indicate the learners' frustration with computer technology. The language is most expressive and totally out of character from these non-violent youngsters as seen below:

- VERY FRUSTRATED, \$#%&!!!! (Grade 10D male)
- I felt like disconnecting the computer from the wall, and throwing it out of a second story window where it can get smashed to bits and then I will jump up and down on top of the pieces. (Grade 10D female)
- Really angry because we did so much and then it froze so we had to do 3 pages all from the start (Grade 11D male)
- I got so frustrated that I wanted to hit some sense into the computer!! Too many stressful moments in front of the computer brings much tension and anger! (Grade 11D female)

Some of the comments of the Grade 11D male learners who experienced little or no technical problems:

- My PC is very stable. (Grade 11D male)
- That hardly happened. (Grade 11D male)
- It didn't really happen to us! So I would be dismayed because it would have caused even greater problems! (Grade 11D male)
- It didn't (Grade 11D male)

5.2.5 Summary of interaction with information from an affective perspective

The manner in which the learners affectively interacted with information while involved in the process of creating their entries *at a distance* was discussed in the

preceding section. The findings are summarised and tabulated in Table 5 - 14 focussing on motivation, the influence of peers, managing time and the learners' mental state.

Table 5 - 14 How the learners affectively interacted with information during the process of creating the *ThinkQuest* entry

Affective perspective	Affective interaction
Motivation	<ul style="list-style-type: none"> • Marks and grades were the major motivating factor.
Influence of peers	<ul style="list-style-type: none"> • Team members were selected because they were friends, and secondly because they have the required skills. • Majority of learners enjoyed working with their team members. • Team conflict experienced <i>at a distance</i> was not brought into the computer laboratory. • Parents gave more support than official coaches. • Novice web creators learned a great deal from other team members. • Experienced learners learned by exploring the applications on their own. • Learners were very supportive of their team members. • Learners knew the worth of their own and others' contribution to the creation of the webs.
Managing time	<ul style="list-style-type: none"> • Learners did not manage time well. • Novice and experienced computer users left the task until very near the due date. • Both groups took a relatively short time to create their web.
Mental state	<ul style="list-style-type: none"> • Learners were proud of their web entries, both groups were proud that they had managed to create a web, on the World Wide Web, for everyone to see. • Grade 10D learners were proud of the content of the web. • Grade 11D were proud of the interactive features of the web. • Experienced users were less irritated by malfunctioning computers than the novice users were.

Table 5 - 14 summarises how the learners affectively interacted with information and their team members when creating the web entry:

- Obtaining marks was a motivating factor in developing a good web entry.
- Learners selected members of their team from those they knew from class activities. They were supportive of the team members who did most of their work. Parents played a supportive role although they were not of much technical help.
- The learners did not manage time well, leaving the work until the due date became imminent, and then only spending a short time creating the web entry.

- The learners enjoyed creating their web entry and were proud of their entries, experienced web developers for the interactive features of the web and novice developers by the fact that they had created and uploaded a web site.

Table 5 - 15 indicates where the affective behaviours or activities tabulated in the literature review, Table 2 - 27 in Chapter 2, and the way in which the learners created the web entries *at a distance*, have common ground. The behaviours or activities were examined from the perspectives of motivation, the influence of peers, managing time and mental state.

Table 5 - 15 Comparing affective behaviour or activity from the literature with the way in which the learners created their *ThinkQuest* web entries

Affective perspective	Affective behaviour or activity from the literature review	Common ground	Interaction with information while creating the <i>ThinkQuest</i> web entry
Motivation	<ul style="list-style-type: none"> Intrinsically motivated 	<ul style="list-style-type: none"> ✓ ✓ ✓ 	<ul style="list-style-type: none"> Learners were proud of their web entries, both groups were proud that they had managed to create a web, on the World Wide Web for everyone to see. Grade 10D learners were proud of the content of the web. Grade 11D were proud of the interactive features of the web.
	<ul style="list-style-type: none"> Extrinsically motivated 	<ul style="list-style-type: none"> ✓ 	<ul style="list-style-type: none"> Marks and grades were the major motivating factor.
Influence of peers	<ul style="list-style-type: none"> Learn in a positive social environment 	<ul style="list-style-type: none"> ✓ ✓ ✓ ✓ ✓ 	<ul style="list-style-type: none"> Majority of learners enjoyed working with their team members. Friendship was the main criteria for team selection, and not marks. Novice learners learned from each other. Conflict experienced creating the web was not brought to the classroom. Learners were supportive of their team members.
	<ul style="list-style-type: none"> Critical of their own digital creations, i.e. want to correct and redo, to impress peers 	<ul style="list-style-type: none"> X 	<ul style="list-style-type: none"> Learners did not exhibit the need to impress others, rather to show what could be done.
	<ul style="list-style-type: none"> Learn with group ownership 	<ul style="list-style-type: none"> ✓ 	<ul style="list-style-type: none"> They worked and learned with group ownership as they were making a group or team entry.
	<ul style="list-style-type: none"> Want the independence to find / create their own learning resources 	<ul style="list-style-type: none"> NA 	<ul style="list-style-type: none"> Not observed.
	<ul style="list-style-type: none"> Not found in the literature review 	<ul style="list-style-type: none"> ⇒ 	<ul style="list-style-type: none"> Parents were supportive of their children's work although they did not have many computer skills.
	<ul style="list-style-type: none"> Not found in the literature review 	<ul style="list-style-type: none"> ⇒ 	<ul style="list-style-type: none"> Learners were knowledgeable about their own computer skills, in comparison to those of others.

Affective perspective	Affective behaviour or activity from the literature review	Contact situation	Interaction with information while creating the <i>ThinkQuest</i> web entry
Managing time	<ul style="list-style-type: none"> Want useful, relevant information 	NA	<ul style="list-style-type: none"> Not observed as the situation did not permit it.
	<ul style="list-style-type: none"> Want fast access to information resources 	NA	<ul style="list-style-type: none"> Not observed as the situation did not permit it.
	<ul style="list-style-type: none"> Not found in the literature review 	⇒	<ul style="list-style-type: none"> Learners did not manage their time well, procrastinating until near the due time.
	<ul style="list-style-type: none"> Not found in the literature review 	⇒	<ul style="list-style-type: none"> Both groups took a relatively short time to complete the web.
Mental state	<ul style="list-style-type: none"> Do not suffer from computer anxiety 	X	<ul style="list-style-type: none"> Grade 10D novice users were more stressed by the malfunctioning computers and printers than the experienced Grade 11D learners.
	<ul style="list-style-type: none"> Willing to try a number of options and accept error 	✓	<ul style="list-style-type: none"> Grade 11D learners learned the web-authoring skills more from exploring the packages themselves than other features.
	<ul style="list-style-type: none"> Adventurous, creative, ready to explore the digital unknown 	✓	<ul style="list-style-type: none"> Experienced learners explored packages to learn new skills.

Based on Table 5 - 15 the following activities were *present* in Table 2 - 27 where the affective profile of a South African FET learner in a digital environment was tabulated based on the literature review, and in the creation of the *ThinkQuest* web entry:

- Intrinsically motivated
- Extrinsically motivated
- Learn in a positive social environment
- Learn with group ownership
- Willing to try a number of options and accept error
- Adventurous, creative, ready to explore the digital unknown

Tabulated in Table 5 - 15, behaviours or activities *not found* in the literature review but present at PHS when the learners created their *ThinkQuest* web entry *at a distance* were:

- Parents were supportive of their children's work although they did not have many computer skills.
- Learners were knowledgeable about their own computer skills, in comparison to those of others.
- Learners did not manage their time well, procrastinating until near the due time.
- Both groups took a relatively short time to complete the web.

Table 5 - 15 compared the literature review and when the learners created their *ThinkQuest* web entry at a distance examining it from an affective perspective.

There was much concurrence between the affective profile of a South African FET learner developed in Chapter 2, and the way the learners at PHS created their *ThinkQuest* web entry at a distance.

5.3 Physical perspective

The following section will examine how the learners interact with information in a *distance* digital environment from a physical perspective looking at processing and planning, and presenting information with a broad physical perspective.

5.3.1 Processing and planning

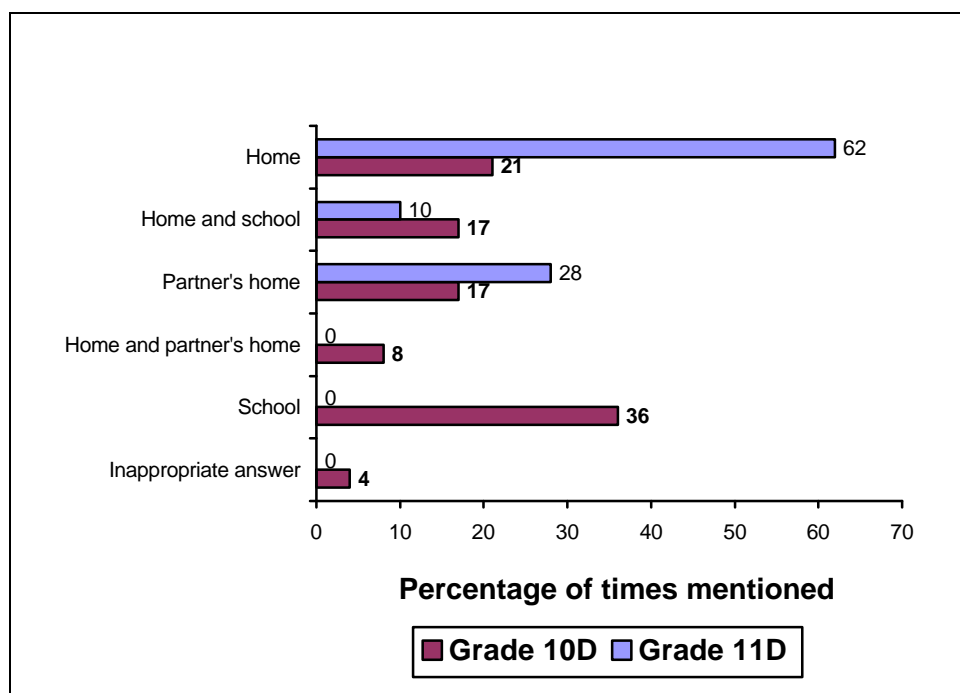
Processing and planning of the *ThinkQuest* entry discusses where the learners worked and why.

The *ThinkQuest* web site was meant to be completed by a team, members of whom were meant to be far apart. Collaboration was meant to be by email, chat, IRC, IRQ, etc. One learner in Grade 10D and one in 11D formed teams with distant persons but they were not successful. Both classes, bar two learners, created web sites with learners at Pinelands High School (PHS), usually a person in their own computer class. (Note that PHS does not have World Wide Web access in the computer laboratory, only email access. Only four slow computers in the media centre have World Wide Web access available for learners' use.) The places where the two classes created their web sites are illustrated in Figure 5 - 22 and the reasons for that decision are illustrated in Figure 5 - 23.

The places where the learners worked are illustrated in Figure 5 - 22.

- Grade 10D - The most common work area was the computer laboratory at school where teams worked together. Note that the learners did not create their web entry in class time in the computer laboratory but rather after school lesson hours.
- Grade 11D - The most common work area was their own homes. Files and completed work were brought to school to be shared with team members. School was not the main place of work as with Grade 10D.

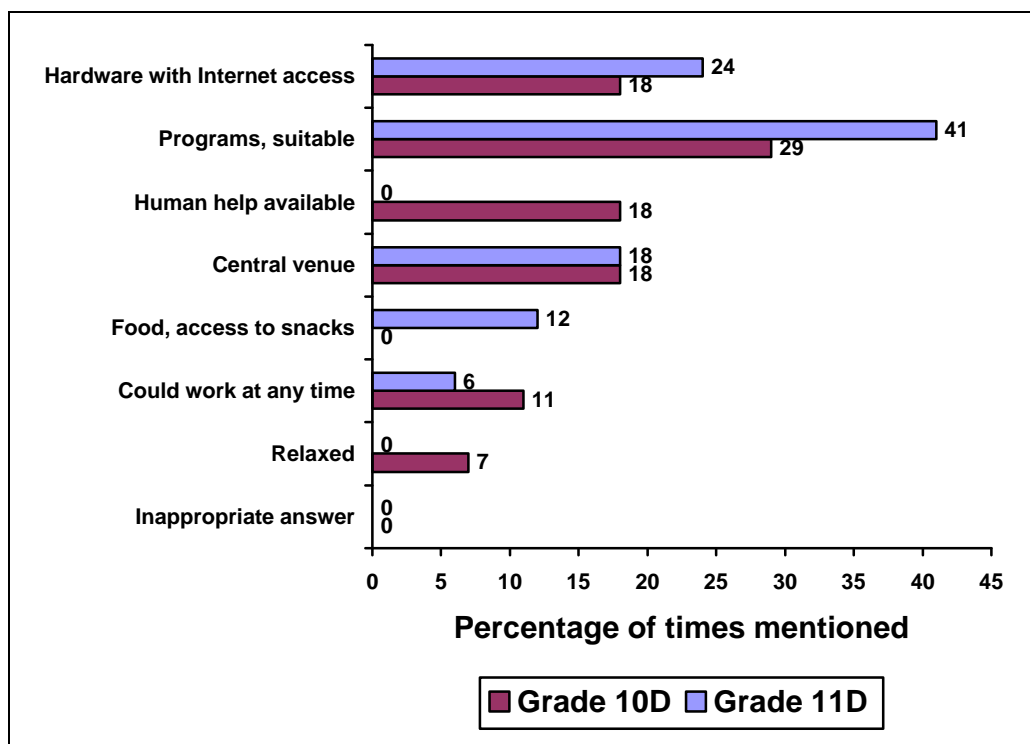
Figure 5 - 22 Work area of learners



An analysis of their responses revealed that the following features illustrated in Figure 5 - 23 were important in determining why the learners preferred to work in particular places.

- Grade 10D - The required programs; then hardware with Internet access, help and a central venue were the most important reasons for working in a particular environment.
- Grade 11D - The required programs and hardware with Internet access were the most important reasons for working in a particular environment, followed by the synthesis of a number of minor factors.

Figure 5 - 23 Reasons for working in a particular environment



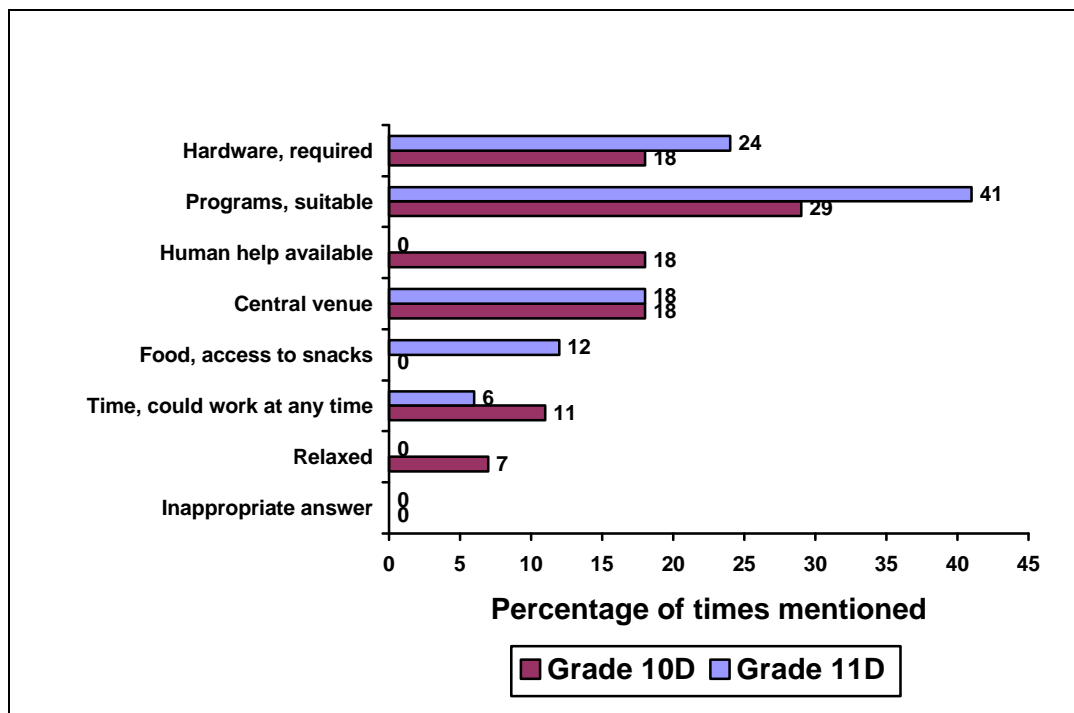
The following quotations illustrate the learners' reasons for working in particular environments:

- It's more relaxed and comfortable than working at school. (Grade 10D male)
- It had all the software requirements we needed. It was also central. (Grade 10D female)
- Comfortable environment and free access to the Internet. (Grade 10D male)
- Well, I couldn't get to his house. (Grade 10D female)
- One always works better in a comfortable surrounding (home), on their own machine. Food, music and your personal choice of programs are available. No people, no unfamiliar programs, no worries. (Grade 11D male)

- It was quiet most of the time and I could always take a break to go and dig in the fridge. But most of the time I would get so involved in my work I would lose track of time and forget to eat!!! (Grade 11D female)

Figure 5 - 24 graphically represents the rationale of the learners with respect to selecting the venue where they worked frequently. The major differences between the two grades are that for Grade 10D help and a relaxed environment are important, whereas in Grade 11D suitable preferred software is important. It must be remembered that Grade 11D knew what could be done as they had had lessons showing the advanced features of *FrontPage* and other software, see Table 5 - 6, whereas Grade 10D were just trying to cope with the basic *FrontPage* application. For both classes, Internet access and a central venue were important factors in selecting a work area. (There is a bit of uncertainty here. I believe that when the Grade 10Ds referred to Internet access they may have meant email access, a method of sending files from one computer to another in a computer laboratory.)

Figure 5 - 24 Required features for work environment



From the preceding discussion the reasons so many Grade 10D learners spent time in the computer laboratory, after school, working on their *ThinkQuest* web sites, is clear. They needed a central venue and human help, although in the computer laboratory I was seldom called upon to give help. Grade 11D learners worked at

home as their homes had additional software, i.e. *Dreamweaver* and *Flash*, and Internet access which the computer laboratory computers did not have.

5.3.2 Presenting information

The learners had to upload their sites to the *ThinkQuest* server. This was very challenging to the Grade 10D learners and their coaches. The cost of staying on line exacerbated their problems as many of them did not read the instructions on the *ThinkQuest* server clearly. The main problem was that some learners did not call their index page 'index' and the server only accepted that file as the main file; and others did not have the correct path for their graphics so when it was uploaded no graphics were shown.

- Grade 10D - Only seven of the initial 11 entries were uploaded in time, although all were eventually completed.
- Grade 11D - Eleven of the 14 entries were uploaded in time, two were completed after the cut off and one was never completed.

5.3.3 Summary of interaction with information from a physical perspective

The manner in which the learners interacted with information from a physical perspective while involved in the process of creating their entries *at a distance* was discussed in the preceding section. The findings are summarised and tabulated in Table 5 - 16, looking at how the learners processed and planned information, and presented information.

Table 5 - 16 How the learners interacted with information from a physical perspective during the process of creating the *ThinkQuest* entry

Physical perspective	Physical interaction
Processing / planning information	<ul style="list-style-type: none"> • Novice web creators worked at school whilst experienced web creators worked at home. • Novice learners preferred to work where there was access to help despite other inconveniences. • In the work area access to the preferred personal programs was of paramount importance to experienced users.
Presenting information	<ul style="list-style-type: none"> • Making a web presented a number of learners with a programming problem related to the correct path. • Uploading the site to the <i>ThinkQuest</i> host was a huge technical challenge to the teams and their coaches.

Table 5 - 16 tabulated how the learners physically worked in a digital information environment when creating their *ThinkQuest* web entries. Learners worked at home

or at school depending on their skills, novice users working at school; and experienced learners working at home using their choice of software. Programming and technical problems relating to file paths and uploading of files respectively proved a problem to a number of learners.

Table 5 - 17 indicates where the physical behaviours or activities tabulated in the literature review, Table 2 - 28, and the way in which the learners created the web entries *at a distance*, have common ground. Due to the circumstances of creating the web site *at a distance* few such behaviours or activities were observed.

Table 5 - 17 Comparing physical behaviour or activity from the literature with the way in which the learners created their *ThinkQuest* entries

Physical perspective	Physical behaviour or activity from the literature review	Common ground	Interaction with information while creating the <i>ThinkQuest</i> web entry
Processing / planning information	• Work / learn actively doing things	NA	• Opportunity was not presented to observe this.
	• Work / learn in a group with talking	NA	• Opportunity was not presented to observe this.
	• Work with partner, share ideas and copies work	NA	• Opportunity was not presented to observe this, worked in team so not applicable.
	• Not found in the literature study	⇒	• Novice learners prefer to work where there is access to help. • Access to the preferred personal programs was of paramount importance to experienced users.
Presenting information	• No specific information found in the literature review	⇒	• Uploading a web to a server was a great technical problem.

Tabulated in Table 5 - 17 behaviours or activities *not found* in the literature review but present at PHS when the learners created a web site at a distance were:

- Novice learners prefer to work where there is access to help.
- Access to the preferred personal programs was of paramount importance to experienced users.
- Uploading a web to a server was a great technical problem.

There was no concurrence between the behaviours or activities in Table 5 - 17 and those present in Table 2 - 28 where the physical profile of a South African FET learner in a digital environment was tabulated based on the literature review.

5.4 Conclusion of analysis

This thesis describes how learners interacted with information in a digital environment from cognitive, affective or physical perspectives while this case study describes how learners interacted with information in a digital environment from cognitive, affective and physical perspectives *at a distance* when they created entries for the *ThinkQuest* web design competition.

The analysis looked at how novice Grade 10D learners and experienced Grade 11D learners interacted with information from cognitive, affective and physical perspectives while creating their *ThinkQuest* entries. The perspectives used for the cognitive, affective and physical activities were taken from the literature review.

Tables 5 - 18, 5 - 19 and 5 - 20 summarise the way the learners at PHS interacted with information while creating their *ThinkQuest* web entries from cognitive, affective and physical perspectives respectively. In each table the perspective and forms of behaviour or activity are drawn from the literature review, to introduce the way the learners interacted with information. Based on the evidence, in a situation where learners interact with information *at a distance*, the main areas of interaction are in the affective and cognitive areas, tabulated in Table 5 - 18 and Table 5 - 19.

Table 5 - 18 Evidence of interaction with information in a distance educational digital environment from a cognitive perspective

Cognitive perspective	Cognitive behaviour or activity	Interaction with information in a distance educational digital environment
Acquiring information	<ul style="list-style-type: none"> • Learning and mentally processing information 	<ul style="list-style-type: none"> • Learners gained web-authoring skills as they created the entries. • Learners used a variety of resources to obtain information, those new to web-authoring mainly from the World Wide Web and those experienced in web-authoring from printed resources
Recalling information	<ul style="list-style-type: none"> • Long term memory recalled 	<ul style="list-style-type: none"> • Not observed.
Processing / planning information	<ul style="list-style-type: none"> • Planning / creating of digital projects 	<ul style="list-style-type: none"> • A level of planning is evident.
	<ul style="list-style-type: none"> • Use of higher-level thinking skills 	<ul style="list-style-type: none"> • Higher-level thinking skills were used in structuring the webs on two levels, a format found in most webs. Frames, indicating higher-level thinking skills, were used by a number of learners although Grade 10D learners were not successful. Quizzes found in half of the entries indicated higher-level thinking skills.
Presenting information	<ul style="list-style-type: none"> • Cognitive processing of screen-based material 	<ul style="list-style-type: none"> • Very few spelling errors noted.
	<ul style="list-style-type: none"> • Ability to communicate their understanding of the subject matter in multiple formats 	<ul style="list-style-type: none"> • Learners did not communicate their content in multiple formats, mainly staying with static images, thumbnails and text-based content.

Table 5 - 19 Evidence of interaction with information in a distance educational digital environment from an affective perspective

Affective perspective	Affective behaviour or activity	Interaction with information in a distance educational digital environment
Motivation	<ul style="list-style-type: none"> Intrinsic motivation 	<ul style="list-style-type: none"> Learners were proud of their web entries: both groups were proud that they had managed to create a web, on the World Wide Web, for everyone to see.
	<ul style="list-style-type: none"> Extrinsic motivation 	<ul style="list-style-type: none"> Marks and grades were the major motivating factor.
	<ul style="list-style-type: none"> Types of motivation for different ability learners 	<ul style="list-style-type: none"> The novice Grade 10D learners were proud of the content of the web. Experienced Grade 11D learners were proud of the interactive features of the web, although there were few.
Influence of peers	<ul style="list-style-type: none"> Social environment 	<ul style="list-style-type: none"> The majority of the learners enjoyed working with their team members. Conflict experienced creating the web was not brought to the classroom. The learners were supportive of their team members. Friendship was the main criteria for team selection, and not marks. Novice learners learned from each other. Learners were knowledgeable about their own computer skills, in comparison to those of others.
	<ul style="list-style-type: none"> Critical appraisal of own digital creations 	<ul style="list-style-type: none"> Learners did not exhibit the need to impress others, rather to show what could be done.
	<ul style="list-style-type: none"> Group ownership of created material 	<ul style="list-style-type: none"> The learners worked and learned with group ownership as they were making a group or team entry.
Managing time	<ul style="list-style-type: none"> Time spent on work 	<ul style="list-style-type: none"> A short time was spent on the entry, having wasted time and procrastinated.
	<ul style="list-style-type: none"> Meeting deadlines 	<ul style="list-style-type: none"> Most of the learners were a few days short of the deadline, i.e. most did not keep to the deadlines.
Mental state	<ul style="list-style-type: none"> Computer anxiety 	<ul style="list-style-type: none"> The Grade 10D novice users were more stressed by the malfunctioning computers and printers than the experienced Grade 11D learners. Novice learners preferred to work where there was access to help. Uploading a web to a server was a stressful technical problem.
	<ul style="list-style-type: none"> Willingness to explore the digital unknown 	<ul style="list-style-type: none"> Experienced Grade 11D learners learned the web-authoring skills more from exploring the packages themselves than other features. The experienced learners explored packages to learn new skills.

Table 5 - 20 Evidence of interaction with information in a distance educational digital environment from a physical perspective

Physical perspective	Physical behaviour or activity	Interaction with information in a distance educational digital environment
Processing / planning information	<ul style="list-style-type: none"> • Work / learn actively doing things 	<ul style="list-style-type: none"> • Nothing noted.
	<ul style="list-style-type: none"> • Work / learn in a group with talking 	<ul style="list-style-type: none"> • Nothing noted.
	<ul style="list-style-type: none"> • Work with partner, share ideas and copy work 	<ul style="list-style-type: none"> • This was an integral part of the project.
	<ul style="list-style-type: none"> • Choice of software 	<ul style="list-style-type: none"> • Access to the preferred personal programs was of paramount importance to experienced users.

The preceding Tables 5 - 18, 5 - 19 and 5 - 30 illustrate how, from cognitive, affective and physical perspectives, learners at PHS acquire, recall, process and plan, and present information in a digital environment *at a distance*. The way in which the learners are motivated and influenced by their peers is described and their mental state noted. To summarise the information:

- Learners gained web-authoring skills while they created the entries. Various sources were used to obtain information, experienced web developers preferring sources other than the World Wide Web.
- The development of web sites lends itself to higher-level thinking skills which were evident in the work. The web sites did not exhibit information in many formats, remaining with the known features of graphic, thumbnail and text.
- Creating their own web site about a topic of their own choice, and placing it in the public domain intrinsically motivated the learners, while the extrinsic motivation of obtaining good marks was also very important to the learners.
- The learners enjoyed working with their partners as a team and kept personal conflicts to themselves, not bringing them to the classroom where they interacted with their *ThinkQuest* partners on an almost daily basis.
- The learners did not plan their work with respect to time, left the work until late, and only spent a relatively short time creating the entry.
- Novice learners were stressed by malfunctioning computers and found emotional security working in an environment where there was technical assistance.
- Experienced learners learned aspects of the web-authoring packages more so on their own than with someone teaching them.

6 Measures to ensure validity and reliability

Measures were taken to ensure validity and reliability. In order to enhance internal validity the strategies based on Merriam (1998, p. 204) and McMillan and Schumacher (1993, p. 391) were used. These strategies included triangulation, long-term observation, member checks or learner validation, field research and looking at researcher's bias.

6.1 Triangulation

In order to triangulate the findings the

- learners were observed as they worked;
- entries were examined by learners and myself to find specific features;

- data was collected via a questionnaire, analysed, collated and then examined by the participants; and
- learners confirmed the data of the case study.

6.2 Observation of the learners

I had the privilege of teaching the Grade 10D learners for the year in which they participated in the *ThinkQuest* web design competition. During this period I observed and got to know them so that I was able to verify the data in the questionnaire. I taught Grade 11D for a full year before they entered the *ThinkQuest* competition, and then the year in which they took part in the competition. During both years I taught the learners one period a day, or every day of the week. I got to know the learners through the long-term teaching and observation.

6.3 Learner validation of the printed case study

The learners were shown this chapter with the statistical data and results of the questionnaire. They were asked to check my interpretation. They looked at the statistics first and found them interesting, and then they looked down at the quotations trying to find if their comments had been chosen. They checked that I had not identified them. The learners did not find anything amiss in the interpretation or, if they did, they did not communicate it to me.

6.4 Field research and questionnaire

The research was done as part of the ongoing aim to improve teaching at the school. The school subscribes to the tenets of Total Quality Management so completing a questionnaire to analyse how things were done is part of usual schoolwork.

Learners were asked to complete the questionnaire found in Appendix I when they had completed the web entry, as data captured from the questionnaire would improve the subject teaching, project work and *ThinkQuest* entry organisation in the future. The learners believed me and completed the entry with honesty, in most cases, see 5.2.2.3, Team conflict, where I am sure the learners did not tell the truth. The following illustrates the faith of the learners in the privacy of the questionnaire, and the open and honest way in which they completed the questions:

My first partner was apparently xxx xxx. But because you said that this report back was private and based on honesty, I feel that I have to say that she was totally made up. I am the kind of person that works on her own and can't really see myself working with people for such a big project and over such a long period of time. So what I did was approach xxx xxx and my second partner yyy yyy and asked them if I could use them and their names when I entered ThinkQuest because you had to be in a team. Reluctantly they agreed. So they weren't technically made up, but they weren't exactly team members. I hope that this honesty doesn't affect my year end marks because that is the main thing I am worried about. (Grade 11 learner)

When the learners were given the questionnaire I first read it aloud to the learners explaining the few ambiguities. They

- completed the questionnaire in a double-period during class time on computer in total silence and in secrecy;
- did not seem to find anything wrong with the questions and would have complained if they had thought the questions infringed on their privacy or were a waste of time; and
- were aware that I was trying to find a way to improve matters in the teaching and organisation of the subject.

The data collected was read on the basis of knowing the learners, and in conjunction with their partners' answers. Where there were strange answers they were corroborated with that of the fellow team member or in an interview with the learner.

6.5 Researcher bias

My underlying bias, if there is one, is to find a way to get my learners to work well and in the future do well in large projects and in the *ThinkQuest* web design competition in particular.

With my level of experience with the *FrontPage* application and *ThinkQuest* organisation, tabulated in Table 5 - 21, I had time to focus on the learners' interaction with information in creating the competition entry.

Table 5 - 21 Author's knowledge of the *ThinkQuest* competition and web-authoring with *FrontPage* in a teaching situation

Author's knowledge	
Subject	<ul style="list-style-type: none"> I have taught the subject Computer Studies Standard Grade (SG) since 1997.
Learners	<ul style="list-style-type: none"> Grade 10D learners were in their first year doing the subject Computer Studies SG with me. Grade 11D learners knew me well as I had taught them for one year already in Grade 10 doing Computer Studies SG. I taught each class for one period a day, every day of the week, for the whole school year.
<i>ThinkQuest</i>	<ul style="list-style-type: none"> The school and I have been involved with <i>ThinkQuest</i> since 1998 as seen in Table 5 - 22. I knew the <i>ThinkQuest</i> organisation and mode of operating after three years of judging, and managing the project with one Grade 11 class in 2000.
Web editor	<ul style="list-style-type: none"> I wrote tip sheets on the web-authoring application <i>FrontPage</i> for the South African <i>ThinkQuest</i> organisers and their CD, and knew the application.

The involvement of the school and myself, nationally and internationally, with *ThinkQuest* is tabulated in Table 5 - 22. After so much experience with *ThinkQuest* my comments and evaluation of web entries is based on experience and is considered valid.

Table 5 - 22 Involvement of the author and Pinelands High School in the competition

Year	Author judging	Learner recognition	Mass entries
1998	<ul style="list-style-type: none"> National International 	<ul style="list-style-type: none"> National - Nothing International - Nothing 	<ul style="list-style-type: none"> None
1999	<ul style="list-style-type: none"> National International 	<ul style="list-style-type: none"> National - Nothing International - Nothing 	<ul style="list-style-type: none"> Two learners in Grade 9 enter competition. Many learners in Grade 12 enter competition for their Matriculation project
2000	<ul style="list-style-type: none"> National 	<ul style="list-style-type: none"> National - Nothing International - Two learners (one team) in Grade 10 reach semi-finals 	<ul style="list-style-type: none"> Whole of one Grade 11 class enter competition - ± 30 learners
2001	<ul style="list-style-type: none"> International 	<ul style="list-style-type: none"> National - Nothing International - Two learners (one team) in Grade 11 reach semi-finals 	<ul style="list-style-type: none"> Two classes, Grade 10D and Grade 11D, enter competition - ± 70 learners

I have endeavoured to make the results valid and reliable by having the participants openly respond to questions, check information collected and use participants' language.

7 Summary

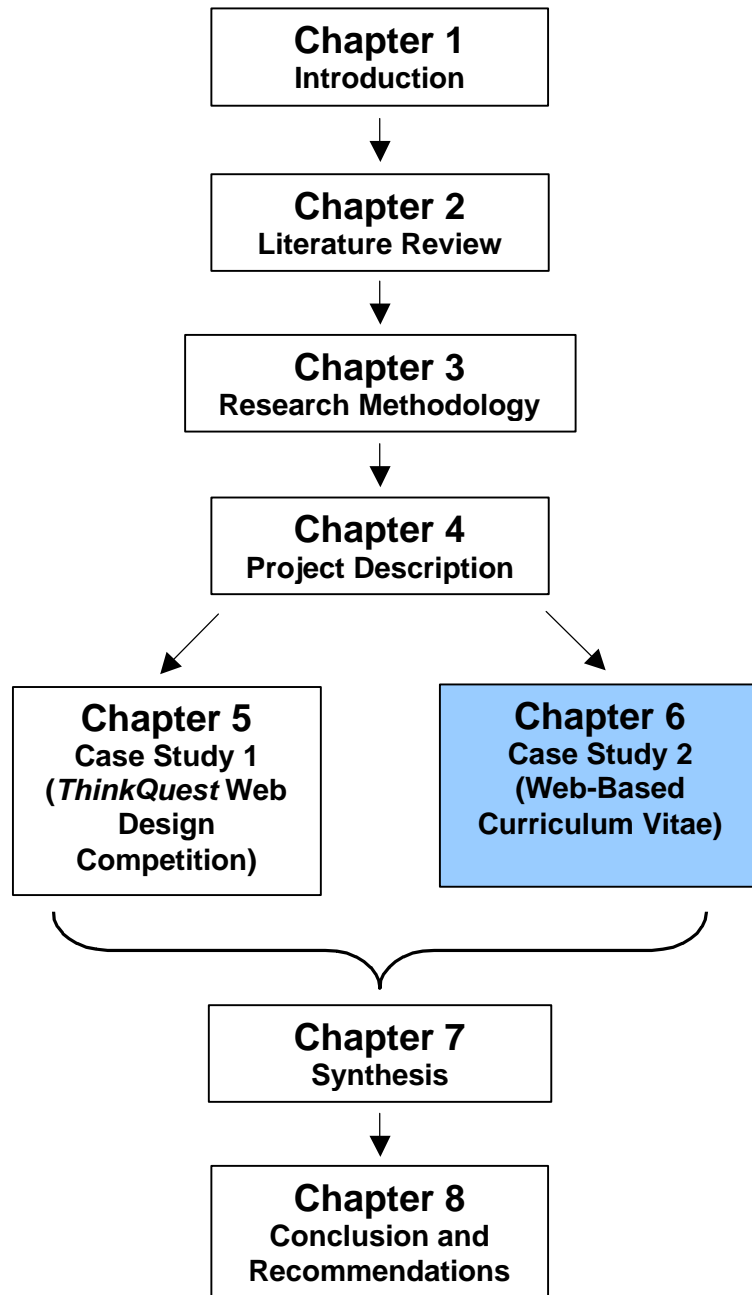
Case Study 1 is an investigation into how learners create an entry for the *ThinkQuest* web design competition *at a distance* in a digital environment. The chapter commenced by describing the diversity of participants in the study looking at:

- Numbers of learners who completed the entry and questionnaire
- Distribution of learners by race and gender
- Numbers of learners who submitted their entries
- Ownership and use of digital devices

The data collection methods were described looking at observation, the event log, the questionnaire, document analysis and interviews. The process of making the entry was described from setting the Background, to the Start, In progress and Submission stages. The completed entries and the questionnaire were analysed with respect to how the learners created the entry from cognitive, affective and physical perspectives. A detailed profile indicating how they interacted with information *in a distance* digital environment was developed. The chapter concluded by describing the measures taken to ensure validity and reliability.

Case Study 2 will be examined in a similar way, looking at how learners interacted with information from cognitive, affective and physical perspectives while creating a web-based CV in a *contact* digital environment.

Chapter 6

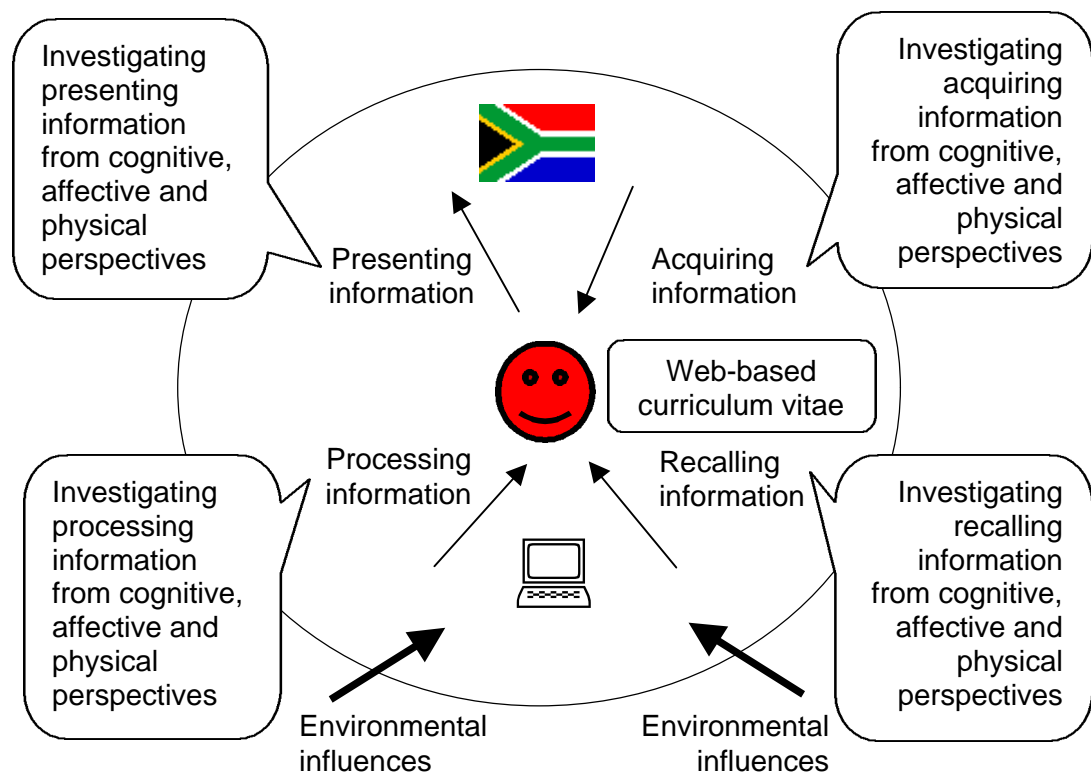


Chapter 6 Case Study 2 - Web-Based Curriculum Vitae

1 Introduction

This case study describes how learners interacted with each other and information in a *contact* digital environment, when they created a curriculum vitae (CV) in a web-based format. The web-based CV was created in a *contact* situation at school in class lesson time. In this case study the focus will be to determine how learners interacted with information with respect to cognitive, affective or physical perspectives as they acquired, recalled, processed and planned, and presented information, as illustrated in Figure 6 - 1. The profile for the analysis of the CV and the process of creating it comes from the profile developed and tabulated at the conclusion of Chapter 2. Figure 6 - 1 illustrates the investigation in this chapter as the PHS learners in a digital environment create their web-based CVs influenced by external forces.

Figure 6 - 1 Interaction with information as the learners create their web-based CVs



This chapter

- examines the participants of the case study, the data collection methods and the process of creating the web-based CV;
- analyses the completed CVs;
- describes the measures taken to ensure validity and reliability; and
- concludes with a summary of the whole case study.

2 Participants

This section provides statistical data on the two Grade 11 classes, 11A and 11D, who made web-based CVs. The following are discussed:

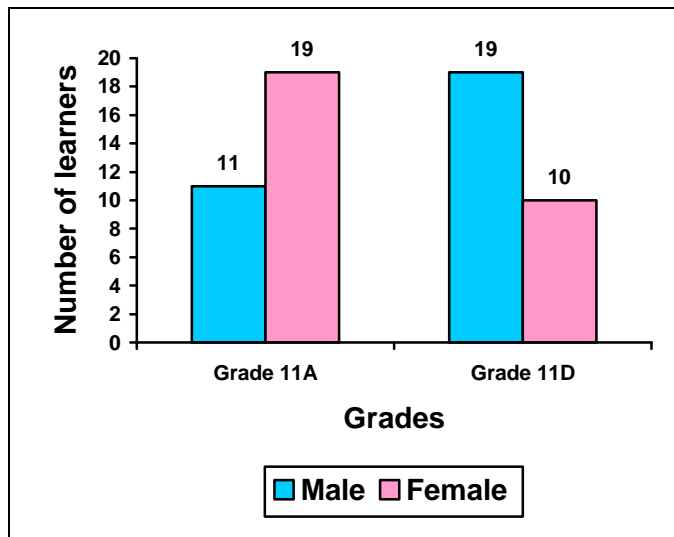
- Numbers of learners who completed the web-based CV
- Distribution of learners by race and gender
- Learners who submitted their web-based CV
- Ownership and use of digital equipment
- Seating positions of the learners in the computer laboratory

The CV was part of the final Matriculation Computer Studies SG project.

- The numbers mentioned in this case study do not reflect those who left the class to do Higher Grade (HG). A number of learners took both Computer Studies Standard Grade (SG) and Computer Studies HG up to Grade 11. For Grade 12 they had to select one or the other grade level for the Matriculation examination. Those learners who elected to do HG in Grade 12 did not do the web-based CV and vacated the class while the web-based CV was being created.
- One learner who was ill for most of the year was not included in the numbers for the grade.

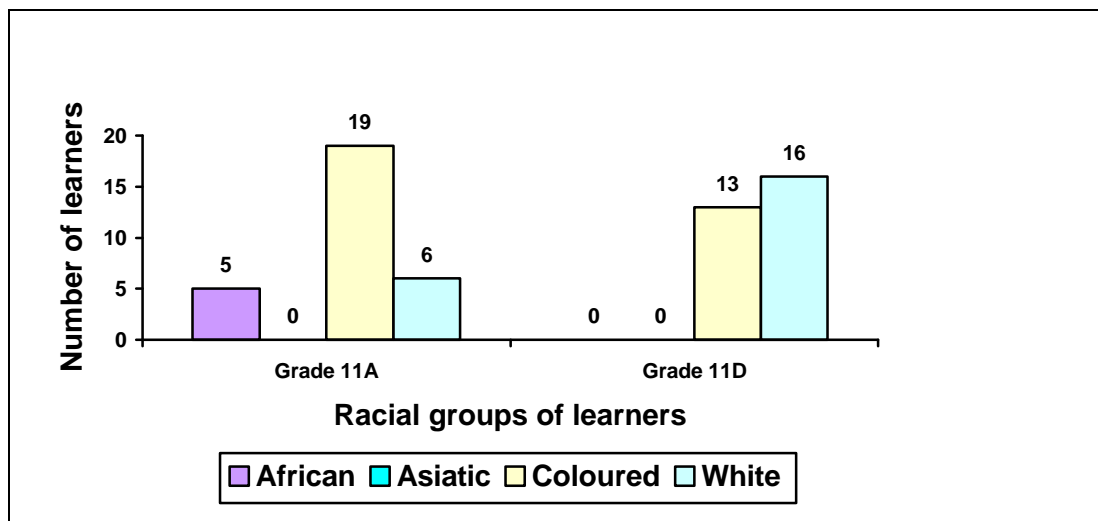
There were two classes of learners in Grade 11 who took the subject Computer Studies SG. The distribution of genders is illustrated in Figure 6 - 2 showing differences in the two classes. The A class has a majority of females whereas the D class has a majority of males.

Figure 6 - 2 Gender distribution by class



The racial distribution of the two classes whose learners made web-based CVs are illustrated in Figure 6 - 3. There are more Coloured learners in the A class and more White learners in the D class, than other racial groups.

Figure 6 - 3 Racial distribution by class



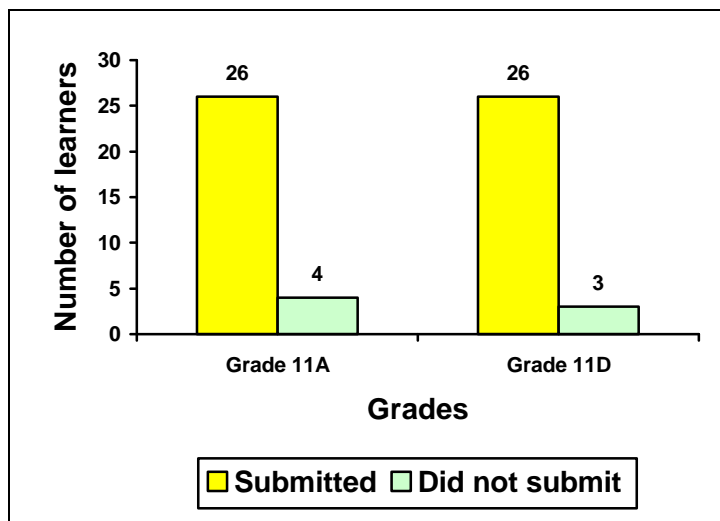
The genders and racial distributions are tabulated in detail in Table 6 - 1. Of the two grades the largest racial group is Coloured, whilst the genders are almost equal.

Table 6 - 1 Gender and racial distributions of learners

			African	Asiatic	Coloured	White
Grade 11A	Male	11	4	0	4	3
	Female	19	1	0	15	3
	Total	30	5	0	19	6
Grade 11D	Male	19	0	0	10	9
	Female	10	0	0	3	7
	Total	29	0	0	13	16
Total		59	5	0	32	22

The numbers of learners who successfully completed and submitted the CV are illustrated in Figure 6 - 4. There is not an appreciable difference between the two classes with respect to the proportion of learners who did not submit their CVs.

Figure 6 - 4 Learners who submitted their CVs



The genders of the learners who successfully submitted their CVs are illustrated in Figure 6 - 5. A higher proportion of males than females did not submit their CVs.

Figure 6 - 5 Genders of learners who submitted their CVs

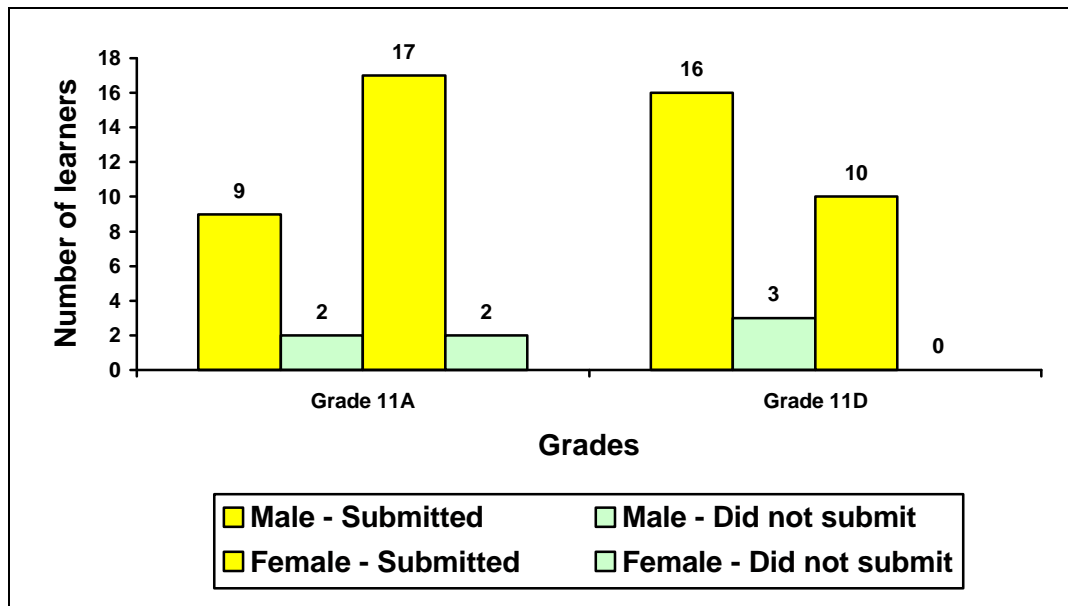


Table 6 - 2 and Table 6 - 3 illustrate how digitally experienced the learners are. They completed the *I own* and *I can* survey discussed in Chapter 4, indicating how many digital pieces of equipment they owned, and how many activities they were able to perform. The data below does not reflect the digital abilities of all the learners who created CVs but sufficient data is provided to indicate that these learners are at home with popular digital activities. There is a significant difference between the two classes, as well as huge differences within the classes. The Grade 11A learners own fewer pieces of digital equipment and are less able to use such equipment.

Table 6 - 2 Digital pieces of equipment owned by learners, out of a maximum of 24

Grade	Average	Maximum	Minimum	Total learners surveyed
11A	13 or 54%	19	7	19
11D	15 or 62%	21	10	18
Average	14 or 58%	20	8	37

Table 6 - 3 Digital activities able to be performed, out of a maximum of 16

Grade	Average	Maximum	Minimum	Total learners surveyed
11A	7 or 43%	11	3	19
11D	12 or 75%	16	9	18
Average	8 or 50%	13	6	37

2.1 Seating positions of learners in the computer laboratory

The learners were allowed to sit where they wished in the computer laboratory. They often walked around to visit and see their friends' work. Regular absence from class probably influenced relationships with peers. In the illustrations of the seating arrangements the blue refers to male learners and pink to female learners. Those learners who did not complete their CV have the words 'No work' in their seating place.

The Grade 11A and Grade 11D seating positions for the course of the web-based CV are illustrated in Figure 6 - 6 and Figure 6 - 7. Before any particular influence is pointed out, it is useful to note

- the empty seats, particularly in Grade 11A;
- the positions of the academically strong learners who took Higher Grade and 'Left' and their possible influence, particularly in Grade 11D;
- the seating positions of learners of different genders; and
- the proximity of the learners who did not hand in work, to other learners.

2.1.1 Seating positions of Grade 11A

The usual seating positions of Grade 11A are illustrated in Figure 6 - 6. In Grade 11A the rate of absence was high. Owing to the fact that there were a number of unused workstations, during the course of the year the learners moved around a bit.

The following learners were often not present and their seats vacant:

- Caryn was absent from class or late for class at least three times a week.
- Avril was often absent on sporting engagements.
- Buntu was often absent for reasons unknown.

Figure 6 - 6 Seating positions of Grade 11A learners

Khim	Basri	Kerri	Gwen	Aisle	Avril	No work Lisa	No work Megal	Mandy	Back row
Nina	Caryn	Judy	Silma			Moosa	Linda	No work Wafiq	4th row
	Liana	Kay	Tracy		No work Chad	Tanya	Carlo	Lyle	3rd row
	Skake	Buntu	Vuyo		Emma	Candy	Zodwa	Siv	2nd row
Max									First row

As seen in Figure 6 - 6

- there were relatively few males in the Grade 11A class;
- only one group of males sat together, i.e. Skake, Buntu and Vuyo; and
- the seating positions of those who did not hand in work providing no discernable pattern of influence with respect to handing in of work.

2.1.2 Seating positions of Grade 11D

The usual positions of Grade 11D for the course of the web-based CV are illustrated in Figure 6 - 7. Those learners who did not complete their CV have the words 'No work' in their seating place. There were not many open seats. The learners whose seats were unoccupied for any length of time are indicated below:

- Peter was absent so often that his work and position is not taken into account for this case study.
- Imran was often absent on sporting engagements.
- The seats occupied by learners who left to do Higher Grade are indicated with 'Left'.

Figure 6 - 7 Seating positions of Grade 11D learners

No-work Gino	Rob	Vinay	Kelly	Aisle	Jason	Left	Brent	Dale	Back row
Left	Left	Jared	Craig		Yusuf	No-work Kader	Ricco	Imran	4th row
Safia	Robyn	Tessa	No-work Alex		Susan	Lara	Kate	Penny	3rd row
Sarah	Peter ##	Marc			Paul	Ross	Brent	Kurt	2nd row
Jenna	Simon								First row

As seen in Figure 6 - 7

- before the Higher Grade learners left, they sat within the class;
- learners of the same gender seemed to sit near others of the same gender; and
- the seating positions of those who did not hand in work provided no discernable pattern of influence with respect to handing in of work.

2.1.3 Seating position and academic performance

Figure 6 - 8 illustrates the seating positions of the Grade 11A learners and their academic results in Computer Studies SG in their Matriculation examinations at the end of 2002. Note the following:

- The learners were free to sit next to whom they liked.
- Those who 'Repeated' did not pass Grade 11 at the end of 2001, the year in which the case study was done, and hence did not write the Matriculation examination at the end of 2002.

There were no marks for Khim in Grade 11A as she 'Did not write' as she was ill on the examination day.

Figure 6 - 8 Seating positions and academic performance of Grade 11A learners

Khim Did not write	Basri 49	Kerri 34	Gwen 50	Aisle	Avril 42	No work Lisa 54	No work Megal 44	Mandy 41	Back row
Nina 58	Caryn 48	Judy 54	Silma 43			Moosa Repeated	Linda 51	No work Wafiq 49	4th row
	Liana 52	Kay 61	Tracy 50		No work Chad Repeated	Tanya 55	Carlo 50	Lyle 65	3 rd row
	Skake 44	Buntu 42	Vuyo 57		Emma 59	Candy 49	Zodwa 39	Siv 55	2 nd row
Max 45									First row

From Figure 6 - 8 (Grade 11A) and Figure 6 - 9 (Grade 11D) it can be observed that learners seated next to each other obtained similar marks.

Figure 6 - 9 Seating positions and academic performance of Grade 11D learners

No work Gino 64	Rob 69	Vinay 80	Kelly 75	Aisle	Jason 92	Left	Brent 66	Dale 57	Back row
Left	Left	Jared 81	Craig 80		Yusuf 77	No work Kader 68	Ricco Repeated	Imran 47	4th row
Safia 80	Robyn 80	Tessa 76	No work Alex Repeated		Susan 77	Lara 69	Kate 77	Penny 81	3 rd row
Sarah 69	Peter Siek	Marc 58			Paul 70	Ross 73	Brent 66	Kurt 90	2 nd row
Jenna 60	Simon 80								First row

3 Data collection methods

In order to ensure reliability, consistency and dependability of the results, multiple methods of data collection were used for analysis. The methods used to collect data for the case study are tabulated in Table 6 - 4. The instruments of observation, an event log, digital document analysis and interviews were used to collect data.

Table 6 - 4 Data collection methods

Instrument	Activity
Observation	<ul style="list-style-type: none"> • The learners were observed over the period of two weeks allocated for the work, while I walked around the computer laboratory and noted the process in an event log. • The seating positions of the learners in the class, with respect to features in their CVs, were noted. • <i>NetOps School</i> was used to monitor the learners from my desk when I was not walking around the room and observations were noted in an event log.
Event log	<p>The following were noted in the event log:</p> <ul style="list-style-type: none"> • When the work was started. • How the learners worked in class. • What work the learners did in class. • Where the learners worked. • With whom the learners worked.
Digital document analysis	<p>The web-based CVs were collated and put onto a CD and the network for closer examination and analysis by learners and myself. The CVs or digital documents were systematically examined using the Windows Find function and the eye, by the learners and myself, and detailed in a spreadsheet, Appendix L. The following were counted:</p> <ul style="list-style-type: none"> • Every animated gif made with <i>CoffeeCup Firestarter</i> or <i>Flash</i>, animated gif made with <i>Gif Animator</i> or similar, drop down box, feedback form, guest book, jigsaw puzzle, quiz, rollover, thumbnail, tile puzzle and crossword; • Every animated clipart gif, static pictures, sound clip, video clip and graphic background; • Shared borders, frames and image maps were noted; and • Spelling mistakes, levels of information, structure, amount of information and technical quality were noted.
Interviews	<ul style="list-style-type: none"> • Interviews were held with certain learners to elaborate on incidents and interpretations in the printed case study. • The interviews took place in the computer laboratory at the learners' workstations usually in full view of their neighbouring peers who often added to the discussion.

The data about how the learners created the web-based CV was collected by observation and interviews, and the product was analysed in order to gain additional data. The CVs were made in November 2001. To add hindsight and depth to the findings the learners re-examined their CVs in July 2002 and confirmed the data in the case study. The aim of this re-examination was to add additional data to the case study and add reliability to the findings.

4 Process of creating the web-based curriculum vitae

This case study considers how the learners interacted with information when they created a curriculum vitae (CV) in a web-based format with respect to cognitive, affective or physical perspectives. The following section will discuss the process of creating the web-based CV by introducing it to the learners, watching their progress and their submission of the work. The section will also look at how the learners were motivated, the software used, the place where they did their work, their use of features and their interpretation of the instructions.

4.1 Background

Both classes of Grade 11 learners were given two weeks in which to complete the task of creating their CV as a web site. Earlier the previous term they had completed many web-based tasks and an examination; hence they were well versed in web-based skills. This web-based CV was given to the learners soon after the web-based tasks and examination, as web-based skills were still fresh in their memories. Earlier in the year, for their annual projects, Grade 11A had created a desk top published booklet and not done a web-based project, whereas Grade 11D had taken part in the *ThinkQuest* web design competition. At the conclusion of their respective projects both classes were given a questionnaire, see Chapter 4, to complete which I analysed. The questionnaire was given to the learners with the express purpose of finding better ways of setting and managing projects with respect to the following:

- motivation;
- time management;
- interacting with peers, parents, adults and technology; and
- information.

Based on their responses, it was decided to start the web part of their important Matriculation project while those skills were still fresh.

Conditions when setting the project were as follows:

- Learners had previously made paper-based CVs in English and knew the content of a CV.
- My web-based CV was available on the network and the World Wide Web as an example of a CV to emulate and improve upon.

- Examples of important web features to include were given as hyperlinks from the digital instruction sheet.
- Time was set aside in class to work on the CVs.
- Learners were given two weeks in which to complete the web-based CVs.
- The web-based CV was an important part of the learners' final Matriculation project.
- Important web features that would ensure high marks were listed and given with the instructions to the learners.

The Matriculation Computer Studies SG project is meant to be a package showing the integration of applications in the *MS Office* suite as well as other impressive uses of computer applications. A business is deemed the best method of meeting the requirements of the project by showing off the features of the *Office* suite. It is a large project so I planned to break it down into smaller manageable components. As the learners had not yet decided on the topic of their business I decided to start them off by creating a web site of a CV. A CV was selected as it could be a stand-alone component, not integrated with other packages and not dependent on the theme of their business. The description of the process of creating the site is divided into the following parts: Start, In progress and Submission.

4.2 Start

On the first Monday of the last fortnight of the year, before lessons ended in preparation for the final Grade 11 end-of-year examinations, when the learners came into the room, they were presented with the instructions to create a web-based CV. They were told it had to be completed within two weeks and there would be no extension of time. There were cries of 'Impossible!', 'Too short a time!', 'Unfair!', etc. They were told it was to be for their final Matriculation project.

After they had settled down, it was calmly explained to them that as they had created their desk top published Red Cross Hospital Primary School activity books (Grade 11A) and *ThinkQuest* web sites (Grade 11D) with very short lead times, they could create a web-based CV in the same kind of time. I explained that they had been given 9-12 months for the projects just mentioned, but according to the questionnaire they had just completed, they had, on average, all spent less than two weeks on the projects, hence two weeks for a web-based CV would be enough.

They were told time would be set aside during class in which to do the work. Calm reigned.

The learners were given printed instructions of the requirements, see Appendix H. They were told what features would give them the highest grading. Where possible they were given examples of those features, with hyperlinks to web sites made by Grade 11 learners, on the network at school. The learners knew the people who had created the web sites with the examples, as they were Grade 11 learners in their grade and probably also in their class.

To assist the learners they were given my web-based CV as an example. Both classes looked at it carefully. Some learners were very disparaging of it and the 'Boring' information. To other learners my web-based CV gave them an idea of what should be done. They laughed at the fact that I had personal details such as pictures of my dogs in my CV, but I indicated to them that that information was found under personal interests, and a CV should show the 'whole' person. I was not upset that learners found my CV 'Boring', 'Stupid', 'Silly', etc., as I wanted them to use it, to make their CVs better than mine. On reflection I realised that my web-based CV was important as most learners copied its structural features.

It seemed to take the learners some time to mentally conceptualise what they could put into their CVs. They started to create a web. They added pages on topics such as personal details, education, references, sport, hobbies and interests, family, future goals, achievements, work experience, etc. Many of the learners had previously completed paper-based CVs during English classes that they had saved on their computers and they tried to use a Windows Copy / Paste function from *Word* to *FrontPage*. The formatting was most strange but it did give them a start, and structure. They then copied and pasted information to the appropriate pages within their web. The learners asked about certificates and pictures and how they could put them on their CVs. I suggested scanning them at school on the scanner in our computer laboratory.

4.3 In progress

As the first week progressed the learners started working on their CVs. On a daily basis as they came into the computer laboratory, they sat down and promptly started working. There was less waiting on me, the teacher, to start the lesson but

they logged in and began, as they had to complete their work on schedule. To help keep the learners focussed, I regularly walked slowly around the room, past every workstation, looking and not really commenting which seemed to help focus or refocus the learners. As the CV was about themselves there was little chatter, they thought about the content, mentally planned the sentence construction, and began writing. Periodically learners went to my desk to use the scanner. They scanned and saved the work in their own folders on the network. By the second week, the learners had seen that their peers were inserting real scanned pictures, and then the rush began to use the scanner on my desk. Many learners did not manage to get access to the scanner during class time so they came after school to use the single machine. Some of the learners made their large scanned pictures into thumbnails.

Walking around the workstations, it seemed as if the learners were greatly inhibited by a lack of keyboarding skills. They seemed to spend a large amount of time checking the spelling or keyboarding errors as they typed. I tried to encourage them to key in the information and then format the material but, although they had been told that many times during the previous two years, they still checked the work as they wrote. In addition to checking the spelling of the work as they typed, they also tried to format the work. I would have preferred them to format the content after they had put in all the information.

The learners started working on interactivity after they had put in a fair amount of text. All the learners in Grade 11D had been given the program *CoffeeCup Firestarter* on the *ThinkQuest* CD-ROM but only Sarah and Yusuf had used it in their *ThinkQuest* web site entries. During the time set aside for the web-based CV, as an afterthought, I had it installed on the network in the computer laboratory. I asked Sarah and Yusuf to demonstrate it to some learners, which they did. Animations with *CoffeeCup Firestarter* then spread throughout the class.

The following section is a discussion of motivation, use of software and place of work, using similar features and interpretation of instructions as part of the work in progress.

4.3.1 Motivation

The majority of the learners in both classes worked very hard on the web-based CV, not wasting time in class. Their body language and expressions indicated pleasure, pride and purpose whilst doing the work.

There is a noticeable difference between the two classes, the Grade 11A class being academically weak whereas the Grade 11D are academically strong. While the learners were working there was a feeling of calm. It seemed as if they, particularly Grade 11A, accepted that they could not use all the features listed in the instruction sheet. I had the feelings that topics they tackled were attainable. If their friends had a particular feature, they would add it, but would not become unduly stressed if they did not manage to create it. Most of the learners were motivated to do well at their own level of ability.

4.3.2 Use of software and place of work

The web-based CV was made in *FrontPage* at school, and in *Dreamweaver* by those who worked at home. A number of learners used *FrontPage* at school and home and took files to and from each place of work. Sarah, Jared, Ross and Kurt were irritated by the limitations of *FrontPage* and had no wish to use the program. They did their work at home using *Dreamweaver*, a program they considered better. In class the learners who did not use the software available at school did the following:

- Sarah sat in her own world, using email and writing in her diary.
- Jared chatted to Craig instead of working on the web-based CV.
- Ross sat at his workstation for most of the two weeks showing off and playing with animations and drawings he had made at home using *3D Studio Max*. I was not able to monitor his CV, as he did not bring his to school until the day it was due.
- Kurt, seated near Ross for every lesson, also did not work on his CV in class. Instead he also showed off his animations and drawings made at home with *3D Studio Max*, *Flash 4*, *Adobe Photoshop 6* and *Adobe After-Effects 4*.

4.3.3 Using similar features

The work of the class seemed to move in waves, as one learner thought of something, others copied and the idea radiated outwards like water in a pond. This

was particularly noticeable in interactive and visual features that could be seen on the screen with maximum visibility.

One of the options to achieve high marks was the use of frames. Frames had never been taught in class and I was not able to give any advice, therefore the learners had to teach each other. The learners struggled to use them and I observed Susan, Lara, Kate and Penny assisting each other, working out how to create frames.

Although I was not meant to teach or help learners with their Matriculation project, I did show both classes how to use an image map of a person, to link to pages in the CV, which they followed with interest and understanding.

4.3.4 Interpretation of instructions

During the creation of the CV, learners did not ask me questions about the requirements on the instruction sheet, Appendix H. They did not seem to refer to it at all. No learner was noticed looking at the hyperlinks to web sites to see features such as the crossword, *Flash* or *CoffeeCup Firestarter* introduction.

Six months after creating the CV, when the learners were asked to examine the CV in preparation for the evaluation of the Matriculation project, it became apparent that many did not know what was meant by a number of the features such as 'thumbnail' or 'mouse over'. Why the learners had not asked what was meant in the instruction sheet by a particular feature I do not know. In hindsight it would appear that they thought they had heard or read the instruction, only to discover they had not heard or read it correctly and consequently not added the feature to their CV.

4.4 Submission

The learners hurried to complete their work on time. Having been in my class for almost two years, most of the learners had learned that I keep a date and seldom, if ever, accept late work. The CVs created by each learner were handed in on CD-ROM, on 3 ½ disks or just transferred via the network to my hard drive.

5 Analysis of the process and product of the web-based curriculum vitae

This chapter aims to describe how learners interacted with information in a *contact* digital environment from cognitive, affective and physical perspectives.

5.1 Cognitive perspective

The following section will examine how the learners interacted with information in a *contact* digital environment from a cognitive perspective looking particularly at acquiring, recalling, processing or planning, and presenting information while creating the web-based CV.

5.1.1 Acquiring information

The learners had already acquired many of the skills required for creating a web before they were tasked with creating a web-based CV. They acquired additional skills as they created the site mainly under the influence of their peers as they worked on the CV. This is discussed later in 5.2.2, *Influence of peers*.

5.1.2 Recalling information

The learners had been taught how to author a web site earlier in the year. The skills required for the authoring of the web-based CV were recalled from previous lessons mainly under the influence of peers, as discussed in 5.2.2, *Influence of peers*. The content required for their own CV web site was recalled by the learners from their own experience or their English print-based CV.

5.1.3 Processing, planning, structuring and amount of information

The way in which the learners planned the web site with reference to the conceptual planning, the structure used and the amount of information included are now examined.

5.1.3.1 Processing and planning

The learners created their CV as they worked and as they learned new features to be included. They did not really pre plan their work although they did plan what information to put on each page. Most of the learners managed their time so they were able to hand the work in on time.

5.1.3.2 Model or structure

The following are features of the model or outward organisational structure of the web-based CV:

- The information was arranged on different pages that the learners found easy after I had given them the example of my web-based CV. They had no difficulty putting the appropriate information on the correct pages. To link to the pages in the web they used hyperlinks from words, hover buttons and image maps.
- Most of the CVs had a clear structure, with the page titles containing information on the topic. However, five learners had sites that were not well structured.
- Information arranged at two levels, a fairly sophisticated feature, was used in about half the web sites. A web site with two levels meant an initial Home page with links to Qualifications, Work experience, Family, etc., and then links from the Qualifications page to the pages of the many different qualifications attained, and so forth.
- Shared borders, something not taught, was used by about five learners.
- A few learners created their own styles.
- Twelve learners in Grade 11D were the only learners who used frames to organise pages and their linking.
- Image maps as a form of pointing the browser in the intended direction in addition to normal hyperlinks, were used by 19 of the 52 learners. This feature was a simpler way of organising the web than frames. This relatively advanced organisational feature was accomplished by seven learners in Grade 11A and twelve in Grade 11D.

5.1.3.3 Amount of information

There was little information per CV. On a scale of 1 (little) - 2 (great deal) most of the learners in Grade 11A had a 1, and Grade 11D learners had a 2. The Grade 11A learners in particular either did not have enough time to plan their lives in CV format, or did not have the ability to mentally process or conceptualise their lives in CV format. The idea of a very short printed CV of one page has become the norm in business and may have influenced the amount of information in the CVs.

It was rather a shock when the case study analysis was given to the class to check and comment on, that two males, Jared and Craig, challenged my perceptions about the lack of information.

- Craig felt that 'creating a lengthy CV full of meaningless useless additions (features) a web-based CV is illogical as users would be more irritated than informed when attempting to browse for relevant information'.
- Jared added that 'users of the CV would wonder why so many unrelated features were implemented and would assume the CV's owner is trying to compensate for a lack of something else. Why would any potential employer want to be pop quizzed on your details? Rather direct browsers to separate work (web work) than pack myriads of finicky features and highlights into a CV.'

Perhaps this was a reason for the lack of textual information presented.

5.1.4 Presenting information

By looking at the surface features of the CVs with reference to spelling, the look of the pages, the tone of the sites and the multimedia features used the following section will discuss how the learners presented information.

5.1.4.1 Spelling

The CVs of the learners contained many spelling errors that the learners had not noticed when they made the CVs and submitted them. Six months later, preparing the CVs for submission for the Matriculation examination, the learners noticed their errors and corrected them. In discussion, it was apparent the learners had not noticed them, because if they had they would have been corrected.

5.1.4.2 Pages

Information was presented in pages in the following ways:

- The CVs were made up of a number of pages, with hyperlinks from the main or index page to other pages.
- Each web was made up of from seven to ten pages.
- Most pages had illustrations in the form of clipart, scanned pictures or thumbnails; or interactive features such as crosswords, tile puzzles or animations; in addition to text.
- On many pages text was found that was not blocked, had too many open lines, had been formatted with too much line spacing or had used more than one

screen. This display necessitated that one had to scroll down a screen that was not full of text or images, to view the information.

5.1.4.3 Tone

The language used was simple. Not all the work had a suitable tone for a CV and some were positively chatty and familiar. One CV was humorous and I am not sure if that was suitable for a CV.

5.1.4.4 Presenting information in multimedia formats

The following section will examine how the learners presented information in various multimedia formats including graphic, static and interactive features developed by the learners.

5.1.4.4.1 Graphic features

The learners were encouraged to insert graphics as I had done on my web site. Many of them inserted clipart pictures which had little bearing on a personal CV: they were generic pictures and not related to their lives, whereas those who added scanned pictures chose pictures which had relevance to the topic in the web-based CV. As I did not want to give too much guidance, as this was part of their individual Matriculation project, I did not correct them.

Silma had the most clipart pictures, 89 in total, as opposed to 12 scanned. Brent had the highest number of scanned pictures, about 48, all related to the content in his CV.

Initially I thought the learners were using too many images and not enough text-based content but I held my own counsel. Perhaps the learners had not sorted out their lives into compartments where they could add much text-based content. Perhaps there was not enough time to add text-based content, and graphic images were a shorthand way of providing information. Perhaps they preferred images, as they did not have the linguistic ability to write at length.

5.1.4.4.2 Static features

Static or very easy to insert features found in the CVs were:

- Illustrations used by almost every learner.
- Video clips with limited relevance to the topic added by three learners.
- Sound clips with little relevance to their CVs added by four learners.

- Background colours or images used by most learners.
- Animated clipart images used a great deal by a few learners. These animations were generic images vaguely on the topic of the text near which they were positioned.
- A database integrated into a web unsuccessfully used by one learner.

5.1.4.4.3 Interactive features

In this context interactive features refer to features that react to input and were developed by the learner. Interactive features, therefore, do not include animated clipart images although, technically, they are interactive. In most instances the interactive features complemented the text and content of the CV.

Interactive features were found in almost every CV. They included the following: thumbnails, rollovers, animated gifs made with *CoffeeCup Firestarter* or *Flash*, animated gifs made with *Gif Animator* or similar, crossword puzzles, tile puzzles, quizzes, jigsaw puzzles, drop down boxes, feedback forms and guestbooks.

The use of interactive features by the learners is tabulated in Table 6 - 5. Apart from the thumbnail and mouse over, in general the learners did not use many interactive features in their entries as seen in Table 6 - 5.

Table 6 - 5 Use of interactive features by Grades 11A and 11D

Feature	Total number used ¹¹	Average number used per learner
Thumbnail	363	6.98
Mouse over	88	1.69
Animated gif made with <i>CoffeeCup Firestarter</i> or <i>Flash</i>	18	0.35
Animated gif made with <i>Gif Animator</i> or similar	41	0.79
Crossword puzzle	7	0.13
Tile puzzle	5	0.10
Quiz	4	0.08
Jigsaw puzzle	1	0.04
Drop down box	9	0.17
Feedback form	10	0.19
Guest book	12	0.23

¹¹ The numbers may not be totally accurate although they were checked by teams of learners.

A thumbnail, a small version of an image, was the most commonly used interactive feature followed by a mouse over, tabulated in Table 6 - 5 and illustrated in Figure 6 - 10. Thumbnails and mouse overs are based on graphic images.

Figure 6 - 10 Numbers of learners who used the interactive features

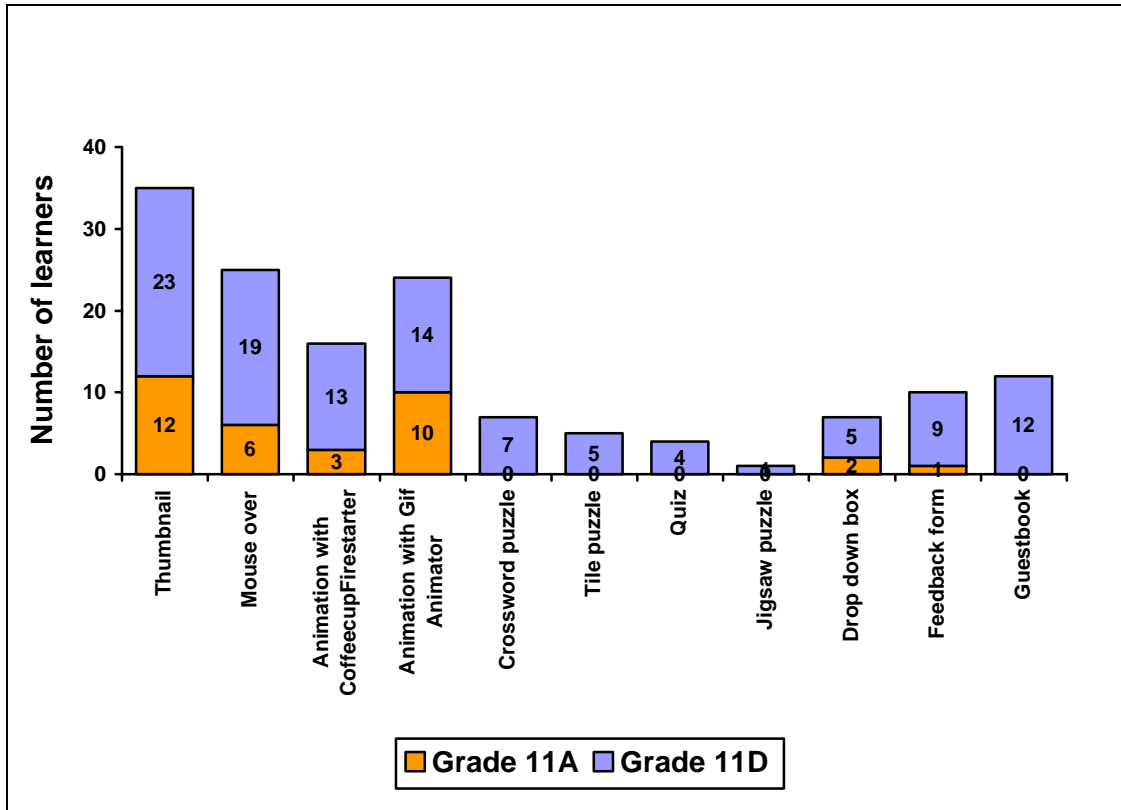


Figure 6 - 11 Images from the CVs

Home Interactive Gallery Links Guestbook Search

Mark it
Reveal Letter

Across

- 1 I would like to be a ___ manager one day (5)
- 4 One of my favourite subjects is ___ (7)
- 7 My home language (7)
- 9 The city in which I was born (8)

Down

- 1 I prefer the ___ of summer to the cold of winter (4)
- 2 I enjoy going to the ___ to watch the latest releases (6)
- 3 The month in which I was born (6)
- 5 I receive a ___ each year on completion of the "Cape Times Big ..."

Crossword Compiler Software © 2001 x-word.com

5.1.5 Summary of interaction with information from a cognitive perspective

The manner in which the learners cognitively interacted with information in the *contact* educational digital environment was discussed in the preceding section.

The findings are summarised and tabulated in Table 6 - 6 based on how the learners acquired, recalled, processes and planned, and presented information when creating their web-based CV, behaviours and activities discussed in Section 6, *Synthesis and profile* in Chapter 2.

Table 6 - 6 How the learners cognitively interacted with information during the process of creating the web-based CV

Cognitive perspective	Cognitive interaction
Acquiring information	<ul style="list-style-type: none"> • Learners acquired web-authoring skills influenced by their peers.
Recalling information	<ul style="list-style-type: none"> • Learners recalled web-authoring skills interacting with their peers.
Processing / planning information	<ul style="list-style-type: none"> • Learners did not plan their CV but created it as they proceeded. • Learners modeled or structured their CV logically. • About half of the learners developed a CV arranged with pages and hyperlinks at two levels using higher-level thinking skills. • Half of Grade 11D learners used frames, whilst no learners in Grade 11A used frames. • Image maps were used by some learners in Grades 11A and D. • Learners had difficulty mentally processing and creating the text-based information required.
Presenting information	<ul style="list-style-type: none"> • Most learners had spelling errors on their web pages that they had not seen when they created the CV. • The web sites were made up of a number of illustrated and linked pages of text. • Static and animated clipart images added to the web pages seldom complemented the content. • Interactive features complemented the content. • Grade 11D were better able than Grade 11A to create interactive features and communicate the subject matter in multiple formats.

Table 6 - 6 summarises how the learners interacted with information when they created their web-based CV.

- Peers influenced the acquisition and recall of information.
- The structure of the CV was planned as the learners worked on the CV.
- A web with pages linked on two levels, frames and image maps, i.e. features of higher-level thinking skills were used by about half the total number of learners.
- Scanned images and interactive features, i.e. objects made by the learners complemented the text.

Table 6 - 7 tabulates where the cognitive behaviours and activities in the literature review, Table 2 - 26 in Chapter 2, and the way in which the learners created the web-based CVs in the *contact* environment of the classroom, have common ground:

- ✓ indicates where the literature review and the behaviour or activity concur.
- X indicates where the literature and the behaviour or activity do not concur.
- ⇒ indicates where the activity was not found in the literature.
- NA indicates where it was not applicable in this situation.

Table 6 - 7 is grouped by perspective and then by the form of cognitive behaviour or activity, to the literature review. Evidence is then found in the activities or behaviour in the *contact* class environment of the classroom, concurring or not concurring with the literature review.

Table 6 - 7 Comparing cognitive behaviour or activity from the literature with the way in which the learners created their web-based CVs

Cognitive perspective	Cognitive behaviour or activity from the literature review	Common ground	Interaction with information while creating the web-based CV
Acquiring information	<ul style="list-style-type: none"> • Able to source material in digital environment with sophisticated search strategies 	NA	<ul style="list-style-type: none"> • Learners did not really source digital information anywhere.
	<ul style="list-style-type: none"> • Absorb material quickly as individual learner accommodated 	NA	<ul style="list-style-type: none"> • The learners already knew web-authoring skills.
	<ul style="list-style-type: none"> • Critical of content of resource material 	NA	<ul style="list-style-type: none"> • Learners did not use resource material, rather created their own.
	<ul style="list-style-type: none"> • Prefer acquiring information from graphic images in preference to text 	NA	<ul style="list-style-type: none"> • Learners did not acquire information in graphic or text-based format, but used graphics instead of text to convey information.
	<ul style="list-style-type: none"> • Know where to find information on a screen 	NA	<ul style="list-style-type: none"> • Learners did not source information on a screen.
	<ul style="list-style-type: none"> • Not found in the literature review 	⇒	<ul style="list-style-type: none"> • Learners acquired web-authoring skills influenced by their peers.
Recalling information	<ul style="list-style-type: none"> • Recall of screen-based material difficult 	NA	<ul style="list-style-type: none"> • Learners were not required to recall screen-based material.
	<ul style="list-style-type: none"> • Short term memory assisted by sensory features of digital environment 	NA	<ul style="list-style-type: none"> • Learners were not required to remember content, apart for the skills for the development of the CV.
	<ul style="list-style-type: none"> • Recall text on screen in chunks and not with the bigger picture 	NA	<ul style="list-style-type: none"> • Learners were not required to remember text on screen.
	<ul style="list-style-type: none"> • Literate in non-verbal environment 	NA	<ul style="list-style-type: none"> • Learners were not required to recall information in a verbal or non-verbal environment.
	<ul style="list-style-type: none"> • Long term memory assisted by organisation of digital environment 	NA	<ul style="list-style-type: none"> • Learners were not required to recall information.
	<ul style="list-style-type: none"> • Not found in the literature review 	⇒	<ul style="list-style-type: none"> • Learners recalled web-authoring skills through interacting with their peers.

Cognitive perspective	Cognitive behaviour or activity from the literature review	Common ground	Interaction with information while creating the web-based CV
Processing / planning information	<ul style="list-style-type: none"> Plan creating digital projects 	X	<ul style="list-style-type: none"> The learners did not pre plan their CV but created it as they went along.
	<ul style="list-style-type: none"> Build mental models of the learning material 	NA	<ul style="list-style-type: none"> Learners were not required to learn material.
	<ul style="list-style-type: none"> Use higher-level thinking skills 	✓	<ul style="list-style-type: none"> About half of the learners developed a CV arranged with pages and hyperlinks at two levels using higher-level thinking skills. As they developed interactive features they used higher-level meaningful thinking. The learners modeled or structured their CV using higher-level thinking skills.
	<ul style="list-style-type: none"> Visually process a number of programs at once 	NA	<ul style="list-style-type: none"> Not observed.
Presenting information	<ul style="list-style-type: none"> Cognitive processing of screen-based material superficial 	✓	<ul style="list-style-type: none"> Most learners had spelling errors on their web pages that they had not seen when they created the site.
	<ul style="list-style-type: none"> Able to communicate their understanding of the subject matter in multiple formats 	⇒	<ul style="list-style-type: none"> Grade 11D, or the academically strong class, were better able than Grade 11A, or the academically weak class, to create interactive features and communicate the subject matter in multiple formats. Static and animated clipart images added to the web pages seldom complemented the content. Interactive features complemented the content. The learners had difficulty mentally processing and creating the text-based information required.
	<ul style="list-style-type: none"> Develop own symbols and abbreviations for communicating 	NA	<ul style="list-style-type: none"> Not observed.
	<ul style="list-style-type: none"> Transfer of learning to other contexts takes place 	NA	<ul style="list-style-type: none"> Not observed.
	<ul style="list-style-type: none"> Use authentic language in developing digital projects which assists information processing 	NA	<ul style="list-style-type: none"> Not observed.
	<ul style="list-style-type: none"> Use authentic language in developing digital projects which assists information processing 	NA	<ul style="list-style-type: none"> Not observed.

The following behaviours or activities were those *present* in Table 2 - 26 where the cognitive profile of a South African FET learner in a digital environment was tabulated, and in the creation of the web-based CV:

- Use higher-level thinking skills
- Cognitive processing of screen-based material superficial

Many cognitive activities or behaviour became apparent. Cognitive behaviours or activities present in the web-based CV but *not found* in the literature review were:

- Learners acquired web-authoring skills influenced by their peers.
- Learners recalled web-authoring skills through interacting with their peers.
- Grade 11D or the academically strong class were better able than Grade 11A or the academically weak class to create interactive features and communicate the subject matter in multiple formats.
- Static and animated clipart images added to the web pages seldom complemented the content.
- Interactive features complemented the content.
- The learners had difficulty mentally processing and creating the text-based information required.

Table 6 - 7 compared the literature review and the behaviours or activities in the classroom when the learners created their CV looking at the activities from a cognitive perspective. There was very little concurrence of the cognitive behaviours or activities of the literature review with the CV created in the *contact* environment of the classroom.

5.2 Affective perspective

The following section will examine how the learners interacted with information in a *contact* digital environment from an affective perspective looking particularly at motivation, the influence of peers, time and mental state.

5.2.1 Motivation

Most of the learners enjoyed creating their web-based CVs. Six months after the creation of the web-based CV, analysing the CVs and looking at them with the classes in preparation for their final Matriculation submission, it was apparent that the learners had enjoyed creating them. Based on the analysis it is apparent that:

- The learners spent time using the features they were able to use but did not worry to include features that would enable them to obtain high marks. Once learners found something they enjoyed making, they focused on that to the exclusion of other features.
- The learners had great fun creating an animation in *PaintShop Pro* with *Gif Animator*, *Gif Construction Set* and *Image Composer*. The shareware versions of *PaintShop Pro* with *Gif Animator* and *Gif Construction Set* were installed on the network for the duration of the making of the CV. Some of the learners preferred to use *Image Composer* already on the network. This feature only gained an intermediate mark but many learners added this feature. Nevertheless, the idea of adding an animation spread throughout the class because it was seen on learners' screens. Although the learners were engrossed, they spent much time on this single feature. In Grade 11A, Lyle spent more than four periods of the allocated nine or ten, working on a sophisticated animation of a skateboarder 'ollieing (jumping over four stairs and landing)' [Lyle]. Carlo, next to him, made an animation which took a great deal of skill and time, of a face smiling.
- The learners enjoyed creating the CV and did not really worry about the marks to be allocated. Avril added 40 animated clipart graphics and Vuyo added 33 thumbnails, and few other features, instead of looking at the marking schedule and adding features which would contribute to marks.
- Many of the learners added features that, although they were mentioned, were not specified in the printed instructions, such as *JavaScript* quizzes and tile puzzles.

The amount of work done by the Grade 11D learners varied from a little to a great deal but most learners seemed to do enough work to obtain a high mark.

- Jason, a councillor, planned the time and effort needed to obtain a good mark for the CV. He was very involved in school sport and leadership activities so did not have time to explore the packages available that could have been used to enhance the CV. He nevertheless obtained a high mark because of his judicious selection of high-mark features.
- Kelly, a councillor, was also involved in sport and leadership activities but she managed her time well and obtained a high mark by using many advanced features which she learned as she created the web-based CV.
- Jared and Kurt did not produce a CV commensurate with their abilities. Jared did very little work on his CV, just adding the minimum features to obtain a high

mark. His effort was very disappointing as he has more web skills than I have. Craig, who sits next to Jared (see their usual seating positions in Figure 6 - 12), also did the minimum, perhaps taking his cue from Jared.

- Kurt seems to work and think in a different way to the norm. He has so much ability but did not produce work reflecting his true ability, perhaps because he is aware that he knows more than I do about web-authoring, and can deceive me with little work.
- Of the academically strong learners in Grade 11D only Jason and Kelly did not use a *Flash* or *CoffeeCup Firestarter*-type animation. Jason did not add one, I think because it required too much effort to learn the program and Kelly did not have enough time to learn to make one.

5.2.2 Influence of peers

During the creation of the web-based CV much collaboration took place with enthusiastic learners sharing ideas with each other. The following section will look at how the two classes worked with frames; animated clipart images; mouse overs; tile puzzles; thumbnails; crossword puzzles; animations made with *CoffeeCup Firestarter* or *Flash*; animations made with *Gif Animator*, *Gif Construction Set* or *Image Composer*; and quizzes. The seating positions of the learners are indicated with coloured blocks, pink for females and blue for males, if the learner used the feature under discussion.

5.2.2.1 Frames

Some of the learners who used this feature shared the skills with those near them. Note their seating positions close to each other in Figure 6 - 12.

- Grade 11A - No learners used frames.
- Grade 11D - Twelve learners used frames. Susan, Lara, Kate and Penny all used frames and sat near each other. Rob, Vinay and Kelly sat next to each other, and all used frames. In Grade 11D the usual seating positions of the learners who used frames are illustrated in Figure 6 - 12.

Figure 6 - 12 Seating positions of Grade 11D learners with reference to their sharing of ideas and frames

No-work Gine	Rob	Vinay	Kelly	Aisle	Jason	Left	Brent	Dale	Back row
Left	Left	Jared	Craig		Yusuf	No-work Kader	Ricco	Imran	4 th row
Safia	Robyn	Tessa	No-work Alex		Susan	Lara	Kate	Penny	3 rd row
Sarah	Marc				Paul	Ross	Brent	Kurt	2 nd row
Jenna	Simon								First row

5.2.2.2 Animated clipart images

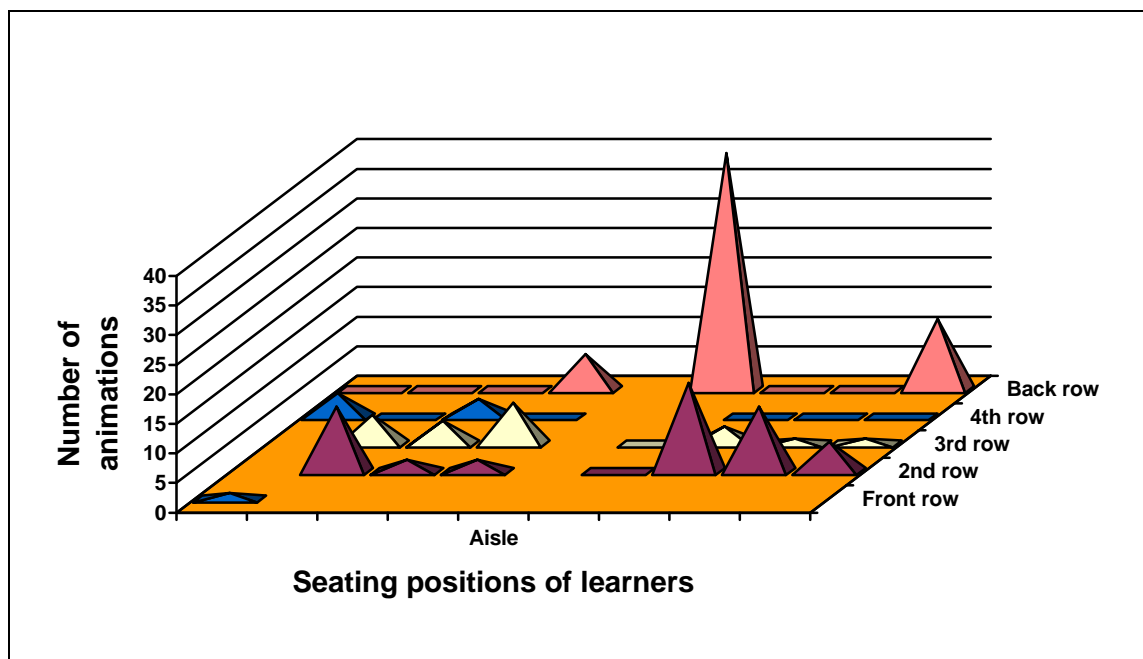
From Figure 6 - 13 it can be seen that learners seated near each other used clipart animations and also used a similar number of animations. It would appear that the learners were influenced by the learners seated next to them with respect to the number of animated images. Most of the learners who used ready-made animated clipart images were in one class, Grade 11A.

- Grade 11A - Avril used the most animated clipart images, 40 in total, followed by Judy, Skake and Zodwa. Figure 6 - 13 illustrates the seating positions of the learners who used clipart animations, giving the number of images used. Figure 6 - 14 shows in 3D format the seating positions of the Grade 11A learners with respect to their position in the computer laboratory, and their use of animated clipart images.
- Grade 11D - Very few learners used clipart animations.

Figure 6 - 13 Seating positions of Grade 11A learners with reference to their sharing of ideas and animated clipart images

Khim	Basri	Kerri	Gwen 6	Aisle	Avril 40	No-work Lisa	No-work Megal	Mandy 12	Back row
Nina 4	Caryn	Judy 3	Silma		Moosa	Linda	No-work Wafiq		4th row
	Liana 5	Kay 4	Tracy 7		No-work Chad	Tanya 3	Carlo 1	Lyle 1	3rd row
	Skake 11	Buntu 2	Vuyo 2		Emma	Candy 15	Zodwa 11	Siv 5	2nd row
Max 1									First row

Figure 6 - 14 Seating positions of Grade 11A learners in 3D format with reference to their sharing of ideas and animated clipart images



5.2.2.3 Mouse overs

The use of mouse overs by the learners did not show a sufficient pattern to see trends.

- Grade 11A - The use of mouse overs was almost restricted to two groups of learners: Siv, Buntu, Vuyo and Zodwa; and Kerri and Kay, their seating positions illustrated in Figure 6 - 15. The first group of learners are friends who stayed after school waiting for lifts and worked on their CVs together in the afternoon.

Gwen and Kay both tried very hard to do well and looked around the class continually to see what they could add.

- Grade 11D - So many learners used mouse overs that no pattern of influence was visible.

Figure 6 - 15 Seating positions of Grade 11A learners with reference to their sharing of ideas and mouse overs

Khim	Basri	Kerri	Gwen	Aisle	Avril	No work Lisa	No work Megal	Mandy	Back row
Nina	Caryn	Judy	Silma		Moosa	Linda	No work Wafiq		4 th row
	Liana	Kay	Tracy		No work Chad	Tanya	Carlo	Lyle	3 rd row
	Skake	Buntu	Vuyo		Emma	Candy	Zodwa	Siv	2 nd row
Max									First row

5.2.2.4 Tile puzzle

Some of the learners recalled learning about tile puzzles during the year and inserted them in their web-based CVs. All of the learners who added a tile puzzle were very motivated and wanted to achieve high marks for their Matriculation examination. They are all in Grade 11D and are friends.

- Grade 11A - No learner had a tile puzzle.
- Grade 11D - Five learners had tile puzzles. The idea of making the puzzle spread, possibly because Vinay and Kelly are friends and sit next to each other; Kelly and Jason are friends; and Jason sits next to Brent with Grant who left the class in between. (Note their usual seating positions in Figure 6 - 16.) I do not recall how Penny remembered the puzzle, or if she learned it from one of the learners just mentioned, nor who initially remembered the puzzle.

Figure 6 - 16 Seating positions of Grade 11D learners with reference to their sharing of ideas and the tile puzzle

No-work Gine	Rob	Vinay	Kelly	Aisle	Jason	Left	Brent	Dale	Back row
Left	Left	Jared	Craig		Yusuf	No-work Kader	Ricco	Imran	4 th row
Safia	Robyn	Tessa	No-work Alex		Susan	Lara	Kate	Penny	3 rd row
Sarah	Marc				Paul	Ross	Brent	Kurt	2 nd row
Jenna	Simon								First row

5.2.2.5 Thumbnails

Learners seated near each other seemed to influence each other with respect to the use of thumbnails in Grade 11A. In Grade 11D so many thumbnails were used that no trends could be seen.

- Grade 11A - In this class the learners who used thumbnails all sat near each other in four rows, plus one learner whose row did not use thumbnails, illustrated in Figure 6 - 17 with coloured blocks. Only 12 of the 26 learners who submitted their CVs used thumbnails. The seating positions of the learners in the computer laboratory and the numbers of thumbnails they used are illustrated in 3D format in Figure 6 - 18.
- Grade 11D - The learners who had no thumbnails either did their work at home or at school, so no conclusion about the use thereof can be attributed to the place of work. Of the learners who did not use thumbnails, Sarah who had a wonderful CV, used many full size pictures that were small enough and did not require to be made into thumbnails; but Marc, on the other hand, had only one scanned picture and a very poor CV. The seating positions of these learners are illustrated in Figure 6 - 19 and in 3D format in Figure 6 - 20. In Figure 6 - 20 one is able to clearly see the high points in the graph indicating the number of thumbnails they used and how those who sat on either side influenced the learners.

Figure 6 - 17 Seating positions of Grade 11A learners with reference to their sharing of ideas and thumbnails

Khim	Basri	Kerri 1	Gwen 5	Aisle	Avril	No work Lisa	No work Megal	Mandy 3	Back row
Nina	Caryn	Judy	Silma		Moosa	Linda	No work Wafiq	4th row	
	Liana 6	Kay 21	Tracy 21		No work Chad	Tanya	Carlo	Lyle 5	3rd row
	Skake 5	Buntu	Vuyo 33		Emma	Candy 7	Zodwa 2	Siv 9	2nd row
Max									First row

Figure 6 - 18 Seating positions of Grade 11A learners in 3D format with reference to their sharing of ideas and thumbnails

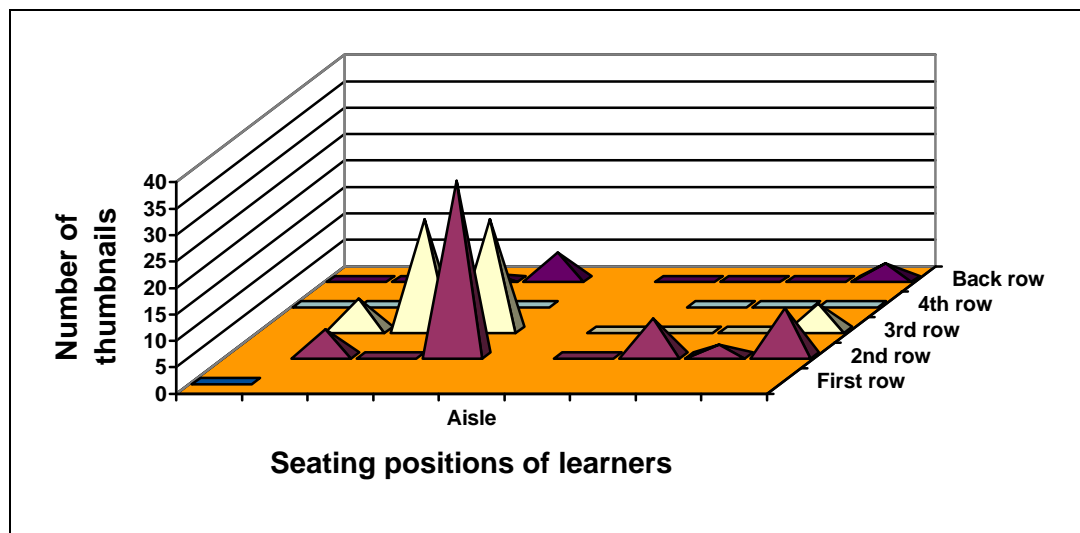
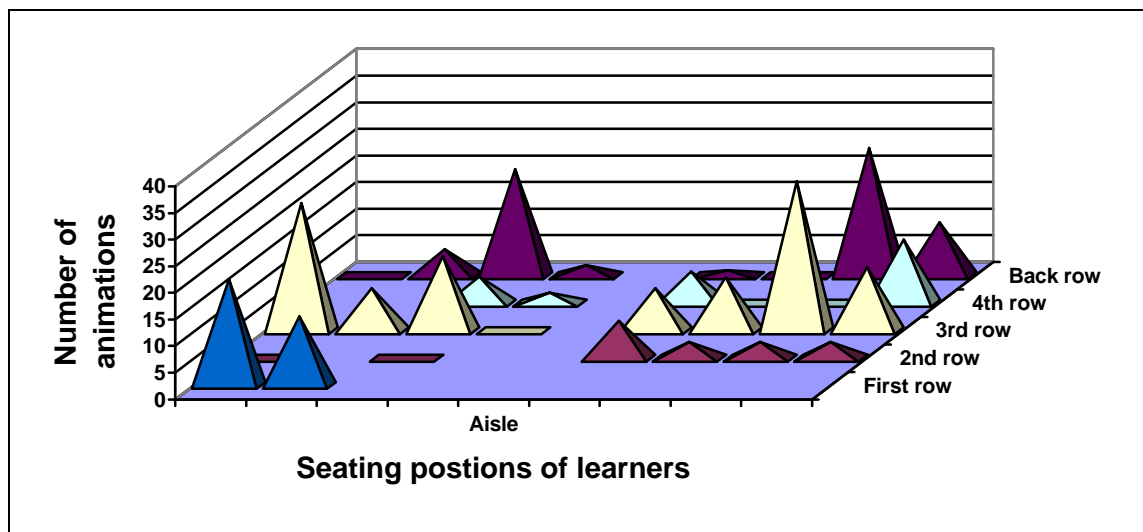


Figure 6 - 19 Seating positions of Grade 11D learners with reference to their sharing of ideas and thumbnails

No-work Gine	Rob 5	Vinay 20	Kelly 2	Aisle	Jason 1	Left	Brent 24	Dale 10	Back row
Left	Left	Jared 5	Craig 2		Yusuf 6	No-work Kader	Ricco 0	Imran 12	4 th row
Safia 24	Robyn 8	Tessa 14	No-work Alex		Susan 8	Lara 10	Kate 28	Penny 12	3 rd row
Sarah 0	Peter Sick	Marc 0			Paul 7	Ross 3	Brent 3	Kurt 3	2 nd row
Jenna 20	Simon 13								First row

Figure 6 - 20 Seating positions of Grade 11D learners in 3D format with reference to their sharing of ideas and thumbnails



5.2.2.6 Crossword puzzle

The learners who had interactive crossword puzzles made with *Crossword Compiler* in their CVs were all girls and all in Grade 11D. Although these learners were highly motivated and competitive, they shared their skills with each other.

- Grade 11A - No learners made interactive crossword puzzles.
- Grade 11D - Safia had found the *JavaScript* shareware software on the World Wide Web during the creation of the *ThinkQuest* competition entry and brought it to my attention during the two week web-based CV period. The network administrator installed it on the network and Safia taught her friends who sat

nearby (see their usual seating positions in Figure 6 - 21). The girls across the aisle also used the crossword puzzle feature. Note the use of features by learners seated next to each other.

Figure 6 - 21 Seating positions of Grade 11D learners with reference to their sharing of ideas and the crossword puzzle

No-work Gine	Rob	Vinay.	Kelly	Aisle	Jason	Left	Brent	Dale	<i>Back row</i>
Left	Left	Jared	Craig		Yusuf	No-work Kader	Ricco	Imran	<i>4th row</i>
Safia	Robyn	Tessa	No-work Alex		Susan	Lara	Kate	Penny	<i>3rd row</i>
Sarah		Marc			Paul	Ross	Brent	Kurt	<i>2nd row</i>
Jenna	Simon								<i>First row</i>

5.2.2.7 Animations made with *CoffeeCup Firestarter* or *Flash*

The sharing of ideas about this feature is apparent between learners who sat near their peers and those who are friends.

- Grade 11A - The only learners who used *CoffeeCup Firestarter* were three learners who are friends, plus one girl who saw the activity in the row in front of her and went to investigate. Their usual seating positions are shown in Figure 6 - 22.
- Grade 11D - The seating positions of the learners to each other in the classroom with respect to the use of a *Flash* or *CoffeeCup Firestarter*-type animation are illustrated in Figure 6 - 23.

Figure 6 - 22 Seating positions of Grade 11A learners with reference to their sharing of ideas and animations made with *CoffeeCup Firestarter* or *Flash*

Khim	Basri	Kerri	Gwen	Aisle	Avril	No-work Lisa	No-work Megal	Mandy	Back row
Nina	Caryn	Judy	Silma		Moosa	Linda	No-work Wafiq		4th row
	Liana	Kay	Tracy		No-work Chad	Tanya	Carlo	Lyle	3rd row
	Skake	Buntu	Vuyo		Emma	Candy	Zodwa	Siv	2nd row
Max									First row

Figure 6 - 23 Seating positions of Grade 11D learners with reference to their sharing of ideas and animations made with *CoffeeCup Firestarter* or *Flash*

No-work Gine	Rob	Vinay	Kelly	Aisle	Jason	Left	Brent	Dale	Back row
Left	Left	Jared	Craig		Yusuf	No-work Kader	Ricco	Imran	4th row
Safia	Robyn	Tessa	No-work Alex		Susan	Lara	Kate	Penny	3rd row
Sarah		Marc			Paul	Ross	Brent	Kurt	2nd row
Jenna	Simon								First row

5.2.2.8 Animations made with *Gif Animator*, *Gif Construction Set* or *Image Composer*

Peers seated next to each other influenced each other to create animations made with *Gif Animator*, *Gif Construction Set* or *Image Composer*.

- Grade 11A - Altogether nine learners created their own animations. The seating positions of the learners in the computer laboratory are illustrated in Figure 6 - 24 and in 3D format in Figure 6 - 25. Note in Figure 6 - 25 the use of animation software by the learners in the 3rd row who all created one animation as they obviously stimulated each other.
- Grade 11D - Fourteen learners created their own animations, Sarah, Penny, Kelly, Ross and Safia creating more than one animation, illustrated in

Figure 6 - 26 and in 3D format in Figure 6 - 21. It is interesting to note the amount of animations by Sarah, Safia and Ross. Sarah and Ross did all of their work at home because they were irritated by *FrontPage* and Safia did most of her CV at home because she wanted extended focused time to work on it.

Figure 6 - 24 Seating positions of Grade 11A learners with reference to their sharing of ideas and animations made with *Gif Animator*, *Gif Construction Set* or *Image Composer*

Khim	Basri 1	Kerri	Gwen 1	Aisle	Avril	No work Lisa	No work Megal	Mandy	Back row
Nina 1	Caryn 1	Judy	Silma		No work Chad	Moosa 3	Linda	No work Wafiq	4th row
	Liana	Kay	Tracy		No work Chad	Tanya 1	Carlo 1	Lyle 1	3rd row
	Skake	Buntu	Vuyo 1		Emma	Candy	Zodwa	Siv	2nd row
Max 1									First row

Figure 6 - 25 Seating positions of Grade 11A learners in 3D format with reference to their sharing of ideas and animations made with *Gif Animator* or similar

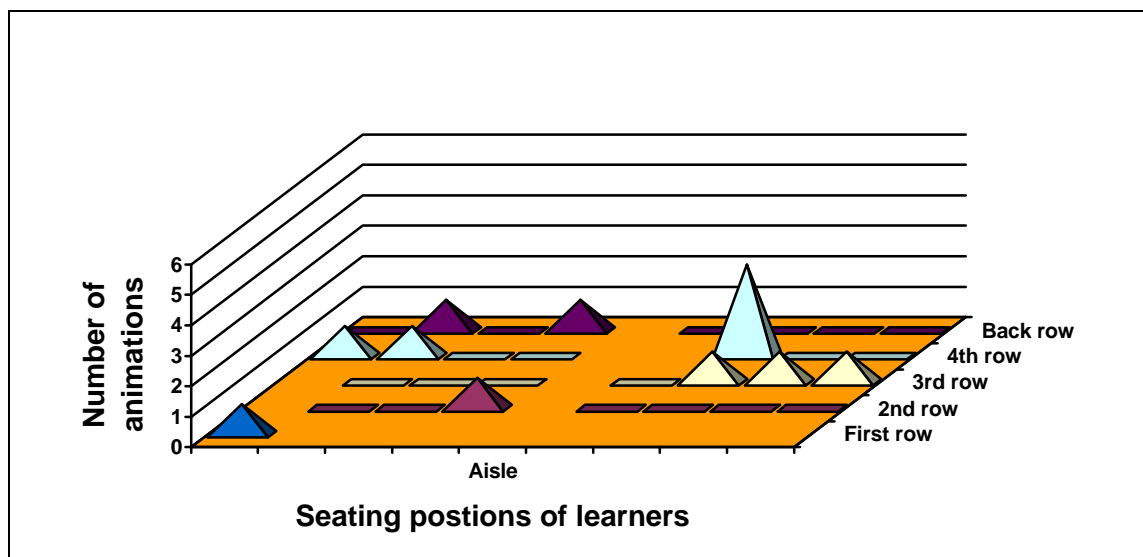
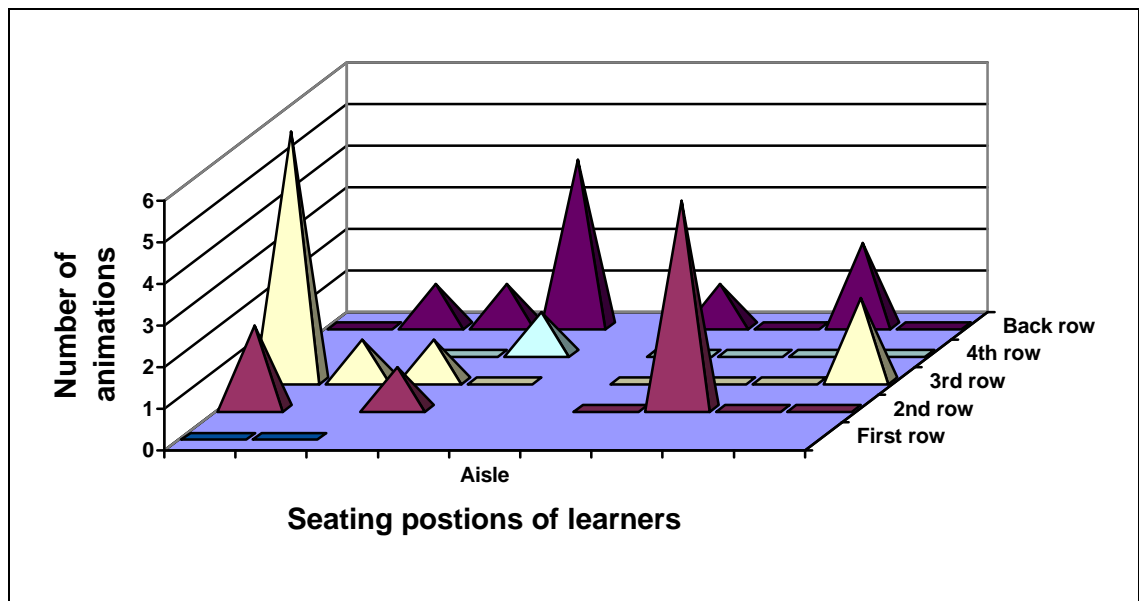


Figure 6 - 26 Seating positions of Grade 11D learners with reference to their sharing of ideas and animations made with *Gif Animator*, *Gif Construction Set* or *Image Composer*

No work Gine	Rob 1	Vinay 1	Kelly 4	Aisle	Jason 1	Left	Brent 2	Dale	Back row
Left	Left	Jared	Craig 1		Yusuf	No work Kader	Ricco	Imran	4 th row
Safia 6	Robyn 1	Tessa 1	No work Alex		Susan	Lara	Kate	Penny 2	3 rd row
Sarah 2		Marc 1			Paul	Ross 5	Brent	Kurt	2 nd row
Jenna	Simon								First row

Figure 6 - 27 Seating positions of Grade 11D learners in 3D format with reference to their sharing of ideas and animations made with *Gif Animator* or similar



5.2.2.9 Quiz

The creation of the *JavaScript* quiz required much skill and motivation. During the course of the year I taught the learners how to create such as quiz by adapting my *JavaScript* quiz code to their needs. No pattern indicating peer influence is apparent.

- Grade 11A - The learners did not create such a quiz as no one recalled it.

- Grade 11D - Sarah, Safia, Vinay and Brent recalled the lesson and created their own quizzes about themselves and their web site. Their usual seating positions are illustrated in Figure 6 - 28 but during the class they moved around.

Figure 6 - 28 Seating positions of Grade 11D learners with reference to their sharing of ideas and the quiz

No-work Gine	Rob	Vinay	Kelly	Aisle	Jason	Left	Brent	Dale	Back row
Left	Left	Jared	Craig		Yusuf	No-work Kader	Ricco	Imran	4th row
Safia	Robyn	Tessa	No-work Alex		Susan	Lara	Kate	Penny	3rd row
Sarah		Marc			Paul	Ross	Brent	Kurt	2nd row
Jenna	Simon								First row

5.2.2.10 Influence of peers

The following section summarises the work of the two classes with reference to the features used and the influence of peers. This is done by looking at the total number of features, gender and spreading of skills regarding features.

5.2.2.10.1 Grade 11A

Figure 6 - 29 illustrates the number of features used by Grade 11A learners in their web-based CV. The features include animated clipart images, mouse overs, thumbnails, animations with *CoffeeCup Firestarter* or *Flash* and animations with *Gif Animator* or similar. The features of frames, tile puzzles and crossword puzzles were not included in this summary as no learner in Grade 11A used them.

One male (blue) has the highest number of features used, 5; followed by two females (pink), 4. An equal number of males and females achieved 3. In this class the females predominate numerically.

Figure 6 - 29 Genders and number of features used by Grade 11A

0	1	1	4	Aisle	1	No work	No work	2	Back row
2	1	1	0			1	0	No work	4th row
	2	3	3		No work	2	2	2	3 rd row
	3	2	5		0	2	4	3	2 nd row
2									First row

Table 6 - 8 compares the number of features used by Grade 11A based on gender. On average, while creating this web-based CV, the females used more features than the males. This may indicate that females used more creativity in web site creation as they are more creative or academically stronger or for any other reason, but this small sample is not wide enough to draw a conclusion.

Table 6 - 8 Comparison of features used by Grade 11A based on gender

Form of comparison	Male	Female
Number of features	21	29
No of learners who handed in	9	17
No of learners who did not hand in	2	2
% Of features per learner who completed the web-based CV	1.1	1.7

In this class the spread of skills outwards does not appear to be influenced by persons of a different gender seated next to one another.

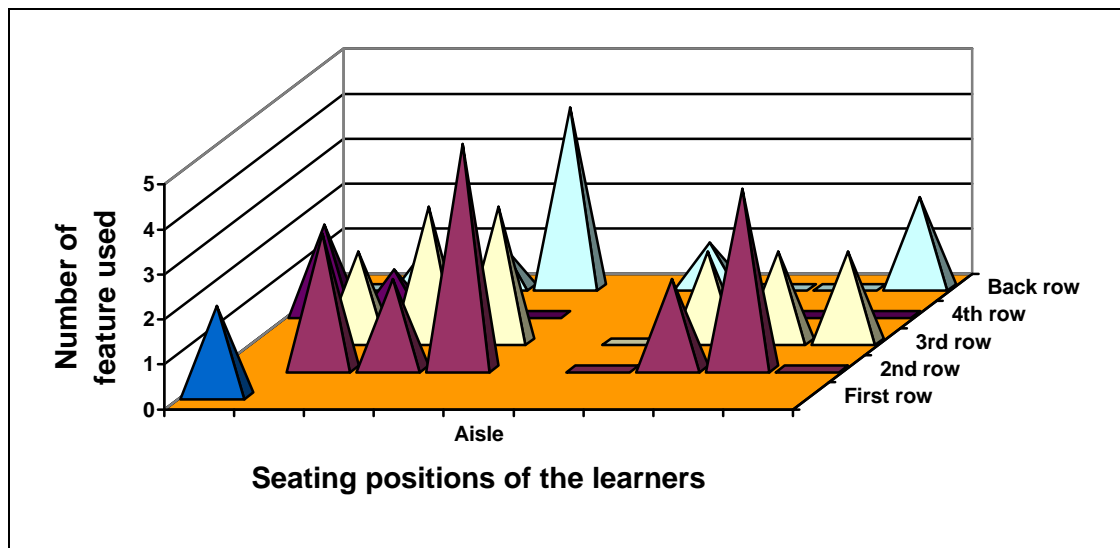
In Grade 11A, Figure 6 - 30 illustrates the spreading of the skills for the listed features. Radiating out sideways from the 5 and 4 in the 2nd row, there are 3s and 2s indicating a sharing of skills. The learners in the 3rd row have shared their skills. The 4 featured in the Back row with a 1 nearby does not indicate a sharing of skills.

Figure 6 - 30 Spreading of the features in Grade 11A

0	1	1	4	Aisle	1	No-work	No-work	2	Back row
2	1	1	0			1	0	No-work	4th row
	2	3	3		No-work	2	2	2	3rd row
	3	2	5		0	2	4	3	2nd row
2									First row

Figure 6 - 31 illustrates the radiation of skills in Grade 11A. The high points in the 3D chart show the radiation of skills outwards in the 2nd row, but not from the high point in the Back row.

Figure 6 - 31 Spreading of the features in Grade 11A in 3D format



From an examination of the features used by Grade 11A a number of patterns are apparent:

- Skilful learners shared skills or their skills were copied.
- Learners extended themselves at the level of those seated next to them.
- Skills used diminish away from the centre.
- The learners' social skills contributed to their successful use of a number of features.

- The number of learners who did not complete their web-based CVs appears to have impacted on those near them, except with respect to one learner in the back row.

5.2.2.10.2 Grade 11D

It is not clear if the learners shared their skills with the persons seated near them for altruistic reasons or if similar-minded people or those with the same academic ability sat near each other. The following web features show strong tendencies for similar work among those learners seated near each other: graphics; thumbnails; animations made with *CoffeeCup Firestarter* or *Flash*; animations made with *Gif Animator*, *Gif Construction Set* or *Image Composer*; crossword puzzles; tile puzzles; quizzes; frames and image maps. They are discussed with particular reference to the seating arrangements in the computer laboratory. In the figures illustrating the seating arrangements, the genders are distinguished by blue for male and pink for female.

Susan, Lara, Kate and Penny (see their usual seating positions in Figure 6 - 32), shared ideas with each other and all added the maximum number of features they were able to add. These learners, more than any other group of learners, had similar features in their CVs.

Ross, Kurt and Paul even went so far as to share some of their creations with the learners seated near them. Ross' CV contained an image created by and credited to Kurt (see their usual seating positions in Figure 6 - 32). Paul used pictures from Kurt in his CV without any reference to Kurt. The proximity of Ross, Kurt and Paul to each other is illustrated in Figure 6 - 32.

Figure 6 - 32 Seating positions of Grade 11D learners who shared a great deal

No-work Gine	Rob	Vinay	Kelly	Aisle	Jason	Left	Brent	Dale	Back row
Left	Left	Jared	Craig		Yusuf	No-work Kader	Ricco	Imran	4th row
Safia	Robyn	Tessa	No-work Alex		Susan	Lara	Kate	Penny	3rd row
Sarah		Marc			Paul	Ross	Brent	Kurt	2nd row
Jenna	Simon								First row

Figure 6 - 33 illustrates the number of features used by Grade 11D learners in their web-based CV. The features include animations with *CoffeeCup Firestarter* or *Flash*, animations with *Gif Animator* or similar, crossword puzzle, tile puzzle, quiz and frames. Two females (pink) and one male (blue) have the highest number of listed features, although in this class the males predominate. More females than males have a 3 although numerically the females are in the minority.

Figure 6 - 33 Genders and number of features used by Grade 11D

No-work	3	5	3	Aisle	2	Left	3	1	Back row
Left	Left	1	2		2	No-work	0	0	4th row
5	3	2	No-work		3	3	3	5	3rd row
3	Sick	1			0	3	0	0	2nd row
1	2								First row

Table 6 - 9 compares the number of features used by Grade 11D based on gender. On average the females used more features than the males in creating this web-based CV. This may indicate that females used more creativity in their web site creation as they are more creative or academically stronger or for any other reason, but this small sample is not wide enough to draw a conclusion. A possible reason is that girls have better social skills than males and share ideas with each other. In

this class the spread of skills outwards does not appear to be influenced by persons of a different gender seated next to one another.

Table 6 - 9 Comparison of features used by Grade 11D based on gender

Form of comparison	Male	Female
Number of features	25	30
Number of learners who handed in their CV	16	10
Number of learners who did not hand in their CV	3	0
% Of features per learner who completed the web-based CV	1.5	3

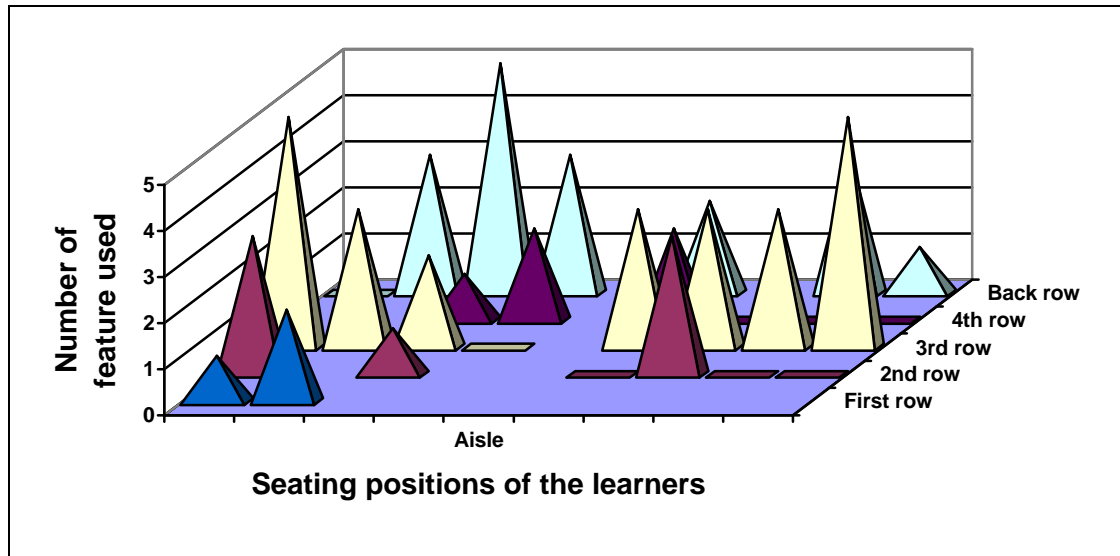
In Grade 11D, Figure 6 - 34 illustrates the spreading of the skills required in creating and using the listed features. Radiating out sideways from every 5 feature, there is a 3 that indicates a sharing of skills.

Figure 6 - 34 Spreading of the features in Grade 11D

No-work	3	5	3	Aisle	2	Left	3	1	Back row
Left	Left	1	2		2	No-work	0	0	4th row
5	3	2	No-work		3	3	3	5	3 rd row
3	Sick	1			0	3	0	0	2 nd row
1	2								First row

Figure 6 - 35 illustrates the radiation of skills in Grade 11D from the high points in the 3rd and Back rows.

Figure 6 - 35 Spreading of the features in Grade 11D in 3D format



From an examination of the features used by Grade 11D, a number of patterns become apparent:

- Talented learners shared skills or their skills were copied.
- Learners extended themselves at the level of those seated next to them.
- Skills used diminish away from the centre. Those learners who did not submit their web-based CV were at the end of a row where the learners showed diminishing use of features.
- The learners' social skills contributed to their successful use of a number of features.
- Females added more features than males.

Sarah sat on her own, in her own world, not influenced by what was happening in class and made her CV at home. Marc put very little effort into his work, but he seldom does much work in class, after school or at home. The boy who sat next to him was usually absent, so Marc had little influence from anyone.

5.2.2.10.3 Joint synthesis of influence of peers

The following can be deduced from the two classes with respect to the influence of peers:

- Skilful learners shared skills or their skills were copied.
- Learners extended themselves at the level of those seated next to them.
- Skills used diminish away from the centre.

- Possibly the learners' social skills contributed to their successful use of a number of features.
- Possibly, in the academically bright Grade 11D class where the learners were less able to move their seating positions as there were fewer open seats, learners added more features as they had more time to develop social relationships in their fixed seating positions.

5.2.3 Managing time

Of the Grade 11A learners who did not hand in their work:

- Wafiq's work was somehow deleted from his computer or as he wrote the 'computer had deleted his work, unfortunately'.
- Lisa's home was burgled and she lost all her work on computer.
- Megal apparently had no time to make her web CV.
- Chad gave no reason for not completing his web-based CV, just a shrug of the shoulders.
- Roxanne handed her work in late because she had been ill.

Of the Grade 11D learners who did not hand in their web-based CVs:

- Kader had not finished his work in time, and had not tried to negotiate with me to hand it in late. He also did not seem to be too perturbed about it.
- Gino also had not finished his work in time, and had not tried to negotiate with me to hand in late. He also did not seem to be too perturbed about it.
- Alex did not hand in his work, probably as he did not know how to make a web page, even after being taught in class.
- Kurt handed his work in late as he had been ill, but is often ill when work is due.

Many of the learners had to juggle their time. Jason and Kelly in Grade 11D were very involved in sport and leadership activities and had to find a quick way of obtaining high marks. Imran (Grade 11D) and Avril (Grade 11A) were very involved in national sporting codes and had great difficulties in coping.

- Jason looked at the rubric and just added enough features in order to obtain a high mark.
- Kelly seemed to find enough time to create a good web-based CV.
- Avril worked studiously in class trying her best to manage although she had missed many classes while on sporting tours.

- Imran had been absent on national and international sporting tours and barely knew how to make a web site. He was very demoralised when he watched his peers in Grade 11D making exciting web sites. After some days spent very depressed, he seemed to rally himself and eventually produced a CV, albeit a poor one.

It was satisfying to see so many learners hand in their work on time as a result of hard work and the management of time, especially in a school where one loses percentages on a sliding scale for late work, a policy I do not follow.

5.2.4 Mental state

The learners enjoyed working on their web-based CV.

- There was no sign of computer anxiety.
- The only stress, if any, was deciding what to put in the text format of the CV. Academically challenged learners with a poor command of text-based language had difficulty formulating what to include and how to write their CV. The learners who struggled were not necessarily English second or third additional language learners, but rather academically weak learners.
- Learners in Grade 11A or the academically challenged class, once they found something they enjoyed doing, spent time on it for the pleasure of doing it. They did not seem to worry about the lack of advanced features for a high mark, but like Carlo and Lyle (both created animated gifs with *Gif Animator*) or Avril (animated clipart graphics) spent a great deal of time on what they could do or enjoyed doing.
- Learners in Grade 11D or the academically strong class, seemed to work on difficult aspects of the CV until they perfected them.

5.2.5 Summary of interaction with information from an affective perspective

The manner in which the learners affectively interacted with information in the *contact* educational digital environment was discussed in the preceding section. The findings are summarised and tabulated in Table 6 - 10 focusing on motivation, the influence of peers, managing time and mental state, behaviours and activities discussed in Section 6, *Synthesis and profile* in Chapter 2.

Table 6 - 10 How the learners affectively interacted with information during the process of creating the web-based CV

Affective perspective	Affective interaction
Motivation	<ul style="list-style-type: none"> • The learners were intrinsically motivated to create their own web-based CV. • They were extrinsically motivated to obtain high marks. • Grade 11D, or the academically strong class, were more motivated to obtain high marks than Grade 11A, or the academically weak class. • Grade 11A, or the academically challenged class, were motivated by the graphics, interactivity of web site features; and by creating a web-based CV about themselves.
Influence of peers	<ul style="list-style-type: none"> • The learners supported and helped those seated physically near them in a non-competitive way. • The learners were critical of their own digital creations, endeavouring to make them better for the motivational reasons above. • Some learners supported each other in kind, for example, with ready-made graphics.
Managing time	<ul style="list-style-type: none"> • For most of the learners using their choice of software was more important than utilizing time well. A number of learners wasted time in class preferring to do their work at home with other software as the web-authoring features of <i>FrontPage</i> irritated them. • The learners lost themselves in their work forgetting about time. • Most of the learners submitted their work in time, despite their initial unease about the amount of time devoted to the web-based CV.
Mental state	<ul style="list-style-type: none"> • Academically challenged learners did not suffer from computer anxiety, leaving advanced features alone. • Academically strong learners repeatedly worked with a feature until they perfected it. • Both groups of learners accepted error and tried to resolve their own problems, up to a certain level. • Both classes were adventurous and willing to explore new features, up to a point, based on their ability. Both groups were ready to explore the digital unknown, up to a point.

Table 6 - 10 summarises how the learners affectively interacted with information based on certain behaviours and activities. In general:

- All the learners were intrinsically motivated to create a web site by the features of a web. However, the academically strong learners were extrinsically motivated to by marks, whereas the academically weaker learners were not.
- Interacting with and physically working near other learners motivated the learners to create a web site with advanced features.

- Time did not overly worry the learners - they spent long periods working on what they enjoyed and preferred to use software of their own choice at home, not using the time set aside for web development in class using 'unsuitable' software.
- The learners enjoyed creating the web, repeatedly trying to develop new features until they were satisfied, and explored the features of the selected applications.

Table 6 - 11 indicates where the affective behaviours or activities tabulated in the literature review, Table 2 - 27 in Chapter 2, and the way in which the learners created the web-based CVs in the *contact* environment of the classroom, have common ground examining it from the affective perspectives of motivation, the influence of peers, managing time and mental state.

Table 6 - 11 Comparing affective behaviour or activity from the literature with the way in which the learners created their web-based CVs

Affective perspective	Affective behaviour or activity from the literature review	Common ground	Interaction with information while creating the web-based CV
Motivation	<ul style="list-style-type: none"> Intrinsically motivated 	✓	<ul style="list-style-type: none"> Learners were intrinsically motivated to create their own web-based CV.
	<ul style="list-style-type: none"> Extrinsically motivated 	✓	<ul style="list-style-type: none"> Learners were extrinsically motivated to obtain high marks.
	<ul style="list-style-type: none"> Not found in the literature review 	⇒	<ul style="list-style-type: none"> Learners in the Grade 11A, or the academically weak class, were more intrinsically motivated by the graphics, interactivity of web site features and by creating a web-based CV about themselves, than extrinsically motivated by good marks.
	<ul style="list-style-type: none"> Not found in the literature review 	⇒	<ul style="list-style-type: none"> Learners in Grade 11D, or the academically strong class, were more extrinsically motivated to obtain high marks than the Grade 11A or the academically weak class.
Influence of peers	<ul style="list-style-type: none"> Learn in a positive social environment 	✓	<ul style="list-style-type: none"> Learners supported and helped those seated physically near them in a non-competitive way by showing them various web-based computer skills.
	<ul style="list-style-type: none"> Critical of their own digital creations, i.e. want to correct and redo, to impress peers 	✓ X	<ul style="list-style-type: none"> Learners were critical of their own digital creations, for extrinsic and intrinsic motivational reasons, and not to impress their peers.
	<ul style="list-style-type: none"> Learn with group ownership 	✓	<ul style="list-style-type: none"> Some learners supported each other in kind, for example, with ready-made graphics. No selfish or unhelpful behaviour was shown.
	<ul style="list-style-type: none"> Want the independence to find / create their own learning resources 	NA	<ul style="list-style-type: none"> Learners were not required to create their own learning resources but they showed a tendency to want to use their own resources, i.e. software.

Affective perspective	Affective behaviour or activity from the literature review	Common ground	Way in which the learners created their web-based CVs
Managing time	<ul style="list-style-type: none"> Want useful, relevant information 	NA	<ul style="list-style-type: none"> Learners had to create their own information, not find relevant information.
	<ul style="list-style-type: none"> Want fast access to information resources 	NA	<ul style="list-style-type: none"> Learners had to create their own information, not obtain fast access to information.
	<ul style="list-style-type: none"> Not found in the literature review 	⇒	<ul style="list-style-type: none"> Time was not an issue when presented with the choice of 'inferior' software and class time, or 'superior' software and their own time. Own choice of software was of great importance.
	<ul style="list-style-type: none"> Not found in the literature review 	⇒	<ul style="list-style-type: none"> Learners lost themselves in their work forgetting about time.
	<ul style="list-style-type: none"> Not found in the literature review 	⇒	<ul style="list-style-type: none"> Most of the learners submitted their work in time, despite their initial unease about the amount of time devoted to the web-based CV.
Mental state	<ul style="list-style-type: none"> Do not suffer from computer anxiety 	✓	<ul style="list-style-type: none"> Learners did not suffer from computer anxiety perhaps because they helped one another.
	<ul style="list-style-type: none"> Willing to try a number of options and accept error 	✓ ⇒	<ul style="list-style-type: none"> Both groups of learners accepted error and tried to resolve their own problems, up to a certain level.
	<ul style="list-style-type: none"> Adventurous, creative, ready to explore the digital unknown 	✓ ⇒	<ul style="list-style-type: none"> Both classes were adventurous and willing to explore new features, up to a point, based on their assumed ability. Both groups were ready to explore the digital unknown, up to a point

Based on Table 6 - 11 the following behaviours or activities were *present* in Table 2 - 27 where the affective profile of a South African FET learner in a digital environment was tabulated based on the literature review, and in the creation of the web-based CV:

- Intrinsically motivated
- Extrinsically motivated
- Learn in a positive social environment
- Critical of their own digital creations
- Learn with group ownership
- Do not suffer from computer anxiety
- Adventurous, creative, ready to explore the digital unknown

Tabulated in Table 6 - 11 behaviours or activities *not found* in the literature review but present at PHS when the learners created a web site in a *contact* situation were:

- The academically weak class was more intrinsically motivated by the graphics, interactivity of web site features and by creating a web-based CV about themselves, than extrinsically motivated by good marks.
- The academically strong class was more extrinsically motivated to obtain high marks than the academically weak class.
- Time was not an issue when presented with the choice of 'inferior' software and class time, or 'superior' software and their own time. Own choice of software was of great importance.
- Learners lost themselves in their work forgetting about time.
- Most of the learners submitted their work in time, despite their initial unease about the amount of time devoted to the web-based CV.
- Both groups were ready to explore the digital unknown, up to a point.
- Academically weak learners were more likely not to attempt something that was beyond their assumed ability.

Table 6 - 11 compared the literature review and the behaviours or activities in the classroom when the learners created their web-based CV in a contact situation examining it from a cognitive perspective. There was much concurrence between the literature review and the behaviours or activities in the classroom in the creation of the web-based CV. Many behaviours or activities not found in the literature review were found in the creation of the CV.

5.3 Physical perspective

The following section will examine how the learners interacted with information in a *contact* digital environment from a physical perspective looking particularly at acquiring, recalling, processing and planning, and presenting information from a broad physical perspective.

5.3.1 Acquiring information

The learners spoke and interacted with each other while acquiring the web-authoring skills. The room was seldom quiet as there was always someone demonstrating a particular skill. There was little physical showing and sharing of personal CV information or graphic images, as the learners were too busy and involved in the creation of the CV.

5.3.2 Recalling information

The learners discussed web-authoring skills taught earlier in the year with each other. They seemed to recall those skills that were within their capabilities, see 5.2.4, Mental state. The learners quietly recalled information about themselves in order to add to their web-based CV.

5.3.3 Processing and planning

The following will discuss the physical aspect of the processing of the web-based CV, how the learners created the CV, software used, place where the work was done and the technical problems encountered.

5.3.3.1 Physical creation

The learners do not have keyboarding skills which inhibited their keying in of information. They did not seem to be aware that they could have worked quicker had they been able to do keyboarding. All learners were able to use a mouse.

The laboratory in which they worked had the workstations in rows. The learners were permitted and were able to look at the workstations on either side and could see those in front of them. Learners were able to get up and walk around to look at each other's work. Talking was permitted in the room and only discouraged when it

became too loud. Although the learners did move around the room and looked at their friends' work, they looked mainly at the work of those in their own rows. As they discussed their work a great deal there was a continual quiet hum in the computer laboratory.

Throughout the Section 5.2.2, Influence of peers, the similar features found in the CVs of learners seated next to each other, were attributed to friendship. It was not considered that learners would share ideas with those near them unless they were friends, but the evidence of the use of the following features may indicate the influence of proximity as well as friendship:

- Frames by Grade 11D (Figure 6 - 12)
- Animated clipart images by Grade 11A (Figure 6 - 13)
- Thumbnails by Grade 11A (Figure 6 - 17)
- Thumbnails by Grade 11D (Figure 6 - 19)
- Crossword puzzle by Grade 11D (Figure 6 - 21)
- Animations with *CoffeeCup Firestarter* or *Flash* by Grade 11D (Figure 6 - 23)
- Animations made with *Gif Animator*, *Gif Construction Set* or *Image Composer* by Grade 11A (Figure 6 - 24)
- Animations made with *Gif Animator*, *Gif Construction Set* or *Image Composer* by Grade 11D (Figure 6 - 26)

5.3.3.2 Use of software and place of work

Three of the learners made their web-based CVs at home as the school did not have the web editors they preferred to use. Most of the learners made their CVs using *FrontPage* plus other software programs. They enjoyed working at school, with their peers, creating objects that moved (animations, mouse overs, thumbnails) and permitted input (crossword puzzle, tile puzzle, quiz). A number of the learners used the computer laboratory in the afternoons to work on their CVs and explore the software packages. Although they enjoyed exploring the packages and adding interactivity, they did not really use all the features listed in the instructions. Either they did not read the instructions properly, as apparent after the event, or they did not actually put meaning to the computer or web terminology words such as mouse over (comments from Simon).

5.3.3.3 Technical features

Technically the CVs had few problems. However, these problems did not influence the work of the learners when they created their web-based CVs. The few problems that occurred were:

- Links that did not work were the most common problems, but there were few of those problems.
- The three video clips took a long time to load, even from a hard drive or CD-ROM. Over the World Wide Web they would have been almost impossible.
- The five sound clips did not work on my computer. I am not sure if they worked on the learners' computers.
- The crossword puzzles took a long time to load but nevertheless all seemed to work.
- *CoffeeCup Firestarter* and *Flash* introductions took a long time to load from the CD-ROM on which all the CVs were stored. Over the Internet it may have been a problem.

5.3.4 Presenting information

The information was presented on CD-ROM or on 3 ½ disks. This did not pose a problem. The CVs were transferred to the network to my directory for safekeeping and privacy, in anticipation of being used in the Matriculation year.

5.3.5 Summary of interaction with information from a physical perspective

The manner in which the learners interacted with information from a physical perspective in the *contact* educational digital environment was discussed in the preceding section. The findings are summarised and tabulated in Table 6 - 12 looking at how the learners acquired, recalled, processed and planned information, behaviours or activities discussed in Section 6, *Synthesis and profile* in Chapter 2.

Table 6 - 12 How the learners interacted with information from a physical perspective during the process of creating the web-based CV

Physical perspective	Physical interaction
Acquiring information	<ul style="list-style-type: none"> • Learners spoke to and shared web-authoring skills with their peers, acquiring them in the process.
Recalling	<ul style="list-style-type: none"> • Learners spoke to each other recalling web-authoring skills taught previously.
Processing / planning information	<ul style="list-style-type: none"> • Learners keyed in their information slowly. • Learners were able to use input devices such as a mouse competently, but not the keyboard. • Learners interacted with each other and the computer, working and looking at each other's screens. • Learners spoke to each other as they worked. • All learners worked at a workstation during the period set aside for the web-based CV, although three worked and fiddled on non web-based CV related matters. • Correct software was very important to certain learners.

Table 6 - 12 tabulated the way the learners physically worked in the digital environment creating their web-based CVs. Most learners worked at their workstations interacting with those near them, looking at each other's screens and discussing matters with them. They spoke and interacted with other learners as they acquired new web-authoring skills and recalled previously taught skills.

Table 6 - 13 indicates where the physical behaviours or activities tabulated in the literature review, Table 2 - 28, and the way in which the learners created the web-based CVs in the *contact* environment of the classroom, have common ground. How the learners interacted with information is examined looking at how they acquired, recalled processed and planned information from a physical perspective.

Table 6 - 13 Comparing physical behaviour or activity from the literature with the way in which the learners created their web-based CVs

Physical perspective	Physical behaviour or activity from the literature review	Common ground	Interaction with information while creating the web-based CV
Acquiring information	<ul style="list-style-type: none"> • Look for required data using digital features 	NA	<ul style="list-style-type: none"> • Learners were not required to obtain any data, but rather create their own.
	<ul style="list-style-type: none"> • Move continually onto a new feature in the digital environment, continuing the flow state 	NA	<ul style="list-style-type: none"> • Learners were not required to obtain information in a digital environment.
	<ul style="list-style-type: none"> • Read certain areas of the screen first in preference to others 	NA	<ul style="list-style-type: none"> • Learners were not required to read the new screens in order to obtain information.
	<ul style="list-style-type: none"> • Read text in a digital environment relatively slowly 	NA	<ul style="list-style-type: none"> • Learners were not required to obtain information in a text-based format in a digital environment.
	<ul style="list-style-type: none"> • Skim and reread certain portions of the screen 	NA	<ul style="list-style-type: none"> • Learners were not required to obtain information on a screen.
	<ul style="list-style-type: none"> • No specific information found in the literature review 	⇒	<ul style="list-style-type: none"> • Learners spoke as they acquired web-authoring skills from their peers.
Recalling information	<ul style="list-style-type: none"> • No specific information found in the literature review 	⇒	<ul style="list-style-type: none"> • Learners spoke as they recalled web-authoring skills taught earlier in the year.

Physical perspective	Physical behaviour or activity from the literature review	Common ground	Interaction with information while creating the web-based CV
Processing / planning information	<ul style="list-style-type: none"> • Work / learn actively doing things 	<ul style="list-style-type: none"> ✓ ✓ ✓ 	<ul style="list-style-type: none"> • Learners seldom sat still for any length of time, they were usually active doing things, such as using input devices. • Learners were able to use input devices such as a mouse and scanner competently, but not the keyboard. The learners keyed in their information slowly. • All learners worked at a workstation during the period set aside for the web-based CV, although three worked and fiddled on non web-based CV related matters.
	<ul style="list-style-type: none"> • Work / learn in a group with talking 	<ul style="list-style-type: none"> ✓ 	<ul style="list-style-type: none"> • Learners interacted with each other and the computer, working, talking and looking at each other's screens.
	<ul style="list-style-type: none"> • Work with partner, share ideas and copy work 	<ul style="list-style-type: none"> ✓ 	<ul style="list-style-type: none"> • Features were copied or shared with learners seated near each other particularly in Grade 11D.
	<ul style="list-style-type: none"> • Choice of software 	<ul style="list-style-type: none"> ⇒ 	<ul style="list-style-type: none"> • Experienced users preferred the software they were used to and would not use the inexpensive software found at school.
Presenting information	<ul style="list-style-type: none"> • No specific information found in the literature review 	<ul style="list-style-type: none"> NA 	<ul style="list-style-type: none"> • Nothing noted.

Based on Table 6 - 13 the following behaviours or activities were *present* in Table 2 - 28 where the physical profile of a South African FET learner in a digital environment was tabulated based on the literature review, and in the creation of the web-based CV:

- Work / learn actively doing things
- Work / learn in a group with talking
- Work with partner, share ideas and copy work

Tabulated in Table 6 - 13 behaviours or activities *not found* in the literature review but present at PHS when the learners created a web site in a *contact* situation were:

- Learners spoke as they acquired web-authoring skills from their peers.
- Learners spoke as they recalled web-authoring skills taught earlier in the year.
- Experienced users preferred the software they were used to and would not use the inexpensive software found at school.

Based on Table 6 - 13 there was concurrence in the way learners physically processed and planned information between the literature review and the creation of the web-based CV at PHS: The learners worked actively in groups doing things and talking

5.4 Conclusion of analysis

This thesis describes how learners interact with information in a digital environment from cognitive, affective or physical perspectives. This case study describes how learners interacted with each other and information in a *contact* digital environment, particularly looking at motivation and the influence of their peers.

The analysis of the Grade 11A and Grade 11D learners' web-based CVs discussed how the learners created their CVs from cognitive, affective and physical perspectives. The perspectives used for the cognitive, affective and physical interaction were obtained from the literature review.

Tables 6 - 14, 6 - 15 and 6 - 16 summarise the ways in which the FET learners at PHS interacted with information from cognitive, affective and physical perspectives respectively in the *contact* digital environment while creating a web-based CV. In each of the three tables the evidence is introduced via the perspective, followed by

the form of behaviour or activity. The way in which the learners at PHS worked in the digital environment is then described.

Table 6 - 14 Evidence of interaction with information in the contact educational digital environment from a cognitive perspective

Cognitive perspective	Cognitive behaviour or activity	Interaction with information in the contact educational digital environment
Acquiring information	<ul style="list-style-type: none"> • Learning and mentally processing information 	<ul style="list-style-type: none"> • Learners acquired web-authoring skills influenced by their peers.
Recalling information	<ul style="list-style-type: none"> • Long term memory recalled 	<ul style="list-style-type: none"> • Learners recalled web-authoring skills through interacting with their peers.
Processing / planning information	<ul style="list-style-type: none"> • Planning / creating of digital projects 	<ul style="list-style-type: none"> • The learners did not preplan their CV but created it as they went along.
	<ul style="list-style-type: none"> • Use of higher-level thinking skills 	<ul style="list-style-type: none"> • About half of the learners developed a CV arranged with pages and hyperlinks at two levels using higher-level thinking skills. As they developed interactive features they used meaningful higher-level thinking skills. The learners modelled or structured their CV using higher-level thinking skills.
Presenting information	<ul style="list-style-type: none"> • Cognitive processing of screen-based material 	<ul style="list-style-type: none"> • Most learners had spelling errors on their web pages that they had not seen when they created the site, indicating superficial reading of screen-based material.
	<ul style="list-style-type: none"> • Ability to communicate their understanding of the subject matter in multiple formats 	<ul style="list-style-type: none"> • Grade 11D, or the academically strong class, were better able than Grade 11A, or the academically weak class, to create interactive features and communicate the subject matter in multiple formats. • Static and animated clipart images added to the web pages seldom complemented the content. • Interactive features complemented the content. • The learners had difficulty mentally processing and creating the text-based information required.

Table 6 - 15 Evidence of interaction with information in the contact educational digital environment from an affective perspective

Affective perspective	Affective behaviour or activity	Interaction with information in the contact educational digital environment
Motivation	<ul style="list-style-type: none"> • Intrinsic motivation 	<ul style="list-style-type: none"> • Learners were intrinsically motivated to create their own web-based CV.
	<ul style="list-style-type: none"> • Extrinsic motivation 	<ul style="list-style-type: none"> • Learners were extrinsically motivated to obtain high marks.
	<ul style="list-style-type: none"> • Types of motivation for different ability learners 	<ul style="list-style-type: none"> • Grade 11A, or the academically weak class, were more intrinsically motivated by the graphics, interactivity of web site features and by creating a web-based CV about themselves, than extrinsically motivated by good marks. • Grade 11D, or the academically strong class, were more extrinsically motivated to obtain high marks than the Grade 11A, or the academically weak class.
Influence of peers	<ul style="list-style-type: none"> • Social environment 	<ul style="list-style-type: none"> • Learners supported and helped those seated physically near them in a non-competitive way by showing them various web-based computer skills.
	<ul style="list-style-type: none"> • Critical appraisal of own digital creations 	<ul style="list-style-type: none"> • Learners were critical of their own digital creations, for extrinsic and intrinsic motivational reasons, and not to impress their peers.
	<ul style="list-style-type: none"> • Group ownership of created material 	<ul style="list-style-type: none"> • Some learners supported each other in kind, for example, with ready-made graphics. No selfish, unhelpful behaviour was shown.
Managing time	<ul style="list-style-type: none"> • Time spent on work 	<ul style="list-style-type: none"> • Learners lost themselves in their work, forgetting about time.
	<ul style="list-style-type: none"> • Meeting deadlines 	<ul style="list-style-type: none"> • Most of the learners submitted their work in time, despite their initial unease about the amount of time devoted to the web-based CV.
Mental state	<ul style="list-style-type: none"> • Computer anxiety 	<ul style="list-style-type: none"> • Learners did not suffer from computer anxiety.
	<ul style="list-style-type: none"> • Acceptance of error 	<ul style="list-style-type: none"> • Both groups of learners accepted error and tried to resolve their own problems up to a certain level.
	<ul style="list-style-type: none"> • Willingness to explore the digital unknown 	<ul style="list-style-type: none"> • Both classes were adventurous and willing to explore new features, up to a point, based on their assumed ability. Both groups were ready to explore the digital unknown, up to a point.

Table 6 - 16 Evidence of interaction with information in the contact educational digital environment from a physical perspective

Physical perspective	Physical behaviour or activity	Interaction with information in the contact educational digital environment
Processing / planning information	<ul style="list-style-type: none"> • Work / learn actively doing things 	<ul style="list-style-type: none"> • Learners seldom sat still for any length of time; they were usually active doing things, such as using input devices. • Learners were able to use input devices such as a mouse and scanner competently, but not the keyboard. The learners keyed in their information slowly. • All learners worked at a workstation during the period set aside for the web-based CV, although three worked and fiddled on non web-based CV related matters.
	<ul style="list-style-type: none"> • Work / learn in a group with talking 	<ul style="list-style-type: none"> • Learners interacted with each other and the computer, working, talking and looking at each other's screens.
	<ul style="list-style-type: none"> • Work with partner, share ideas and copy work 	<ul style="list-style-type: none"> • Learners copied and shared the skills of creating interactive features with those seated next to them. In the class where the learners were physically closer to each other, more features were shared.
	<ul style="list-style-type: none"> • Choice of software 	<ul style="list-style-type: none"> • Time was not an issue when presented with the choice of 'inferior' software' and class time, or 'superior' software and their own time. Own choice of software was of great importance.

In the preceding tables, Table 6 - 14, Table 6 - 15 and Table 6 - 16, the way in which learners acquire, recall, process and present information is tabulated from cognitive, affective and physical perspectives. The information can be summarised as follows:

- Peers influenced the acquisition and recall of information. Learners helped each other when they sat near each other learning new features and providing motivation to explore the applications.
- Higher-level thinking skills were exhibited when the learners created the CV, particularly when they used frames, image maps and webs with different levels.
- Interactive features that required much work to create, complemented the content.
- The constant interaction of the learners with each other caused a continual buzz in the computer laboratory.
- The learners coped with error, up to a level.
- The academically challenged learners were motivated and affirmed by creating a web about themselves. Obtaining high grades motivated the academically bright learners.

6 Measures to ensure validity and reliability

Measures were taken to ensure validity and reliability. In order to enhance internal validity the strategies based on Merriam (1998, p. 204) and McMillan and Schumacher (1993, p. 391) were used. These strategies included triangulation, long-term observation, member checks or learner validation, field research, peer examination and looking at the researcher's bias.

6.1 Triangulation

In order to triangulate the findings the

- learners were observed as they worked;
- web-based CVs were examined by myself and results placed in a spreadsheet;
- learners corroborated the results of the spreadsheet;
- learners' comments about their web-based CVs six months after the initial making of the CVs were noted;
- learners confirmed the data in the case study; and
- colleagues confirmed the findings.

6.2 Observation of the learners

I have worked with the learners over a two-year period during which time they have become accustomed to me, and vice versa. This case study itself is based on a two weeks' observation when the learners created their web-based CV. Information in the questionnaire was examined in the light of knowledge of and long-term observation of the subjects.

6.3 Learner validation of the spreadsheet

In order to get the learners to check and validate the figures, they were encouraged to check the figures in the spreadsheet. The learners were given the spreadsheet illustrating all the statistical data about their web-based CV two weeks before the final submission of their Matriculation project. During these final two weeks they were given the opportunity to improve their work. They were asked to check the data in the spreadsheet against their web-based CV. They did this with interest and motivation, as they were eager to find extra points to improve their grades.

The learners checked my numbers in the spreadsheet which

- counted every animated gif with *CoffeeCup Firestarter* or *Flash*, animated gif with *Gif Animator* or similar, drop down box, feedback form, guest book, jigsaw puzzle, quiz, mouse over, thumbnail, tile puzzle, crossword;
- counted every animated gif, clipart, static picture, sound clip, video clip, background;
- noted the shared borders, frames, image maps; and
- noted spelling mistakes, levels of information, structure, amount of information and technical quality.

6.4 Learner validation of the printed case study

Two weeks before the final submission of their Matriculation project and about six months after making the web-based CV, the learners were asked to check and comment on the printed case study during class time, noting accuracy and interpretation. The case study was put on the shared network which is accessible to all and the learners did a 'Find' looking for their own names. This checking of the printed case study took place before their names were changed in order to ensure anonymity. The checking happened on three consecutive days with the hope that, with time and reflection, the learners might wish to comment on and change my

interpretation. During this checking, the learners looked critically at my work hoping to gain ideas of what met with my disapproval in order to improve their work for the final submission of the Matriculation project.

The learners showed their peers their names and discussed my findings:

- Carlo and Lyle requested that changes be made with reference to the details about their animations.
- Jenna refuted some data which I then changed.
- Sarah and Kurt concurred with my comments about them.
- Tamlyn told me she learned from and with the persons seated next to her.
- Avril smiled at the references to her time management.
- Jared, Craig and Jason discussed the amount of information found in their CVs and the CVs in general, and were disapproving of the whole idea of a web-based CV.

6.5 Field research

The research was done in a natural environment for this particular case study, observing learners dynamically interacting with information in a digital environment, which was also the aim of the research.

6.6 Colleague examination of the data

Few members of the school staff have commented on the findings as they have been made.

- Neil Eddy, the mathematics teacher, suggested that the learners were not necessarily sharing their work. He put forward the idea that similar-minded learners sat with each other, hence their doing similar forms of work (Eddy, 2002). Four learners, Susan, Lara, Kate and Penny, commented on his comment. They indicated that although they sat near each other and shared with each other, they were not friends, but shared because they sat near each other.
- The principal, Dave Arguile, read the case study and commented that it was 'interesting'.

6.7 Researcher bias

My underlying bias, if there is one, is to find a better way of getting all learners to work to their full potential. My aim would be looking to see if the learners were working to their fullest potential and, if they were not, to find out why.

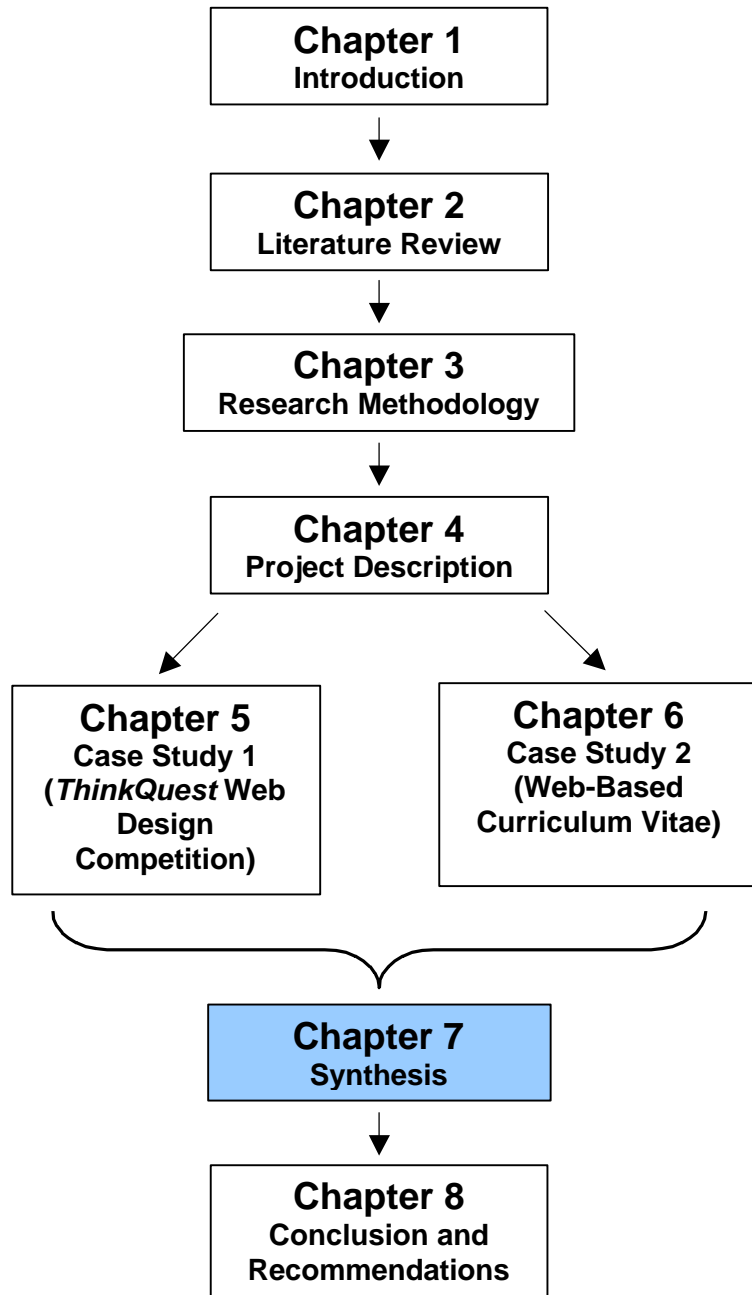
7 Summary

Case Study 2 is an investigation into how learners create a web-based CV in a *contact* digital environment. The chapter commenced by describing the participants in the study looking at:

- Numbers of learners who completed the entry and questionnaire
- Distribution of learners by race and gender
- Numbers of learners who submitted their entries
- Ownership and use of digital devices
- Seating positions of the learners in the computer laboratory

The data collection methods were described looking at Observation, the Event log, Document analysis and Interviews. The process of making the web-based CV was described from setting the background, to the start, in progress and submission stages. The completed web-based CV was analysed with respect to how the learners created the site from cognitive, affective and physical perspectives. A detailed summary indicating how they interacted with information in the *contact* digital environment was developed. The chapter concluded by describing the measures taken to ensure validity and reliability.

Chapter 7

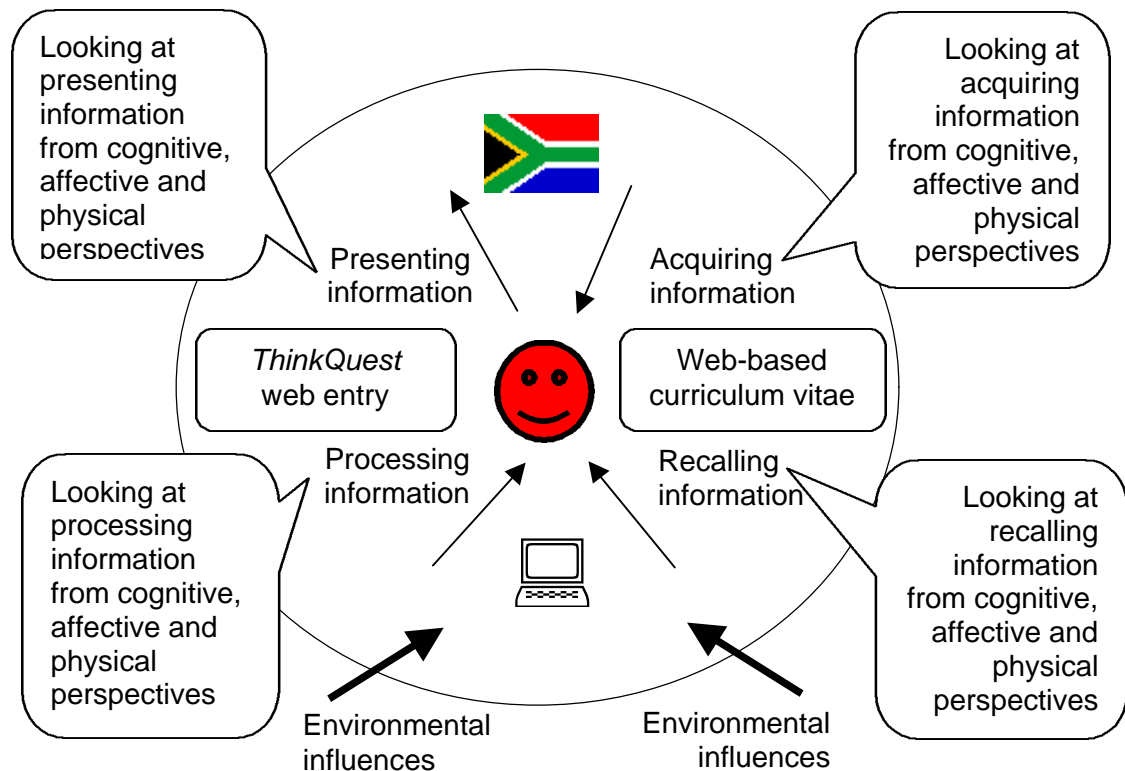


Chapter 7 Synthesis

1 Introduction

The aim of this research was to investigate how South African FET learners interact with information in a digital environment from cognitive, affective and physical perspectives as they acquire, recall, process and present information. This chapter synthesises the findings of the two case studies against the background of the usual work done at PHS in the computer laboratory, illustrated in .

Figure 7 - 1 Interaction with information by South African FET learners in a digital environment as they made two web sites



In order to provide a basis for the investigation, the literature was reviewed and reported on in Chapter 2. On the basis of the literature review a profile was developed in Chapter 2 of how South African FET learners in a digital environment interact with information. Chapter 3 described the research methodology used to investigate the problem of how the learners acquire, recall, process and present information in a digital environment. Chapter 4 described the usual work done by South African FET learners in the digital environment of the computer laboratory at PHS in Computer Studies SG. Chapters 5 and 6 described two case studies where PHS learners interacted with information while creating web sites. This chapter

synthesises the two case studies and compares the findings with the literature review.

2 Scope of the two case studies

Two case studies, the *ThinkQuest* web entry and the creation of a web-based CV, were conducted and reported on in Chapters 5 and 6. They differed in management, see Table 4 - 12, and in each of the following points providing context and credibility to ensure reliability of the findings:

- Content of the web sites
- Provision of examples
- Clarity of instructions
- Motivation, intrinsic and extrinsic
- Influence of peers
- Group dynamics
- Availability of software
- Method of submission
- Physical proximity
- Place of work
- Allocation of time
- Lead time

As tabulated in Table 3 - 5, three groups of learners, altogether 86, took part in the two case studies. The learners differed from each other as follows:

- one to two years difference in ages;
- ranging from academically strong to academically weak;
- different levels of prior experience;
- one week's training in the application to one term's training in the application and features used with the application;
- working with peers at a distance and in a contact situation; and
- experience in the application and no experience with the application.

There was a period of two to three months between the two case studies, conducted against a background of usual class work.

3 Synthesis of the two case studies

The way in which the learners in the two case studies interacted with information in a digital environment is now synthesised from cognitive, affective and physical perspectives and compared with the literature review

The following section examines how the learners interacted with information from cognitive, affective and physical perspectives. The perspectives and behaviours or activities, tabulated in Table 7 - 1, used for the examination of the interaction with information were developed in Chapter 2, Section 6, *Synthesis and profile*. The way the learners interacted with information with respect to acquiring, recalling, processing and planning, and presenting information while working on the two case studies is tabulated and synthesised in Tables 7 - 2, 7 - 3 and 7 - 4.

Table 7 - 1 Examination of perspectives and activities

Perspective	Behaviour or activity
Cognitive perspective	<ul style="list-style-type: none"> • Learning and mentally processing information • Long term memory recalled • Planning / creating of digital projects • Use of higher-level thinking skills • Cognitive processing of screen-based material • Ability to communicate their understanding of the subject matter in multiple formats
Affective perspective	<ul style="list-style-type: none"> • Intrinsic motivation • Extrinsic motivation • Types of motivation for different ability learners • Social environment • Critical appraisal of own digital creations • Group ownership of created material • Time spent on work • Meeting deadlines • Computer anxiety • Acceptance of error • Willingness to explore the digital unknown
Physical perspective	<ul style="list-style-type: none"> • Working / learning actively doing things • Working / learning in a group with talking • Working with partner, sharing ideas and copying work • Choice of software

Table 7 - 2 Synthesis of cognitive processing of information in the two case studies

Processing	Cognitive processing	Way in which the learners created their <i>ThinkQuest</i> web entries	Way in which the learners created their web-based CVs	Synthesis of two case studies
Acquiring information	Learning and mentally processing information	<ul style="list-style-type: none"> Learners gained web-authoring skills as they created the entries. Learners used a variety of resources to obtain information, those new to web-authoring mainly from the World Wide Web and those experienced in web-authoring from printed resources. 	<ul style="list-style-type: none"> Learners acquired web-authoring skills influenced by their peers. 	<ul style="list-style-type: none"> The learners acquired the skills necessary for creating the web while they were creating it, influenced by their peers. The learners used a number of resources for information, novice users preferring the World Wide Web and experienced learners preferring printed resources.
Recalling information	Long term memory recalled	<ul style="list-style-type: none"> Not observed. 	<ul style="list-style-type: none"> Learners recalled web-authoring skills through interacting with their peers. 	<ul style="list-style-type: none"> The learners recalled web-authoring skills through interacting with their peers.
Processing / planning information	Planning / creating of digital projects	<ul style="list-style-type: none"> A small level of planning is evident. 	<ul style="list-style-type: none"> The learners did not preplan their CV but created it as they went along. 	<ul style="list-style-type: none"> Preplanning of the work was not evident. The learners created the webs as they worked.
	Use of higher-level thinking skills	<ul style="list-style-type: none"> Higher-level thinking skills were used in structuring the webs on two levels, a format found in most webs. Frames, indicating higher-level thinking skills, were used by a number of learners although Grade 10D learners were not successful. Quizzes found in half of the entries indicated higher-level thinking skills. 	<ul style="list-style-type: none"> About half of the learners developed a CV arranged with pages and hyperlinks at two levels using higher-level thinking skills. As they developed interactive features they used meaningful higher-level thinking skills. The learners modelled or structured their CV using higher-level thinking skills. 	<ul style="list-style-type: none"> Higher-level thinking skills were evident in conceptualising and creating the webs with levels of information, frames, image maps and interactivity.

Processing	Cognitive processing	Way in which the learners created their <i>ThinkQuest</i> web entries	Way in which the learners created their web-based CVs	Synthesis of two case studies
Presenting information	Cognitive processing of screen-based material	<ul style="list-style-type: none"> • Very few spelling errors noted. 	<ul style="list-style-type: none"> • Most learners had spelling errors on their web pages that they had not seen when they created the site, indicating superficial reading of screen-based material. 	<ul style="list-style-type: none"> • Work done as a team presented fewer spelling errors than work done by an individual. Individuals seemed not to have seen their superficial spelling errors.
	Ability to communicate their understanding of the subject matter in multiple formats	<ul style="list-style-type: none"> • Learners did not communicate their content in multiple formats, mainly staying with static images, thumbnails and text-based content. 	<ul style="list-style-type: none"> • Grade 11D, or the academically strong class, were better able than Grade 11A, or the academically weak class, to create interactive features and communicate the subject matter in multiple formats. • Static and animated clipart images added to the web pages seldom complemented the content. • Interactive features complemented the content. • The learners had difficulty mentally processing and creating the text-based information required. 	<ul style="list-style-type: none"> • Academically strong and experienced learners were able to communicate the content in multiple formats. • Self-created interactive features complemented the text, but not ready-made features. • The learners had difficulty writing the text to add to the webs.

Table 7 - 3 Synthesis of affective processing of information in the two case studies

Processing	Affective processing	Way in which the learners created their <i>ThinkQuest</i> web entries	Way in which the learners created their web-based CVs	Synthesis of two case studies
Motivation	Intrinsic motivation	<ul style="list-style-type: none"> Learners were proud of their web entries, both groups were proud that they had managed to create a web, on the World Wide Web, for everyone to see. 	<ul style="list-style-type: none"> Learners were intrinsically motivated to create their own web-based CV. 	<ul style="list-style-type: none"> The learners were intrinsically motivated to create a web site, particularly when it was relevant to their lives.
	Extrinsic motivation	<ul style="list-style-type: none"> Marks and grades were the major motivating factor. 	<ul style="list-style-type: none"> Learners were extrinsically motivated to obtain high marks. 	<ul style="list-style-type: none"> The learners were extrinsically motivated to obtain good marks.
	Types of motivation for different ability learners	<ul style="list-style-type: none"> The novice Grade 10D learners were proud of the content of the web. Experienced Grade 11D learners were proud of the interactive features of the web, although there were few. 	<ul style="list-style-type: none"> Grade 11A, or the academically weak class, were more intrinsically motivated by the graphics, interactivity of web site features and by creating a web-based CV about themselves, than extrinsically motivated by good marks. Grade 11D, or the academically strong class, were more extrinsically motivated to obtain high marks than the Grade 11A, or the academically weak class. 	<ul style="list-style-type: none"> Novice and academically challenged learners were motivated by managing to create a web with its content and graphical interface, whereas experienced or academically bright learners were more motivated to obtain good marks.

Processing	Affective processing	Way in which the learners created their <i>ThinkQuest</i> web entries	Way in which the learners created their web-based CVs	Synthesis of two case studies
Influence of peers	Social environment	<ul style="list-style-type: none"> • The majority of the learners enjoyed working with their team members. • Conflict experienced creating the web was not brought to the classroom. • The learners were supportive of their team members. • Friendship was the main criteria for team selection, and not marks. • Novice learners learned from each other. • Learners were knowledgeable about their own computer skills, in comparison to those of others. 	<ul style="list-style-type: none"> • Learners supported and helped those seated physically near them in a non-competitive way by showing them various web-based computer skills. 	<ul style="list-style-type: none"> • The learners supported and helped each other for no ulterior purpose.
	Critical appraisal of own digital creations	<ul style="list-style-type: none"> • Learners did not exhibit the need to impress others, rather to show what could be done. 	<ul style="list-style-type: none"> • Learners were critical of their own digital creations, for extrinsic and intrinsic motivational reasons, and not to impress their peers. 	<ul style="list-style-type: none"> • The learners explored features to share the excitement of the feature.
	Group ownership of created material	<ul style="list-style-type: none"> • The learners worked and learned with group ownership as they were making a group or team entry. 	<ul style="list-style-type: none"> • Some learners supported each other in kind, for example, with ready-made graphics. No selfish, unhelpful behaviour was shown. 	<ul style="list-style-type: none"> • Learners shared ideas and skills they had learned.

Processing	Affective processing	Way in which the learners created their <i>ThinkQuest</i> web entries	Way in which the learners created their web-based CVs	Synthesis of two case studies
Managing time	Time spent on work	<ul style="list-style-type: none"> A short time was spent on the entry, having wasted time and procrastinated. 	<ul style="list-style-type: none"> Learners lost themselves in their work, forgetting about time. 	<ul style="list-style-type: none"> The learners focused on the work losing sight of time.
	Meeting deadlines	<ul style="list-style-type: none"> Most of the learners were a few days short of the deadline, i.e. most did not keep to the deadlines. 	<ul style="list-style-type: none"> Most of the learners submitted their work in time, despite their initial unease about the amount of time devoted to the web-based CV. 	<ul style="list-style-type: none"> The learners had problems keeping deadlines, particularly those with long lead times.
Mental state	Computer anxiety	<ul style="list-style-type: none"> The Grade 10D novice users were more stressed by the malfunctioning computers and printers than the experienced Grade 11D learners. Novice learners preferred to work where there was access to help. Uploading a web to a server was a stressful technical problem. 	<ul style="list-style-type: none"> Learners did not suffer from computer anxiety. 	<ul style="list-style-type: none"> When working in a supportive environment the learners did not suffer from anxiety.
	Acceptance of error	<ul style="list-style-type: none"> Nothing noted. 	<ul style="list-style-type: none"> Both groups of learners accepted error and tried to resolve their own problems up to a certain level. 	<ul style="list-style-type: none"> The learners accepted errors and resolved their own problems up to a point.
	Willingness to explore the digital unknown	<ul style="list-style-type: none"> Experienced Grade 11D learners learned the web-authoring skills more by exploring the packages themselves than from other features. 	<ul style="list-style-type: none"> Both classes were adventurous and willing to explore new features, up to a point, based on their assumed ability. 	<ul style="list-style-type: none"> Experienced learners pushed the boundaries of the programs, learning new features. Novice learners explored up to a point.

Table 7 - 4 Synthesis of physical processing of information in the two case studies

Processing	Physical processing	Way in which the learners created their <i>ThinkQuest</i> web entries	Way in which the learners created their web-based CVs	Synthesis of two case studies
Processing / planning information	Work / learn actively doing things	<ul style="list-style-type: none"> Nothing noted. 	<ul style="list-style-type: none"> Learners seldom sat still for any length of time; they were usually active doing things, such as using input devices. Learners were able to use input devices such as a mouse and scanner competently, but not the keyboard. The learners keyed in their information slowly. All learners worked at a workstation during the period set aside for the web-based CV, although three worked and fiddled on non web-based CV related matters. 	<ul style="list-style-type: none"> The learners are always physically active using the mouse or keyboard. Learners keyed in information slowly with errors.
	Work / learn in a group with talking	<ul style="list-style-type: none"> Nothing noted. 	<ul style="list-style-type: none"> Learners interacted with each other and the computer, working, talking and looking at each other's screens. 	<ul style="list-style-type: none"> The learners interacted with each other much of the time.
	Work with partner, share ideas and copies work	<ul style="list-style-type: none"> This was an integral part of the project. 	<ul style="list-style-type: none"> Learners copied and shared the skills of creating interactive features with those seated next to them. In the class where the learners were physically nearer each other, more features were shared. 	<ul style="list-style-type: none"> The learners worked and interacted with those on either side of them although it was not required. The learners shared features with those on either side.

Processing	Physical processing	Way in which the learners created their <i>ThinkQuest</i> web entries	Way in which the learners created their web-based CVs	Synthesis of two case studies
	Choice of software	<ul style="list-style-type: none"> • Access to the preferred personal programs was of paramount importance to experienced users. 	<ul style="list-style-type: none"> • Time was not an issue when presented with the choice of 'inferior' software and class time, or 'superior' software and their own time. Own choice of software was of great importance. 	<ul style="list-style-type: none"> • Experienced learners are most particular with respect to software selection.

In Tables 7 - 2, 7 - 3 and 7 - 4 the ways in which the learners interacted with information in the two case studies were synthesised by tabulating how they acquired, recalled, process and planned, and presented information. The following section compares the findings at PHS with the data from the literature review.

4 Comparison of the findings at PHS with the literature review

Many of the behaviours and activities present at PHS when the learners created their web sites were not mentioned in the literature review in Chapter 2, Section 6, *Synthesis and profile*, others were in agreement with the literature review and others differed from the literature review. Tables 7 - 5, 7 - 6 and 7 - 7 compares how the learners at PHS interacted with information with that of the literature review in Tables 2 - 26, 2 - 27 and 2 - 28 as they acquired, recalled, processed and planned, and presented information motivated, being influenced by peers, managed time and mental state.

Table 7 - 5 Comparison of the cognitive processing at PHS with the literature review

Processing	How the learners at PHS interacted with information	Literature review
Acquiring information	The learners acquired the skills necessary for creating the web while they were creating it, while influenced by their peers.	Not mentioned
	The learners used a number of resources for information with novice users preferring the World Wide Web.	Not mentioned
Recalling information	The learners recalled web-authoring skills through interacting with their peers.	Not mentioned
Processing / planning information	Preplanning of the work was not evident. The learners created the webs as they worked.	Differs from
	Higher-level thinking skills were evident in conceptualising and creating the webs with levels of information, frames, image maps and interactivity.	Agrees with
Presenting information	Work done as a team presented fewer spelling errors than work done by an individual. Individuals seemed not to have seen their superficial spelling errors.	Not mentioned
	Academically strong and experienced learners were able to communicate the content in multiple formats.	Agrees with, but with additional information
	Self-created interactive features complemented the text, and not ready-made features.	Not mentioned
	The learners had difficulty writing the text to add to the webs.	Not mentioned

Table 7 - 6 Comparison of the affective processing at PHS with the literature review

Processing	How the learners at PHS interacted with information	Literature review
Motivation	The learners were intrinsically motivated to create a web site, particularly when it was relevant to their lives.	Agrees with, but with additional information
	The learners were extrinsically motivated, to obtain good marks.	Agrees with, but with additional information
	Novice and academically challenged learners were motivated by managing to create a web with its content and graphical interface, whereas experienced or academically bright learners were more motivated to obtain good marks.	Agrees with, but with additional information
Influence of peers	The learners supported and helped each other for no ulterior purpose.	Agrees with
	The learners explored features to share the excitement of the feature.	Not mentioned
	Learners shared ideas and skills they had learned.	Agrees with
Managing time	The learners focused on the work, losing sight of time.	Not mentioned
	The learners had problems keeping deadlines, particularly those with long lead times.	Not mentioned
Mental state	Working in a supportive environment the learners did not suffer from anxiety.	Not mentioned
	The learners accepted errors and resolved their own problems, up to a point.	Agrees with, but with additional information
	Experienced learners pushed the boundaries of the programs, learning new features, while novice learners explored up to a point.	Agrees with, but with additional information

Table 7 - 7 Comparison of the physical processing at PHS with the literature review

Processing	How the learners at PHS interacted with information	Literature review
Processing / planning information	• The learners are always physically active using the mouse or keyboard.	• Not mentioned
	• Learners keyed in information slowly with errors.	• Not mentioned
	• The learners interacted with each other much of the time.	• Agrees with
	• The learners worked and interacted with those on either side of them although it was not required.	• Agrees with
	• The learners shared features with those on either side.	• Agrees with
	• Experienced learners are most particular with respect to software selection.	• Not mentioned

Tables 7- 5, 7 - 6 and 7 - 7 compared the factors at PHS with those of the literature review. Many additional factors on how learners interacted with information in a digital information environment are tabulated not having been found during the literature review; other factors are developed in the tables and a few differ from the literature review.

5 Factors contributing to interaction

The two cases studies were synthesised on the basis of factors contributing to the interaction between the learners and information from cognitive, affective and physical perspectives.

The following synthesis takes the preceding synthesis beyond the work of a web-based task to that of 'usual' work in an educational digital environment. Tables 7 - 8, 7 - 9 and 7 - 10 illustrates how South African FET learners interact with information in a digital information environment while doing work in general. The tables illustrate how cognitive, affective and physical factors such as content, examples, instructions, motivation, peers, management of time, mental state, classroom ecology, contact environment and software influences the way learners interact with information from cognitive, affective and physical perspectives.

Table 7 - 8 Cognitive factors that contribute to interaction from cognitive, affective and physical perspectives

Factor	Cognitive perspectives	Affective perspectives	Physical perspectives
Content	<ul style="list-style-type: none"> • Learners have difficulty conceptualising content. • Transmediating content from one format to another is dependent on computer skills in the particular formats. • Ready made images and features add little to the content it is meant to complement. • Self-made features have relevance to the work it is meant to complement. 	<ul style="list-style-type: none"> • Personally meaningful content leads to greater motivation. • Transmediating content from one format to another is enjoyed by learners. 	<ul style="list-style-type: none"> • Content is gleaned from print rather than digital sources.
Examples	<ul style="list-style-type: none"> • Examples prove important to learners who have not been exposed to computer technology. • Examples provide something to aim for and improve upon, leading to higher-level thinking. 	<ul style="list-style-type: none"> • Examples provide security in that one can see what has to be made, particularly with novice or beginner users. 	<ul style="list-style-type: none"> • Examples are easily accessible.
Instructions	<ul style="list-style-type: none"> • Vague open-ended instructions lead to challenging work from experienced users but confuse and put less experienced users off. • Clear detailed instructions with lists of options lend themselves to more effort from novice or weaker learners, as well as experienced users. • Instructions are not always read and comprehended properly. • Academically bright learners do just enough work to achieve the set instructions. 	<ul style="list-style-type: none"> • Clear detailed instructions with lists of options lead to more objectives being reached; and less stress. 	<ul style="list-style-type: none"> • Instructions given in multiple formats such as voice, digital and print enhance comprehension.

Table 7 - 9 Affective factors that contribute to interaction from cognitive, affective and physical perspectives

Factor	Cognitive perspectives	Affective perspectives	Physical perspectives
Motivation	<ul style="list-style-type: none"> • Academically bright learners motivated by grades. • Academically weak learners motivated by creating work in a digital environment. 	<ul style="list-style-type: none"> • Learners enjoy working in digital environment. • Learners share exciting features. 	<ul style="list-style-type: none"> • The 'buzz' of the proximity of others in a computer laboratory stimulates and motivates learners.
Peers	<ul style="list-style-type: none"> • Learners acquire and recall skills with their peers. • Higher-level thinking skills were developed with peers in a contact environment meeting challenges set by the instructions. 	<ul style="list-style-type: none"> • Learners acquire and recall skills interacting with their peers. 	<ul style="list-style-type: none"> • Learners acquire and recall skills interacting with their peers in a contact environment.
Time management	<ul style="list-style-type: none"> • Structured time in the digital environment leads to focusing the mind on the work at hand. 	<ul style="list-style-type: none"> • Learners are prepared to spend more time on work which is emotionally fulfilling than mundane work. 	<ul style="list-style-type: none"> • Academically bright learners do just enough work to achieve the goal set by the teacher and do not waste time doing anything extra. • Learners underestimate the time required for work.
Mental state	<ul style="list-style-type: none"> • A positive mental state in the class leads to better work and higher-level thinking skills. 	<ul style="list-style-type: none"> • Companionship of peers lends emotional support. • Work in the computer laboratory is enjoyable. 	<ul style="list-style-type: none"> • Peers seated next to each other affect mental state.

Table 7 - 10 Physical factors that contribute to interaction from cognitive, affective and physical perspectives

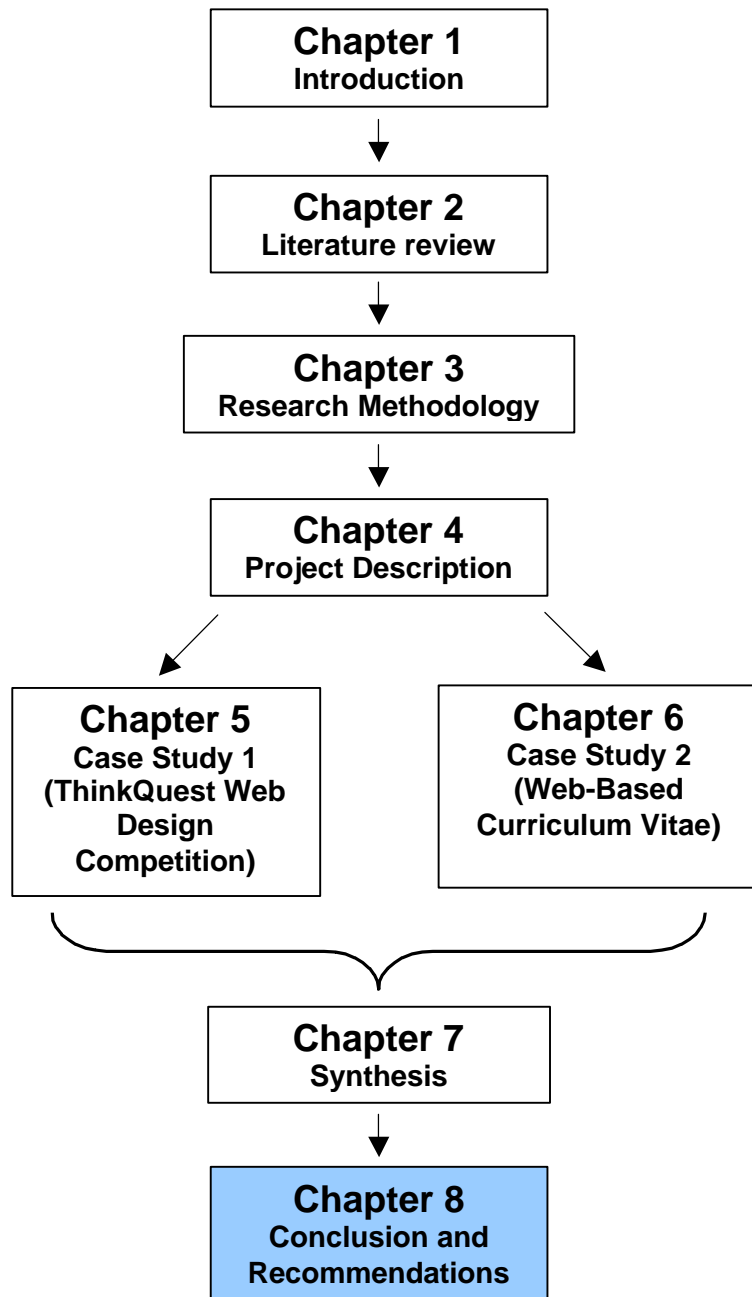
Factor	Cognitive perspectives	Affective perspectives	Physical perspectives
Classroom ecology	<ul style="list-style-type: none"> Physical layout of classroom with rows lends to learners collaborating with those on either side, leading to work requiring higher-level thinking skills as learners are motivated to share ideas. 	Physical closeness in computer laboratory <ul style="list-style-type: none"> leads to peer support particularly to academically challenged learners; and motivates learners to create features to share with peers. 	<ul style="list-style-type: none"> Physical layout of classroom with rows lends to learners collaborating with those in the same row. Learners sit next to a person of their own choice, hence friends produce similar work.
Contact environment	Physical contact leads to learners <ul style="list-style-type: none"> sharing work and ideas; discussing work, thus verbalising ideas; and lends itself to immediate feedback on problems. 	Physical contact <ul style="list-style-type: none"> lends emotional support to learners who are anxious; and leads to learners exploring applications. 	<ul style="list-style-type: none"> Physical contact leads to learners talking to each other.
Software	<ul style="list-style-type: none"> Experienced users are irritated by so-called inferior software and prefer to endure time in a computer laboratory, and then do their work in another environment which has the preferred software. Learners explore software applications with their peers in a contact environment. Learners explore applications up to a level of their assumed competence. 	<ul style="list-style-type: none"> Learners explore applications in the emotionally secure contact environment with their peers nearby. Learners do not use all the software available but select what suits their emotional needs. 	<ul style="list-style-type: none"> Learners physically explore applications in the emotionally secure contact environment with their peers nearby.

Table 7 - 8, 7 - 9 and 7 - 10 described how certain cognitive, affective and physical factors can impact on learners' work in a digital environment from cognitive, affective and physical perspectives. The impact of relatively unimportant factors such as content, examples, instructions, motivation, peers, time, mental state, classroom ecology, contact environment and software on the way learners interact with information in a digital environment is great, affecting cognitive, affective and physical perspectives of learners' education.

6 Summary

This chapter concludes the major part of the research by synthesising the data obtained from two case studies and comparing it with the literature review. The chapter opens by describing the scope of the study and describes the width and depth of the situations from which the data was collected. The two case studies were then compared based on the perspectives and activities developed in the literature review. The data was then re-examined by looking at factors which contributed to the way the learners cognitively, affectively and physically interact with information.

Chapter 8



Chapter 8 Conclusion and Recommendations

1 Introduction

This research began when a problem emerged in the computer classes at PHS where learners 16 years and older were taught. The problem evolved into the research problem 'How do South Africa Further Education and Training learners acquire, recall, process and present information in a digitally enabled environment?'

In order to address the problem, the following research questions were identified and examined:

- What is a digital information environment in the field of education?
- How have a changing society and advances in technology influenced the way South African FET learners interact with information in an educational environment?
- What is meant by cognitive, affective and physical perspectives with reference to interaction with information?
- How do South African FET learners interact with information in a digital information environment from cognitive, affective and physical perspectives?

This chapter concludes the research into the problem. The following section presents answers to the identified questions.

2 Answers to research questions

2.1 Research question 1: What is a digital information environment in the field of education?

The educational digital information environment was described and defined in Chapter 2. The information found in such an environment is presented via electronic or digital means and it has a hypermedia format which encompasses multimedia and hypertext.

2.2 Research question 2: How have a changing society and advances in technology influenced the way South African FET learners interact with information in an educational environment?

How a changing society and technology has influenced the way learners interact with information in an educational environment was discussed in Chapter 2. The research commenced by investigating recent changes in society and how they have influenced young people. *Generation X* is influenced by changes in society, and the *Net* and the *Child of Chaos* generations influenced by technology. Today's youth, besides being influenced by the *X Generation* through their parents who were born in the early years of that generation as well as themselves being part of the tail end of that generation, are also influenced by technology. In addition South African youth are also influenced by the political and economic events in South Africa.

The traits of the major generations were examined with respect to character, family life, the future, peers and technology; and then their consequences for the way in which young people interact with information. Based on the literature it was found that

- Learners need material in visual format.
- Learners need to find or create their own learning content.
- Learners need fast access to learning material as they have no time to waste.
- Learners need learning material that has long-term career value.
- Learners are motivated by technology used in information interaction.
- Learners must do things.
- Learning is social, therefore noise is inevitable.

The chapter concluded with the development of a profile based on how the learners interact with information from cognitive, affective and physical perspectives as they acquire, recall, process and present information motivated, influenced by peers, manage time and their mental state.

2.3 Research question 3: What is meant by cognitive, affective and physical perspectives with reference to interaction with information?

For the purpose of the research the different perspectives are defined as illustrated in Table 2 - 13 in the literature review and used in the analysis of the learners' activities when they created their web sites. The areas of cognitive, affective and

physical perspectives in an education environment encompass the way the learners intellectually interact with information, their emotions as they interact with the information and those around them, and how they physically interact with information.

2.4 Research question 4: How do South African FET learners interact with information in a digital information environment from cognitive, affective and physical perspectives?

The research was conducted at PHS, a South African school with a diverse learner population body with learners 16 years and older in the digital environment of the computer laboratory. The school and learner body was described in Chapter 4 in order to provide context to the case studies. The rich description of the school, learners and their usual work in the computer laboratory has contributed to the credibility and authenticity of the research by showing commonality in its diversity.

In Chapter 3 the methodology of doing case study action research was investigated and note taken of measures to ensure reliability and validity. To protect myself from finding what I expected, the participants and peers examined the work and it has been informally reviewed by a number of people. The participants and peers examined the work prior to the change of names of the participants, so they were able to identify the learners.

The learners at PHS, in their usual class work, took part in two case studies described in Chapters 5 and 6 where they created web sites. Learners with a range of skills, ages, academic abilities, prior experience, etc., took part in the case studies which had many different management formats such as *at a distance*, *contact* environment, clear instructions, specific or open-ended instructions, examples, etc. tabulated in Table 4 - 12. The learners and their usual class work were described in Chapter 4.

On the basis of the findings in the literature review in Chapter 2, the two case studies investigated the way in which learners interacted with information from cognitive, affective and physical perspectives as they acquired, recalled, processed and presented information, motivated, influenced by peers, time and mental state. The two case studies, the *ThinkQuest* web entry and the web-based CV, examined

the way (process) in which approximately 86 learners created the web sites as well as the products of the web sites.

The two case studies were synthesised in Chapter 7 and tabulated in Tables 7 - 2, 7 - 3 and 7 - 4 from cognitive, affective and physical perspectives. The synthesis indicating how learners at PHS interacted with information while creating their web sites was then compared with the profile developed in the literature review, Tables 2 - 26, 2 - 27 and 2 - 28, in Tables 7 - 5, 7 - 6 and 7 - 7. The following section examines the findings of the synthesis in light of the literature review.

3 Findings

The following section compares the findings from the synthesis of the two case studies with the literature review and notes where they support the literature, where they differ, where they support it with additional information, and where the literature review makes no mention of particular activities.

3.1 Conclusive evidence

Both case studies *support* the literature with respect to the following activities in Table 8 - 1 from cognitive, affective and physical perspectives, therefore we know they are true.

Table 8 - 1 Conclusive findings

Perspective	Processing	Activity
Cognitive	Processing or planning information	<ul style="list-style-type: none"> Higher-level thinking skills were evident in conceptualising and creating the webs with levels of information, frames, image maps and interactivity.
Affective	Influence of peers	<ul style="list-style-type: none"> The learners supported and helped each other for no ulterior purpose. Learners shared ideas and skills they had learned.
Physical	Processing or planning of information	<ul style="list-style-type: none"> The learners interacted with each other much of the time. The learners worked and interacted with those on either side of them although it was not required. The learners shared features with those on either side.

3.2 Recommended further research

Both case studies *oppose* the literature with respect to the following activity in Table 8 - 2 therefore we question the literature and recommend further research.

Table 8 - 2 Oppose the literature

Perspective	Processing	Activity
Cognitive	Processing or planning information	<ul style="list-style-type: none"> Preplanning of the work was not evident. The learners created the webs as they worked.

Both case studies *support the literature but with additional information* with respect to the following activities tabulated in Table 8 - 3, therefore we recommend further research.

Table 8 - 3 Support the literature, with additional information

Perspective	Processing	Activity
Cognitive	Presenting information	<ul style="list-style-type: none"> Academically strong and experienced learners were able to communicate the content in multiple formats.
Affective	Motivation	<ul style="list-style-type: none"> The learners were intrinsically motivated to create a web site, particularly when it was relevant to their lives. The learners were extrinsically motivated, to obtain good marks. Novice and academically challenged learners were motivated by managing to create a web with its content and graphical interface, whereas experienced or academically bright learners were more motivated to obtain good marks.
	Mental state	<ul style="list-style-type: none"> The learners accepted errors and resolved their own problems, up to a point. Experienced learners pushed the boundaries of the programs, learning new features, while novice learners explored up to a point.

No mention was found in the literature with respect to the following activities in Table 8 - 4 found in both case studies, therefore we recommend further research in these fields.

Table 8 - 4 Not found in the literature

Perspective	Processing	Activity
Cognitive	Acquiring information	<ul style="list-style-type: none"> The learners acquired the skills necessary for creating the web while they were creating it, while influenced by their peers.
		<ul style="list-style-type: none"> The learners used a number of resources for information with novice users preferring the World Wide Web.
	Recalling information	<ul style="list-style-type: none"> The learners recalled web-authoring skills through interacting with their peers.
	Presenting information	<ul style="list-style-type: none"> Work done as a team presented fewer spelling errors than work done by an individual. Individuals seemed not to have seen their superficial spelling errors.
		<ul style="list-style-type: none"> Self-created interactive features complemented the text, and not ready-made features.
		<ul style="list-style-type: none"> The learners had difficulty writing the text to add to the webs.
Affective	Influence of peers	<ul style="list-style-type: none"> The learners explored features to share the excitement of the feature.
	Management of time	<ul style="list-style-type: none"> The learners focused on the work, losing sight of time. The learners had problems keeping deadlines, particularly those with long lead times.
	Mental state	<ul style="list-style-type: none"> Working in a supportive environment the learners did not suffer from anxiety.
Physical	Processing or planning information	<ul style="list-style-type: none"> The learners are always physically active using the mouse or keyboard. Learners keyed in information slowly with errors. Experienced learners are most particular with respect to software selection.

Based on Tables 8 - 2, 8 - 3 and 8 - 4 further research is recommended to investigate how learners cognitively acquire, recall, process and plan and present information; motivation, the influence of peers, time management and their mental state; and how they physically process or plan information in a digital information environment.

4 Bias

My bias is ensuring that learners achieve their potential academically. I am of the opinion that without the external motivation the learners would not have created web sites of the quality they did. I believe that my bias, openly declared in Chapter 1, may have influenced the results of the research, but guiding learners to achieve their academic potential is fundamental to work in an educational environment. The

research is based in an educational environment so my bias may not have influenced the findings unduly.

5 Recommendations for facilitating the interaction with information by South African FET learners in a digital information environment

The abilities of learners in South African schools range from

- academically bright to academically weak;
- those who use English (the medium of most pull-down and Help menus) as a first language to those who use English as second language or third additional language; and
- experienced to novice computer users.

The major findings of the research were the influence of peers and importance of external motivation in the form of grades or marks on the learners' cognitive, affective and physical learning activities and behaviour in the computer laboratory. Secondary findings indicated the importance of content, examples, instructions, time, mental state, classroom ecology, contact environment and software in the way learners acquired, recalled, processed and presented information.

Based on the preceding research, in order to facilitate interaction with information in a digital environment, educators should endeavour to fulfill the actions tabulated in Table 8 - 5.

Table 8 - 5 Actions to ensure successful interaction with information in an educational digital environment

Factor	Measure
Classroom ecology	<ul style="list-style-type: none"> • Permit learners to select their own seating positions and keep them for a length of time. • Arrange seating of learners in compact areas, i.e. physically near each other where they can easily work in groups.
Contact environment	<ul style="list-style-type: none"> • Spend a long period teaching learners in a collaborative environment before requiring learners to do work alone or at a distance.
Content	<ul style="list-style-type: none"> • Ensure the content of work is personally meaningful to the learners. • Ensure learners are able to use applications well before they are required to change the application format of information to another application format, i.e. before they are required to transmediate information. • Discourage the use of ready-made images, such as clipart, as they seldom add value to the meaning of information in the context.
Examples	<ul style="list-style-type: none"> • Provide readily accessible examples for the learners to copy and improve upon.
Instructions	<ul style="list-style-type: none"> • Provide clear instructions with options from which to select. • Make sure learners understand and comprehend the instructions.
Mental state	<ul style="list-style-type: none"> • Provide a mental environment where exploration is the norm.
Motivation	<ul style="list-style-type: none"> • Provide motivation for both academically brighter and weaker learners.
Peers	<ul style="list-style-type: none"> • Utilise peer interaction and support in the teaching methodology.
Software	<ul style="list-style-type: none"> • Encourage the use of the software available at school so that there are common applications.
Time	<ul style="list-style-type: none"> • Structure time in the computer laboratory for work. • Plan time usage to cater for fast and slow learners - enough time for slow learners to complete the work while fast learners can spend the extra time on additional facets of the projects that could extend their capabilities even further. • Break work up into easily manageable chunks and set a time limit for each chunk, thus teaching learners to manage time.

6 Conclusion

It is my belief that the research question: 'How do South Africa Further Education and Training learners acquire, recall, process and present information in a digitally enabled environment?' has been answered in this thesis to such an extent that other educators will be encouraged to use the information provided to guide other FET learners to acquire, recall, process and present information in a meaningful way in the digital environment.

The literature review has been found to be adequate in a few points, and lacking in many respects to the way learners interact with information in a digitally enabled environment. Recommendations for further research have been made based on Tables 8 - 2, 8 - 3 and 8 - 4 in Section 3.2

It is my belief that the research has been ethically done and the findings are valid and authentic, reliable and credible.

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Appendices

Appendix A Grade 10 Computer Studies SG 1st term to 4th term

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Computer Studies SG Grade 10 - 2001

Term 1 - The Internet

Books	<ul style="list-style-type: none"> Chapter on the Internet in <i>Computer Studies 2001 Grade 10 Theory</i> by Sandra Jacobs. Computer dictionary <i>Glossary of PC Acronyms & Computer terms</i> obtainable from Pam Buttle. The textbook and dictionary do not contain all the required information.
Files for task, test or exam use	<p>Open the program you intend using, then click on the required file. Make sure you are able to download these files. New files will be added during the term. The version of Microsoft Office products used is 2000 not 1997.</p> <ul style="list-style-type: none"> Access - lib.mdb Excel - file unknown till later in the year Inspiration - JoeSoap.ins HTML - 3D model of the Internet, Evaluation rubrics <i>PowerPoint</i> - cssg.ppt, What is a network?
Applications used	<ul style="list-style-type: none"> Access Excel Inspiration PowerPoint Tabs+ Word

Most tasks require a great deal of research as well as computer skills. **Prepare ahead.**
Find the information long before the time.

All exercises and tests are meant to be completed **at home**. The marks will go towards your theory mark.

Week	Exercises/tests and Tasks - Due any day on or before Wednesday
1	Task 1 - Inspiration mindmap on Me
2	Exercise/test 2A - Email test Exercise/test 2B - Internet and word processing crossword Exercise/test 2C - Email quiz
3	Task 3 - Tabs+ 3D format model of the Internet
4	Exercise/test 4A - Word processing crossword Exercise/test 4B - Email, newsgroups and the Internet Exercise/test 4C - Access database sorting
5	Task 5 - PowerPoint presentation on Computer Studies at Pinelands High

6	Task 6 - PowerPoint presentation on Netiquette Exercise/test 6A - Internet, email and word processing crossword Exercise/test 6B - Computer expressions
7	Task 7 - Access database of SA web sites Exercise/test 7 - Database basics
8	Exercise/test 8A - Quiz on the Internet Exercise/test 8B - Another quiz about the Internet Exercise/test 8C - The Internet Exercise/test 8D - Excel spreadsheet sorting
9	Task 9 - Word document on Email addresses
10	Test 10 - Huge quiz on the Internet based on whole chapter in the text book and all work done this term
11	Bits and pieces

Term 1 - all work contributing to May assessment

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Computer Studies SG Grade 10 - 2001

Term 2 - Hardware

Books	<ul style="list-style-type: none"> Chapter on the What is a computer and Hardware in <i>Computer Studies 2001 Grade 10 Theory</i> by Sandra Jacobs. <i>Glossary of PC Acronyms & Computer terms</i> obtainable from Pam Buttle. The textbook and dictionary do not contain all the required information.
Files for task, test or exam use	<ul style="list-style-type: none"> Access - Technet.mdb
Applications used	<ul style="list-style-type: none"> Access Inspiration Tabs+ Word
Examinations	<p>Theory</p> <ul style="list-style-type: none"> Internet (from textbook) and class work this year Computer Hardware, all work done up to the week before the exam period Computer trends (not from any specific source) Word processing, presentations and databases from knowledge of applications

	<p>Practical</p> <ul style="list-style-type: none"> • Word processing - knowledge of Word processing evaluation rubric and ability to apply that knowledge
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Most tasks require a great deal of research as well as computer skills. Prepare ahead. Find the information long before the time.

All exercises and tests are meant to be completed at home. The marks will go towards your theory mark.

In every exercise/test only selected questions will be marked. Be sure to complete every question in order to cover yourself.

Week	Exercises/tests and Tasks - Due any day on or before Wednesday
1	Exercise/test 1 - Page 5-6, questions 1-15
2	Check registration for <i>ThinkQuest</i> - 10 marks Exercise/test 2 - Keyboard and Word processing Task 2 - Word document on the Keyboard
3	Project - Connectivity OR 10 typed pages of content and photographs for <i>ThinkQuest</i> web site - 10 marks Exercise/test 3 - Pointing devices and Word processing Task 3 - Word document on Pointing devices
4	Exercise/test 4 - Scanners and Scanners and Page 11, questions 1-12 Task 4 - Word document on Scanners and digital cameras
5	Project - Layout of the room(s)/environment - 10 marks Task 5 - Word book on Monitors OR Practical exam in class period on word processing - Online learners write at PHS
6	Exams
7	Theory exam - Friday 1 May - Online learners to write at PHS
8	Exercise/test 8 - Access queries based on stock in a computer store Task 8 - Tabs+ 3D model of Input and output devices
9	Exercise/test 9 - Page 17, questions 1-15 Task 9 - Word book on Printers
10	Exercise 10 - Pages 26-27, questions 1-23 Task 10 - Word drawings of Storage devices and drives
11	Task 11 - Inspiration concept map of Input and output devices

Term 2 - work contributing to May, then August assessment

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Computer Studies SG Grade 10 - 2001

Term 3 - Hardware, Software, Data representation and Development of the computer

Books	<ul style="list-style-type: none"> Chapter on the Hardware, Software, Data representation and Development of the computer in <i>Computer Studies 2001 Grade 10 Theory</i> by Sandra Jacobs. <i>Glossary of PC Acronyms & Computer terms</i> obtainable from Pam Buttle. The textbook and glossary do not contain all the required information.
Files for task, test or exam use	<p>Online learners open the program you intend using, then click on the required file. Make sure you are able to download these files. New files will be added during the term.</p> <ul style="list-style-type: none"> Word - Storage.doc, Table High School Bazaar Access - mhse2000.mdb (Access 2000) or mhse97.mdb (Access 97)
Examinations	Practical - Word processing

Most tasks require a great deal of research as well as computer skills. Prepare ahead Find the information long before the time.

All exercises and tests are meant to be completed at home. The marks will go towards your theory mark.

In every exercise/test only selected questions will be marked. Be sure to complete every question in order to cover yourself.

Week, starting Monday	Tests and Tasks - Due Wednesdays
1- 23 July	Exercise/test 1A - Operating system quiz Exercise/test 1B - Questions 1-10 on pages 31 & 32 in textbook
2 - 30 July	Task 2 - Spreadsheet task on Pinelands High School Tuckshop Exercise/test 2A - Questions 1-11 on page 38 in textbook
3 - 6 Aug	Practical word processing exam about Storage - online learners write at PHS Test 3 - Huge exercise/test on Storage devices
4 - 13 Aug	Task 4 - Spreadsheet task on Table High School Bazaar Exercise/test 4A - Questions 1-3 on page 41 in textbook
5 - 20 Aug	Task 5 - Questions 1-13 on page 43 in textbook Exercise/test 5A - Application software quiz Project and <i>ThinkQuest</i> due 24 August
6 - 27 Aug	No tasks this week - X-Curricula Week
7 - 3 Sept	Task 7 - Database queries about a school Exercise/test 7A - Too difficult
8 - 10 Sept	Exercise/test 8A - Too difficult Exercise/tests 8B and 8C - Early developments of computers and

	Mechanical calculating machines
9 - 17 Sept	Task 9 - PowerPoint presentation on Modern computer giants Huge task!!!!!! Exercise/test 9A - Too difficult
10 - 24 Sept	Exercise/test 10A - Too difficult Exercise/tests 10B and 10C - Electromechanical and electronic machines, First generation computers

Term 3 - most work contributing to August, then November assessment

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Computer Studies SG Grade 10 - 2001

Term 4 - Revision, and Spreadsheets and Databases

Books	<ul style="list-style-type: none"> • <i>Computer Studies 2001 Grade 10 Theory</i> by Sandra Jacobs. • <i>Glossary of PC Acronymns & Computer terms</i> obtainable from Pam Buttle. • The textbook and glossary do not contain all the required information.
Files for task, test or exam use	<p>Online learners open the program you intend using, then click on the required file. Make sure you are able to download these files. New files will be added during the term.</p> <ul style="list-style-type: none"> • Excel - stock.xls, software.xls • Access - sawsites2000.mdb (Office 2000)
Examinations	<ul style="list-style-type: none"> • Practical - Spreadsheets, Databases, Word, Mail merge, PowerPoint with VBA • Theory - Chapters 1, 2, 3, 6 and 7 of textbook plus current trends (What is a computer?, Hardware, Software, Internet, Social implications of the computer and current trends)

Most tasks require a great deal of research as well as computer skills. Prepare ahead Find the information long before the time.

All exercises and tests are meant to be completed at home. The marks will go towards your theory mark.

In every exercise/test only selected questions will be marked. Be sure to complete every question in order to cover yourself.

Week, starting Monday	Tests and Tasks - Due Wednesdays normally
1- 8 October	Exercise/test 1 - South African web site database test (Tuesday) Task 1A - South African web sites (Wednesday) Task 1B - Stock (Inventory) costs of a computer store (Thursday)

	or Friday)
2 - 15 October	Task 2A - Staff logins in a computer shop (Wednesday) Task 2B - Stock (Inventory) counts of a computer store (Thursday or Friday)
3 - 22 October	Task 3A - Pricing of software - (Wednesday) Task 3B - Report of software - (Thursday or Friday) Task 3C - Pivoting of Software - (Soonest)
4 - 29 October	Task 4A - Mouse Computer School Task 4B - Telephone costs
5 - 5 November	Practical examination
6 - 12 November	Practical examination
7 - end of term	School examination time where all theory is examined plus theoretical questions about word processing, presentations, spreadsheets, databases and graphics

Term 4 - all work contributing to November assessment

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Appendix B Grade 11 Computer Studies SG 1st term to 4th term

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Computer Studies SG Grade 11 - 2001

Term 1 - The Internet

Books	<ul style="list-style-type: none"> Chapter on the Internet in <i>Computer Studies 2001 Grade 11 Theory</i> by Sandra Jacobs, and the section in last year's textbook. Computer dictionary such as <i>Glossary of PC Acronymns & Computer terms</i> obtainable from Pam Buttle. The textbook and dictionary do not contain all the required information.
Files for task, test or exam use	<p>Open the program you intend using, then click on the required file. Make sure you are able to download these files. New files will be added during the term. The version of Microsoft Office products used is 2000 not 1997.</p> <ul style="list-style-type: none"> Inspiration - 0111m14a.INS HTML - Evaluation rubrics, Glossary of Terms, Puzzle, 3D model of the Internet
Applications used	<ul style="list-style-type: none"> Access The main focus this term is the creation of web-based activities, web pages and a web site. You write web pages (HTM or HTML) using a web editor such as FrontPage, Dreamweaver, HomeSite, HotDog or NetObjects Fusion. You view a web page using Netscape Navigator or Internet Explorer. I am fairly expert in FrontPage and HotDog. You may use any web editor. Inspiration PaintShop Pro from Jasc or Fireworks from Macromedia PowerPoint Tabs+

Most tasks require a great deal of research as well as computer skills. **Prepare ahead.**
Find the information long before the time.

All exercises and tests are meant to be completed **at home**. The marks will go towards your theory mark.

Week	Exercises/tests and Tasks - Due any day on or before Wednesday
1	Exercise/test 1A - Internet Exercise/test 1B - Another quiz on the Internet Exercise/test 1C - More about the Internet Discussion of Project or <i>ThinkQuest</i>
2	Task 2 - Web site about Yourself
3	Task 3 - Tabs+ 3D format model of the Internet
4	Exercise/test 4 - Inspiration mindmap on the Internet

5	Task 5 - Creation of an HTM or HTML glossary about the Internet
6	Task 6 - Web-based quiz on e-Commerce Exercise/test 6A - Internet 6A Exercise/test 6B - Internet 6B
7	Task 7 - Access database of SA web sites Exercise/test 7 - Database basics
8	Task 8A - Puzzle on the WWW or Task 8B - Gif animation on Satellite communication Task 8C - Data access page on South Africa web sites
9	Task 9 - PowerPoint presentation on the Internet in South Africa
10	Test 10 - Huge quiz on the Internet based all work done this term plus bits from anywhere.
11	Test 11 - Practical examination on Web design

Term 1 - all work contributing to May assessment

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Computer Studies SG Grade 11 - 2001

Term 2 - Computer architecture

Books	<ul style="list-style-type: none"> • <i>Computer Studies 2001 Grade 11 Theory</i> by Sandra Jacobs, and the section in last year's textbook. • <i>Glossary of PC Acronyms & Computer terms</i> obtainable from Pam Buttle. • The textbook and dictionary do not contain all the required information.
Files for task, test or exam use	<p>Open the program you intend using, then click on the required file. Make sure you are able to download these files. New files will be added during the term.</p> <ul style="list-style-type: none"> • Access - Database called mhsemine2000.mdb (Access 2000) or mhse.mdb (Access 97)
Applications used	<ul style="list-style-type: none"> • Access 2000 • Excel 2000 • Microsoft Map (part of the MS Office suite - check it is installed) • Publisher 2000
Examinations	<p>Theory only</p> <ul style="list-style-type: none"> • Internet (Grade 10 book) and class work this year • Computer architecture, all work done up to the week before the exam period • Social implications of computers (Chapter 5)

	<ul style="list-style-type: none"> • Computer trends (not from any specific source) • Desktop publishing (from given notes) and knowledge of Publisher
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**Most tasks require a great deal of research as well as computer skills. Prepare ahead.
Find the information long before the time.**

**All exercises and tests are meant to be completed at home. The marks will go towards
your theory mark.**

**In every exercise/test only selected questions will be marked. Be sure to complete
every question in order to cover yourself.**

Week	Exercises and Tasks - Due any day on or before Wednesday
1	Exercise/test 1 - Questions 1-13 on page 10 of textbook and DTP due Friday
2	Project - 10 typed pages of content and photographs for <i>ThinkQuest</i> web site - 10 marks; OR 20 pages of content/ideas for Red Cross activity book - 20 marks Exercise/test 2 - Questions 1-12 (not no 11) on page 17 of textbook
3	Check registration for <i>ThinkQuest</i> - any team that have male members - 10 marks for Practical marks Task 3 - Newsletter on the Motherboard or Primary memory Exercise/test 3 - Hardware vocabulary and Memory
4	Check registration for <i>ThinkQuest</i> - any girls-only teams - 10 marks for Practical marks Task 4 - Diagram on Buses or advertisement on the Central Processing Unit Exercise/tests - Buses and Central Processing Unit and Central Processing Unit and Buses
5	Work on projects if you have time Exams
6	Work on projects if you have time Theory exam - Wednesday 23 May - Online learners will write at PHS
7	Work on projects if you have time Exams
8	Exercise/test 8 - Questions 1-15 on page 27 of textbook Task 8 - Graphic representation of Hardware suppliers
9	Exercise/test 9 - Questions 16-22 on pages 27-28 of textbook Task 9 - Newsletter on Hard drives
10	Exercise/test 10 - Modular PC Design and Video performance and sound and Hard drives Task 10 - Database queries about a school
11	Huge test on Architecture Task 11 - DTP exam - Online learners will write at PHS

Term 2 - all work contributing to May, then September report

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Computer Studies SG Grade 11 - 2001

Term 3 - Software

Tutorials	<ul style="list-style-type: none"> • Desktop publishing information found in Desktop publishing guidelines and in Help menu • Web page design - Yale C/AIM Web Style Guide or the guide from Mark Gregory in Australia • Information about web page creation using FrontPage found on the web • Information about web page creation using FrontPage found at PHS (link to be added later)
Textbook	<ul style="list-style-type: none"> • Chapters on the System Software and parts of Data Representation in <i>Computer Studies 2001 Grade 11 Theory</i> by Sandra Jacobs. • <i>Glossary of PC Acronyms & Computer terms</i> obtainable from Pam Buttle. • The textbook and glossary do not contain all the required information.
Files for task, test or exam use	<p>Online learners open the program you intend using, then click on the required file. Make sure you are able to download these files. New files will be added during the term.</p> <ul style="list-style-type: none"> • Word - Test 1A form on Software 0111s11a.doc, Test 1B form on Software 0111s11b.doc, Software.doc
Examinations	<p>Practical - Desktop publishing Practical - Web design, graphics and animations</p>

Most tasks require a great deal of research as well as computer skills. Prepare ahead Find the information long before the time.

All exercises and tests are meant to be completed at home. The marks will go towards your theory mark.

In every exercise/test only selected questions will be marked. Be sure to complete every question in order to cover yourself.

Week, starting Monday	Tests and Tasks - Due Wednesdays
1- 23 July	Exercise/test 1A and 1B - Word forms on Software 1A and 1B
2 - 30 July	Exercise/test 2A - Questions 1-4 on page 68 in textbook
3 - 6 Aug	Exercise/test 3A and 3B - Software and Operating systems and how the operating system is loaded
4 - 13 Aug	Task 4 - DTP booklet / newsletter on Software Exercise/test 4 - Questions 1-7 on page 36 in textbook
5 - 20 Aug	Practical unseen DTP examination - online learners write at PHS Exercise/test 5 - Questions 1-9 on page 41 in textbook Project or <i>ThinkQuest</i> - due 24 August
6 - 27 Aug	No tasks this week - X-Curricula Week

7 - 3 Sept	Prepare for Web examination Exercise/test 7 - Questions 1-9 on page 49 in textbook
8 - 10 Sept	Practical web examination on Software and the Software Layer Model - online learners write at PHS
9 - 17 Sept	Task 9 - Mindmap on Configuring the system or Utilities or Anti Virus software or System Software Exercise/test 9A - Test on Software Exercise/test 9B - Huge test on System Software
10 - 24 Sept	

Term 3 - all work contributing to September, then November assessment

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Computer Studies SG Grade 11 - 2001

Term 4 - Data Communication, and Spreadsheets and Databases

Books	<ul style="list-style-type: none"> • <i>Computer Studies 2001 Grade 11 Theory</i> by Sandra Jacobs. • <i>Glossary of PC Acronymns & Computer terms</i> obtainable from Pam Buttle. • The textbook and glossary do not contain all the required information.
Files for task, test or exam use	<p>Online learners open the program you intend using, then click on the required file. Make sure you are able to download these files. New files will be added during the term.</p> <ul style="list-style-type: none"> • Excel - stock.xls • Word - Grade 12 2001 exam Chicken Chain • PowerPoint - compneed.ppt (23 kb), workingworld.ppt (76 kb), ecommerce.ppt (41 kb), Animals.zip (76 kb),
Examinations	<ul style="list-style-type: none"> • Practical - PowerPoint with VBA, Spreadsheets, Databases • Theory - Chapters 1, 2, 4, 5 and Appendix A of textbook plus current trends (Computer Architecture, System Software, Data Communication, Social Implications of the Computer and Careers in Computing; and current trends)

Most tasks require a great deal of research as well as computer skills. Prepare ahead. Find the information long before the time.

All exercises and tests are meant to be completed at home. The marks will go towards your theory mark.

In every exercise/test only selected questions will be marked. Be sure to complete every question in order to cover yourself.

Week, starting Monday	Tests and Tasks - Due Wednesdays normally
1- 8 October	Discussion of 2002 Matric project Task 1A - Stock (Inventory) costs of a computer store (Tuesday or Wednesday) Task 1B - Pictures of hardware components of a network (Thursday or Friday) Task 3 - PowerPoint tutorial on networks - HUGE task - be sure Multipages complete
2 - 15 October	Exercise in textbook on page 79, questions 1-12 (Wednesday) Task 2A - Staff logins in a computer shop (Wednesday) Task 2B - Stock (Inventory) counts of a computer store (Thursday or Friday) Task 3 - PowerPoint tutorial on networks - HUGE task - be sure text tip pictures are complete
3 - 22 October	Exercise in textbook on page 94, questions 1-7 (Wednesday) Task 3 - PowerPoint tutorial on networks - HUGE task
4 - 29 October	Exercise in textbook on page 94, questions 8-13 (Wednesday)
5 - 5 November	Practical examination First cutoff date for 2002 Matric project
6 - 12 November	Practical examination - date not clear yet
7 - end of term	School examination time where all theory is examined plus theoretical questions about word processing, presentations, spreadsheets, databases and graphics

Term 4 - all work contributing to November assessment

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Appendix C Grade 12 Computer Studies SG 1st term to 3rd term

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Computer Studies SG Grade 12 - 2001

Term 1 - Software

Books	<ul style="list-style-type: none"> Chapter on System software in <i>Computer Studies 2001 Grades 10, 11 and 12 Theory</i> by Sandra Jacobs. Computer dictionary <i>Glossary of PC Acronymns & Computer terms</i> obtainable from Pam Buttle. The textbook and dictionary do not contain all the required information.
Files for task, test or exam use	<p>Open the program you intend using, then click on the required file. Make sure you are able to download these files. New files will be added during the term.</p> <ul style="list-style-type: none"> Access - Technet2000.mdb, mhse2000.mdb (Access 2000) or mhse97.mdb (Access 97) HTML - Questionnaire survey, Examples of expressions that use text values as criteria, Evaluation rubrics Word - 0011s11a.doc, 0011s11b.doc and Project as Word document or Project as Adobe Acrobat Pdf file
Applications used	<ul style="list-style-type: none"> Access Adobe Acrobat Reader MS Publisher PowerPoint Web editor such as FrontPage, Dreamweaver, HomeSite, HotDog or NetObjects Fusion. You view a web page using Netscape Navigator or Internet Explorer. I am fairly expert in FrontPage and HotDog. You may use any web editor. Word

Most tasks require a great deal of research as well as computer skills. **Prepare ahead.**
Find the information long before the time.

All exercises and tests are meant to be completed **at home**. The marks will go towards your theory mark.

Week	Exercises/tests and Tasks - Due any day on or before Monday
1	Discussion of Project as Word document or Adobe Acrobat Pdf file Revision Software Word form 1 and Software Word form 2
2	Task 2 - Collection and analysis of information about usage of Software Exercise/test 2A - Software - Answers
3	Task 3 - Word book on Basic tasks or functions of an operating system Exercise/test 3A - Database basics
4	Exercise/test 4A - Software Exercise/test 4B - Access queries based on stock in a computer store
5	Task 5 - PowerPoint presentation of Management of input and output devices (I/O)

	Exercise/test 5 - Questions at the end of chapter on System software in textbook
6	Task 6 - Collection and analysis of information about usage of Software Exercise/test 6A - Operating systems and how the operating system is loaded
7	Task 7 - Online test on Management of files on storage devices
8	Exercise/test 8 - Old exam papers - System software Project as Word document or Adobe Acrobat Pdf file - Target market questionnaire
9	Task 9 - MS Publisher newsletter on Network operating systems
10	Task 10 - Word business cards for consulting computer firm Practical examination forming part of the final assessment for matric
11	Practical examination forming part of the final assessment for matric Unseen test on System software (copied word for word from 4 old WCED exam papers) from Grade 10, 11 and 12

Term 1 - all work contributing to May assessment

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Computer Studies SG Grade 12 - 2001

Term 2 - Data communication

Books	<ul style="list-style-type: none"> • Chapters on Data communication in <i>Computer Studies 2001 Grades 11 and 12</i> textbooks by Sandra Jacobs. • <i>Glossary of PC Acronyms & Computer terms</i> obtainable from Pam Buttle. • The textbook and dictionary do not contain all the required information.
Files for task, test or exam use	<p>Open the program you intend using, then click on the required file. Make sure you are able to download these files. New files will be added during the term.</p> <ul style="list-style-type: none"> • Word - Telecommunications, LANs, WANs and Intranets, Table High School Bazaar, Bond repayments, Telephone costs, Project • Powerpoint - What is a network? (843 kb) • Zipped file - What is a network? (499 kb)
Applications used	<ul style="list-style-type: none"> • Excel • MS Publisher • Powerpoint • Web editor, any

Examinations	<p>Theory</p> <ul style="list-style-type: none"> • Operating systems and system software, Data communications from Grades 10, 11 and 12 books tested at Matric level • Computer trends (not from any specific source) • Desktop publishing (from given notes) and knowledge of Publisher • Word and Access - based on knowledge of the packages gained from the tasks done in the first term <p>Practical</p> <ul style="list-style-type: none"> • Web creation - done after the main exam period
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Most tasks require a great deal of research as well as computer skills. Prepare ahead. Find the information long before the time.

All exercises and the project are meant to be completed at home.

In every exercise/test only selected questions will be marked. Be sure to complete every question in order to cover yourself.

Week	Exercises/tests and tasks - Due any day on or before Monday
1	Task 1 - Task 2 - Newsletter on Telecommunications
2	Exercise/test - Data communication, Telecommunications and LANs, WANs and Intranets (based on Grade 11 and 12 textbooks and PowerPoint presentation on What is a Network? - PowerPoint 843 kb or What is a network? - Zipped 499 kb) Task 2 - Newsletter on Telecommunications
3	Exercise/test - Questions 1-10 on page 74-75 of textbook Project - Hand in your presentation or web site plus disks - Online learners bring the material in hard copy to PHS.
4	Exercise/test - Questions 11-20 on page 76-77 of textbook
5	Project - hand in marketing materials - need at least 5 items plus the computer disks, e.g. T-shirt, business card, envelopes, labels, staff labels, packets, wrapping paper, complimentary cards, packaging, bag, pamphlet, CD, catalogue, company profile, letterhead, etc. Show off your DTP and graphic skills. Online learners bring the material in hard copy to PHS. Theory exam - Wednesday 16 May - Online learners write at PHS
6	Exams
7	Exams
8	Project - Layout of store area - Online learners bring the hard copy to PHS
9	Web exam - Similar to this task - Web site on LANs, WANs and Intranets - Online learners to write at PHS
10	Task 10 - Spreadsheet task on Pinelands High School Tuckshop and Table High School Bazaar and Bond repayments
11	Task 11 - Spreadsheet task on Telephone costs

Term 2 - all work contributing to May, then September report

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Computer Studies SG Grade 12 - 2001

Term 3 - Revision

Theory examinations	<ul style="list-style-type: none"> • Computer Studies 2001 by Sandra Jacobs Grade 11 and 12 textbooks: all of Grade 11 book except Data Representation and Binary Logic; all chapters in Grade 12 book except Binary Logic and Computer Architecture. • <i>Glossary of PC Acronyms & Computer terms</i> obtainable from Pam Buttle. • The textbook and glossary do not contain all the required information.
Files for task, test or exam use	<ul style="list-style-type: none"> • Online learners make sure you are able to download these files. • Access files - mhse2000.mdb (Access 2000) or mhse97.mdb (Access 97), software2000.mdb (Access 2000), lib2000.mdb • Excel - quest2.xls • Portable Document Format - Bazaar.pdf, Marks - pdf, 0012mprq.pdf • Word - Bazaar.doc, Marks - doc • Text files - quest1.txt
Practical Examinations	<ul style="list-style-type: none"> • External - Word processing, Databases and Spreadsheets • Internal - Web design, and Word processing, Databases and Spreadsheets merged and integrated • Check the syllabus above and do not waste time

Most tasks require a great deal of research as well as computer skills. Prepare ahead. Find the information long before the time.

All exercises and the project are meant to be completed at home.

In every exercise/test only selected questions will be marked. Be sure to complete every question in order to cover yourself.

Week starting Monday	Tests and Tasks - Due Mondays, Wednesdays and Fridays
1- 23 July	Database queries about a school Old exam paper Table High School Bazaar (pdf file or Word file) Huge quiz on the Internet
2 - 30 July	Database on Pricing of software Final matric Practical examination on Web design (Online learners write at PHS) Huge test on System Software
3 - 6 Aug	Spreadsheet on Marks - pdf or Marks - doc Old exam paper - 2000 March matric practical examination with word processing file, spreadsheet file and lib2000.mdb database file Huge test on Architecture
4 - 13 Aug	Spreadsheet task on Pinelands High School Tuckshop

	Old exam paper - Word processing, Database and Spreadsheet integrated mock examination on Mouse Computer School Huge exercise/ test on Storage devices
5 - 20 Aug	Mock matric examinations
6 - 27 Aug	Mock matric examinations
7 - 3 Sept	Mock matric examinations
8 - 10 Sept	Hand in matric project on Friday 14 Sept
9 - 17 Sept	Friday 21 FINAL MATRIC PRACTICAL EXAM on word processing, databases and spreadsheets
10 - 24 Sept	

Term 3 - work contributing to September and final marks

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Appendix D Use of ICT in a ... business: A case study

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Computer Studies SG

Project - Use of ICT in the business: A case study - due 24 August

The aim of the project is to report on the use of information and communication technology (ICT) in a particular business environment.

Examples could be:

- 'Use of ICT in garages with particular reference to Pompies Garage, Half Circle, Pumpkin Town: A case study'
- 'Use of ICT in dental practices with particular reference to Pullitout Dental Practice, Half Circle, Pumpkin Town: A case study'
- 'Use of ICT in garden services with particular reference to Cleansny Garden Services, Half Circle Pumpkin Town: A case study'
- 'Use of ICT in a bakery with particular reference to Bakedyeast Bakery, Half Circle, Pumpkin Town: A case study'

You must decide on the business. It must be one where you can ask questions over a period of time. It is not an easy project. You will need to learn tact and charm.

The report needs photographs of the people and machinery, and factual details shown in text, graphs and tables. The first page of the work must include a statement by the owner/manager/worker in the business, as below:

<p style="text-align: center;">This work reflects the use of ICT in this business:</p> <p style="text-align: center;">Signed: Date:</p> <p style="text-align: center;">Name (and branch) of firm:</p>
--

Final report must be ring-bound, set out in the format of the Word processing evaluation rubric, with a table of contents and an index

The business must be looked at in various ways as seen in the table below:

There are three cut-off dates, end Term 1, end Term 2 and 24 August. The *content* of that section of the work will be marked at its cut-off date and not at the end when the work is bound and submitted again. Corrections can be made and work can be redone for the final submission. The *word processing* will be marked at the end.

	Use	Due date	Format	Length
Connectivity - email addresses, email policy, URL, telephone numbers, fax machines, etc	Word	End Term 1	Printed sheets	One/two sheets
Layout of the room(s)/environment	Spex+ / CAD / Word	End Term 2 Added to bound book, due 24 August	Single sheet	One/two sheet(s)
Hardware currently used	Word	24 August	Part of bound book	Initially 5 - 10 pages
Software currently used	Word	24 August	Part of bound book	5 - 10 pages
Method of doing business now using ICT	Word	24 August	Part of bound book	5 - 10 pages
Method of doing business in the past with or without ICT	Word	24 August	Part of bound book	1 - 10 pages
				Altogether 10 - 30 pages of text and pictures

Assessment - 50 marks

Final report must be ring-bound, set out in the format of the Word processing evaluation rubric, with a table of contents and an index - 50%

Content - 50%

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Appendix E *ThinkQuest* web design competition

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Computer Studies SG - 2001



***ThinkQuest* - due 24 August**

This project is for the talented and skilled! Having judged internationally and locally for the last three years I am aware of the judging criteria and required standard. Start soon. You have to register round about the middle of January- it is a long and involved process, and submit the final web site by middle August. Check <http://www.thinkquest.org> for final details.

In 2000 a boy from Grove Primary was one of the finalists and won many many dollars. In 2000 teams from Pinelands reached the semi finals.

What is *ThinkQuest*? You have to design a web site which meets certain criteria. You must have two official coaches. You must be in a team of two or three young people. It must have a great deal of content. By the end of it, this site must be the best site on the Internet with regard to content matter. You will be left to do this project on your own.

This project planning guide [[hyperlink to thinkplanning.htm](#)] may help.

Stage 1

Register from home. Do it from home.

Criteria	Suggestions / Methods to achieve those criteria
Educational value and interest	Foods of different Cape Town cultures, Cape Point, Rietvlei, SANCOB, Table Mountain, Cape Town in the World Wars, use of ICT by disabled persons living in Cape Town (Think of an American or German person interested in Africa!)
Grow in content	Type of guest book, threaded discussion, database of collected information
Valuable	Will be highly used by others
Interactions	Need things for the browser to DO, e.g. link to other pages, do quizzes, make choices, WORK with animated gifs, listen to suitable sounds
Show team collaboration	Need 2-3 learners, living in different suburbs, schools with differing computer facilities, different languages, different countries, etc.
Uniqueness	I do not know what is unique - you must make your web site unique.

Correctness	Correct grammar, language, facts
Technically	Every link must work!
Languages	HTM or HTML, whatever works for you. I would also like some South African vernacular. It must have 2 South African languages.
Bibliography	Very important
Permissions	Need permission from the author, photographer, copyright holder of every piece of data

Stage 2

- You will be required to hand in a bound printed copy/book of the site, and labelled disks slipped into a pocket in the bound book.
- All files must be in the same directory on the disks.
- The book must include instructions for installation.

Assessment - 50 marks

- Will be marked on the *ThinkQuest* site according to *ThinkQuest* criteria, and the evaluation rubrics for Web design [hyperlink to [evweb.htm](#)] and Presentation skills [hyperlink to [evtip.htm](#)] (50%), and Content (50%).

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Appendix F Red Cross Children's Hospital activity book

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Computer Studies SG Grade 11 - 2001

Project - due 24 August

Projects done in Grades 10 and 11 lead up to the huge project in Grade 12. In Grade 10 your project was a word processed document or presentation. In Grade 11 your project will be desktop published book or a web site. In Grade 12 your project has to use all the applications.

This project is a real job, your contribution to the community and Red Cross Children's Hospital. Too many children are injured in the home, as a passenger in a car, as a pedestrian on the road, playing with electricity, misusing poisons in the kitchen, playing in the sun, using fireworks, etc.

Stage 1

- Your job is to create an activity book for a child to teach them safety in one danger area. The work must be focused on a child from a particular age group, background, language and literacy level in Cape Town. It must be able to keep that child occupied for days! He/she must keep coming back to it.
- You can find information anywhere. This web site may be useful: <http://childsafewebjump.com>. The Child Accident Prevention Foundation of Southern Africa at Red Cross Children's Hospital in Rondebosch (021 - 685 5208) may be of some assistance but you are the one who has to find the information and devise the activities.
- Recommended software is MSPublisher.
- Activities - Required are 24 pages of activities such as mazes, word searches, vocabulary building exercises, colouring exercises, joining dots, illustrating/colouring in pictures which accompany a short story, playing a game with counters and dice, etc.

Stage 2

You must hand in two copies of the bound desktop published book, one to give to the Hospital and one for keeping. Be sure to keep your files of the work, on disk, in case a publisher requires the work.

Assessment - 50 marks

Commonsense DTP 50% and content 50%.



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Appendix G PowerPoint tutorial on networks

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PowerPoint tutorial on Networks

1. *Without* a partner, i.e. alone, create a PowerPoint tutorial on computer networks. Use the tip sheets on creating a PowerPoint presentation [hyperlink to ppt\index.htm], multipages [hyperlink to pptmultipage\index.htm], text tips [hyperlink to pptcontroltip\index.htm] and quizzes [hyperlink to pptquiz\index.htm]. Look at the tip sheet on adding hyperlinks and bookmarks [hyperlink to pptlink\index.htm]. Look at the file Animals.zip [hyperlink to animals.zip] for ideas on quizzes (76 kb). (The University of Cape Town has done quite a bit in developing tutorials using MS Word and Excel that uses VBA to customise, automate and simplify the learning environment. Some examples can be seen on <http://www.meg.uct.ac.za/downloads/>. Get ideas from them.)
2. It needs 6-10 slides. Each slide must have a simple background. No transitions [hyperlink to pptlink\index.htm], no sound or no animations are required. Slides may only move forward when a hot spot or bookmark [hyperlink to pptlink\index.htm] is clicked.
3. Each slide needs three command buttons, one to information found on a multipage [hyperlink to pptmultipage\index.htm], one to a picture with text tips [hyperlink to pptcontroltip\index.htm] and one to a quiz [hyperlink to pptquiz\index.htm].
4. Save as Read-Only [hyperlink to readonly\readonlyppt.htm] so no one can change it.
5. Save the file with the name YourSurname_FirstName
6. Submit on CD-ROM disk or zip [hyperlink to wz\wzwhatis.htm] it as it probably will be huge.

See examples below	
	Slide with list of hot spots and bookmarks on the left. Three command buttons to information, a picture and a quiz are found at the lower part of the screen.
	Information on a multipage

	Text tips on a picture to explain features
	Text tips on a picture to explain features
	Quiz on a page

Suggestions

- Slide 1 - Main slide with instructions, title and author.
- Slides 2 - 6, 7, 8, 9 or 10 needs topics such as
 1. What is data communication
 2. Basic concepts
 3. What is a computer network
 4. Types of area networks
 5. Reasons for networking
 6. Network administration
 7. Physical layout of a network
 8. Communication channels
 9. Network interface cards
 10. Media access methods
 11. LAN architecture
 12. Network operating systems

Assessment

- Be sure that all command buttons and user forms have appropriate names.
- Multipages: Text the correct sizes and styles; text not able to be deleted during a presentation
- Quizzes or exercises: Need two or more forms of questions on a screen, i.e. one set of questions or two or three, or ...
- Correct grammar, copyright symbol, background.

Assessment rubric

Criteria	Very high	High	Medium	Low	Very low	Not shown
Communication ability	5	4	3	2	1	0
Mechanical ability	5	4	3	2	1	0
Critical-thinking ability	5	4	3	2	1	0
Creative ability	5	4	3	2	1	0
Problem-solving ability	5	4	3	2	1	0

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Appendix H Matriculation web curriculum vitae

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Computer Studies SG - 2001

Matriculation project - Web design

Creation of your Curriculum Vitae

You need pages on your Biographical information, Awards, Qualifications, Projects, Interests and References. The curriculum vitae must be clear, well structured and informative. It must be created as a Web and saved as YourSurname_YourFirstName, for example the curriculum vitae of Joe Soap would be Soap_Joe. It must be saved and handed in a 3 ½ disk or CD-ROM. It must totally run from the disk. The curriculum vitae will be saved on PM's login, safe and private, ready to be used next year. Complete this list, print and hand in. Be sure to save this file on your disk. In the third term 2002 it must be retrieved from PM, updated, printed, bound and handed in with the rest of the project.

Be sure to have many of the following design features: I (Intermediate) and H (High). The more H features you have the greater chance you have of obtaining an H category. You must decide where such a feature will be best used in your curriculum vitae. Complete the list indicating on which page/file the particular feature is found. After discussion add more features to this list with its level.

For assistance on Web design using FrontPage look at the Tip sheet page where there are links to many resources. Make sure your web curriculum vitae is better than that of PM's web curriculum vitae [hyperlink to pmiller\homepage.htm] made a few years ago.

Feature	Level	Name of file where found
Insert - Date which changes as page is edited	I	
Format - Background graphic	I	
Insert - Copyright symbol	I	
Insert - Email to	I	
Insert - Sound which can be turned off	H	
Insert - Response forms with at least four form fields (must work)	H + Integration	
Insert - Animations	I	
Insert - Video, mpg	H	
Table - Table with interesting design	I	
Insert - Flash or Coffee Cup introduction - see Soul of District Six http://library.thinkquest.org/C0118982/	H	
Insert - Animation made with PaintShopPro or Gif Construction Set (not banners)	I or H	
Graphic - Writing on a picture	I	
Graphic - Thumbnail	I	
Format - Mouse over - see Teen hair of Cape Town	H	

http://library.thinkquest.org/C0120888/		
Insert - Crossword - see Kramats of the Western Cape http://library.thinkquest.org/C0120708/	H	
Frame - see Where eagles fly: the South African airforce in 2001 http://library.thinkquest.org/C0110164/_or Planet Mars http://library.thinkquest.org/C0122083/	H	
Graphics - Image map - see Kramats of the Western Cape http://library.thinkquest.org/C0120708/	H	
Insert - Bookmarks within the page	I	
Insert - Hit counter	I	
Insert - Database	H + Integration	
Insert - Spreadsheet pivot table / pivot report	H + Integration	
Insert - JavaScript	H	
Format - Style sheet with Shared borders	H	
Visitors book	H	

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Appendix I *ThinkQuest* project questionnaire

How the Computer Studies Project was done

Please answer the following questions as fully as possible. Write at least 3 lines per question.

Name:

Grade:

Name of project:

Group

1. Who was your Partner no 1 and why did you select that person?
2. Who was your Partner no 2 and why did you select that person?
3. What did you like about working with Partner no 1?
4. What did you like about working with Partner no 2 (if there was such a partner)?
5. What did you not like about working with Partner no 1?
6. What did you not like about working with Partner no 2 (if there was such a partner)?
7. Describe the group or social roles played by the different members of the team, e.g. peace maker, troublemaker, etc. Who did what?
8. Was there any conflict in the group? If there was, how did you resolve the conflict?
9. Did any members join the team for a free ride, meaning they did nothing? Who? Has it been dealt with or ignored? How did you deal with it?
10. If you had to choose a partner now for a computer project, describe the kind of partner you would like.
11. If you had to choose a partner now for a computer project, describe the kind of partner you would not like.
12. Would you choose the same people and give your reasons?
13. Would age, colour or gender make any difference to your choice of partner in the future? Why? Explain your answer in the light of the 2 questions above.

Marks

1. Do you think your Partner no 1 should get the same marks as you? Why? If you were given 100 out of 100 what do you think Partner no 1 should get?
2. Do you think your Partner no 2 should get the same marks as you (if there was such a partner)? Why? If you were given 100 out of 100 what do you think Partner no 2 should get?

Computer skills used

1. When you were given the project you did not have all the required skills. When did you learn the extra skills used in developing the project?
2. Where did you learn those extra skills used?
3. Who taught you those extra skills used?
4. What did they teach you? How did they teach you, i.e. show or tell?
5. Why did they teach you?

Time

1. Did you have enough time for the project? If not, how much more time would you have liked? If not, why did you not finish in time? If not, why did you not find the time?
2. When did you start working on the project?
3. When did you do most of the work?
4. How did you plan (project plan) the time the project would require?

Place of work

1. Where did you do most work?
2. Why did you work there?

Content matter

1. Where did you find the information? What sources did you use for the content - electronic and print?
2. Did you ask people for the places where the information was stored?
3. What key words did you use when searching in indexes or search engines?
4. How much information that you collected, did you not use? Why not?

Help

1. Which adult helped your team the most?
2. How did they help you?
3. Why did they help you?
4. How did you prevent them from doing too much for you?

Preference

1. In your project what are you most proud of - text, animations, graphics, interactivity, etc?
2. Why are you proud of those aspects?
3. If you had a chance, is there anything you would do differently with that aspect?

Motivation

1. Why did you put so much, or so little effort, into your project
2. What do your parents / guardians think of your project?
3. How will you feel when the public, i.e. strangers, look at your project?
4. How did you feel when your computer or printer 'misbehaved'?

If you had to do a similar project next year, what would you do differently?

List the 10 best experiences or things, about doing the project? Then number them from 1-10 with number 10 being the best experience you had doing the project, and 9 the second best, and so on.

List the 10 worst experiences or things, about doing the project? Then number them from 1-10 with number 10 being the worst experience you had doing the project, and 9 the second worst, and so on.

Appendix J I own and I can surveys

I own and I can surveys

Please complete the following surveys by clicking in the appropriate boxes. Please **SAVE** and return the file as an email attachment to pmiller@phs.wcape.school.za
Please note that there are two pages.

Thank you

P. Miller

Ownership

Surname

First name

Please click in the box next to the item. Click those of the following which are available for your use at home or are freely accessible to you after school hours.

1. ATM bank card
2. Calculator
3. Cassette tape recorder
4. CD player
5. CD ROM
6. CD writer
7. Cell phone
8. Digital watch
9. Digital camera
10. DSTV
11. DVD
12. Electronic music keyboard
13. Ghetto blaster
14. Internet
15. Printer
16. M-Net
17. MP3 player
18. Pager
19. PDA (Palm top computer)

- 20. Scanner
- 21. Video camera
- 22. Video recorder
- 23. Walkman
- 24. Web camera

Click in the box next to the item if you are able to do the following:

- 1. Replay old messages using an answering machine
- 2. Draw cash from an ATM
- 3. Search through a CD for a given track
- 4. Copy files from a CD-ROM onto a hard drive
- 5. Store phone numbers using a cell phone
- 6. Send a fax
- 7. Connect a music keyboard to the computer
- 8. Set the alarm on a digital watch
- 9. View the images of a digital camera before printing
- 10. Send a SMS
- 11. Connect to an FTP server
- 12. Print in landscape orientation
- 13. Remove old messages from a pager
- 14. Connect to the Internet using a PDA (Palm top computer)
- 15. Scan an image
- 16. Use a video recorder to program and record a TV program to play at a later date

Appendix K Analysis of the *ThinkQuest* web entries

No. of Entries	Grade	Title	Animated gif made with Coffeecup Starter or Flash	Animated gif made with Gif Animator or similar	Drop down box	Feedback form	Guest book	Jigsaw puzzle	Quiz	Mouse over	Thumbnail	Tile puzzle	Crossword puzzle	Animated gif, clipart	Picture, not interactive	Sound clip	Video clip	Background image	Shared borders	Frames	Image map	Spelling mistake - max 5	Levels of information, 1 or 2	Clear structure, 1 or 0	Amount of information, max 2	Technical quality - max 5	
1	10	BMXing in Cape Town	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	5	2	1	2	4	
2	10	Cape Drugs	1	0	0	0	0	0	1	0	0	0	1	0	60	0	0	0	0	0	1	4	2	1	2	2	
3	10	Cape Town: The Mother City	0	0	0	0	0	0	0	0	19	0	0	0	39	0	0	0	0	0	0	1	2	1	1	4	
4	10	Dance clubs in Cape Town	0	0	0	0	0	0	0	1	0	0	0	0	3	0	0	1	0	0	0	5	2	1	1	3	
5	10	Hiking trails in the Western Cape	0	0	0	0	0	0	0	0	82	0	0	0	0	0	0	0	0	0	0	1	2	1	1	1	
6	10	Restaurant guide to Cape Town	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	1	1	1	1	3	
7	10	Special needs schools	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	3	2	1	2	1	
8	10	Sportman's guide to the Western Cape	0	0	0	0	0	0	0	0	12	0	0	0	1	0	0	0	0	0	0	2	1	1	1	3	
9	10	Tales @ the table	3	0	0	0	0	0	1	0	0	0	0	0	4	0	0	1	1	0	0	3	2	1	1	3	
10	10	Tourist guide to Cape Town	0	0	0	0	0	0	0	0	0	0	0	0	44	0	0	0	0	0	0	3	2	1	1	4	
	10	Foetal alcohol syndrome ¹²																									
1	11	Genesis animation	0	0	0	0	0	0	0	0	0	0	0	0	118	0	0	0	0	0	1	0	1	2	1	2	5
2	11	Beaches in Cape Town	1	0	0	0	0	0	0	0	43	1	0	1	96	0	0	0	0	0	1	1	4	2	1	2	5
3	11	Cape cuisine	0	0	0	1	0	0	0	0	8	0	0	0	6	0	0	0	0	0	1	0	2	1	1	2	2
4	11	Teen hair of Cape Town	0	0	0	0	0	0	1	11	0	1	0	0	100	0	0	1	1	0	0	1	2	1	2	5	
5	11	Kramats of the Western Cape	10	1	0	0	0	0	1	2	39	0	1	0	0	0	0	1	0	1	1	1	2	1	2	5	
6	11	Lifestyle of three typical teenagers in Cape Town	0	0	0	0	0	0	1	0	40	0	0	3	40	0	0	0	0	0	0	5	2	1	1	3	

¹² Unable to access this web site for the analysis.

University of Pretoria

No. of Entries	Grade	Title	Animated gif made with Coffeecup Starter or Flash Animator or similar	Drop down box	Feedback form	Guest book	Jigsaw puzzle	Quiz	Mouse over	Thumbnail	Tile puzzle	Crossword puzzle	Animated gif, clipart	Picture, not interactive	Sound clip	Video clip	Background image	Shared borders	Frames	Image map	Spelling mistake - max 5	Levels of information, 1 or 2	Clear structure, 1 or 0	Amount of information, max 2	Technical quality - max 5	
7	11	Planet Mars	0	0	0	0	0	0	0	4	0	0	0	5	0	0	1	0	1	0	1	1	1	1	4	
8	11	Sculpture in Cape Town	2	2	0	1	1	0	1	4	88	0	0	25	1	0	0	0	0	1	0	1	2	1	2	5
9	11	Soul of District Six	1	1	0	1	1	0	1	0	12	1	0	17	0	0	0	0	0	1	0	1	2	1	2	5
10	11	Tourism and whaling in Hermanus	0	0	1	1	1	0	1	0	25	0	0	1	0	1	0	1	0	0	0	0	1	1	2	4
11	11	V & A Waterfront	1	3	0	0	0	0	1	5	31	1	0	1	60	0	0	0	0	0	0	1	2	1	2	4
12	11	Where eagles fly: the South African airforce in 2001	3	0	0	1	1	0	1	0	10	1	0	100	0	0	1	1	1	1	0	3	2	1	2	5
13	11	Xtreme sports in South Africa	1	1	0	0	1	0	0	0	0	0	1	5	0	0	1	0	0	0	1	1	1	1	4	
	11	Old Mutual ¹³																								
		Total	23	8	1	5	5	0	10	23	413	5	2	7	781	2	0	8	3	9	2	50	40	23	36	84
		Average	1.0	0.3	0.0	0.2	0.2	0.0	0.4	1.0	18.0	0.2	0.1	0.3	34.0	0.1	0.0	0.3	0.1	0.4	0.1	2.2	1.7	1.0	1.6	3.7
		Average 10D	0.4	0.0	0.0	0.0	0.0	0.2	0.1	11.3	0.0	0.1	0.0	20.9	0.0	0.0	0.2	0.1	0.1	0.0	2.8	1.8	1.0	1.3	2.8	
		Average 11D	1.5	0.6	0.1	0.4	0.4	0.0	0.6	1.7	23.1	0.4	0.1	0.5	44.0	0.2	0.0	0.5	0.2	0.6	0.2	1.7	1.7	1.0	1.8	4.3
		Maximum	10	3	1	1	1	0	1	11	88	1	1	3	118	1	0	1	1	1	1	5	2	1	2	5
		Minimum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	
		Number of 10D who did it	2	0	0	0	0	0	2	1	3	0	1	9	0	0	2	1	1	0	10	10	10	10	10	
		Number of 11D who did it	7	5	1	5	5	0	8	4	10	5	1	5	11	2	0	6	2	8	2	12	13	13	13	

¹³ Not handed in at all.

No. of Entries	Grade	Title	Animated gif made with <i>Coffeecup Starter</i> or <i>Flash Animator</i> or similar	Drop down box	Feedback form	Guest book	Jigsaw puzzle	Quiz	Mouse over	Thumbnail	Tile puzzle	Crossword puzzle	Animated gif, clipart	Picture, not interactive	Sound clip	Video clip	Background image	Shared borders	Frames	Image map	Spelling mistake - max 5	Levels of information, 1 or 2	Clear structure, 1 or 0	Amount of information, max 2	Technical quality - max 5	
		Difference	5	5	1	5	5	0	6	3	7	5	0	5	2	2	0	4	1	7	2	2	3	3	3	3
		Used feature	9	5	1	5	5	0	10	5	13	5	2	5	20	2	0	8	3	9	2	22	23	23	23	23

Appendix L Analysis of the web-based curriculum vitae

No. of Learners	Group	Web	Animated gif made with Coffeecup Starter or Flash Animator or similar	Drop down box	Feedback form	Guest book	Jigsaw puzzle	Quiz	Mouse over	Thumbnail	Tile puzzle	Crossword puzzle	Animated gif, clipart	Picture, not interactive	Sound clip	Video clip	Background image	Shared borders	Frames	Image map	Spelling mistake - max 5	Levels of information, 1 or 2	Clear structure, 1 or 0	Amount of information, max 2	Technical quality - max 5
1A	Avril	0	0	0	0	0	0	0	0	0	0	0	4	3	0	0	0	0	0	0	2	1	1	1	4
2A	Basri	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	3	1	1	1	4
3A	Buntu	0	0	0	0	0	0	0	6	0	0	0	3	8	0	0	1	1	0	2	5	2	1	1	4
4A	Candy	0	0	0	0	0	0	0	0	7	0	0	15	12	0	0	0	0	0	0	3	1	1	1	4
5A	Carlo	0	1	0	0	0	0	0	0	0	0	0	1	7	0	0	1	1	0	1	2	1	1	2	4
6A	Caryn	0	1	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	5	2	1	2	1
7A	Chad	No work																							
8A	Emma	0	0	0	0	0	0	0	0	21	0	0	0	2	0	0	1	0	0	0	2	1	1	1	4
9A	Gwen	0	1	0	0	0	0	0	0	5	0	0	6	6	1	0	0	0	0	0	2	1	1	1	4
10A	Judy	0	0	0	0	0	0	0	0	0	0	0	3	28	0	0	0	0	0	1	3	2	0	2	5
11A	Kay	0	0	0	0	0	0	0	1	21	0	0	4	1	0	0	0	0	0	0	2	2	1	2	5
12A	Kerri	0	0	2	1	0	0		1	1	0	0	0	0	0	0	0	0	0	0	2	1	1	1	4
13A	Khim	0	0	0	0	0	0	0	0	0	0	0	0	37	0	0	0	0	0	0	1	1	1	2	4
14A	Liana	0	0	0	0	0	0	0	0	6	0	0	5	5	0	0	0	0	0	0	2	1	1	1	5
15A	Linda	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	5	1	1	1	1
16A	Lisa	No work																							
17A	Lyle	0	1	0	0	0	0	0	0	5	0	0	1	3	0	0	1	1	0	1	2	1	1	1	3
18A	Mandy	0	0	2	0	0	0	0	0	3	0	0	12	10	0	0	0	0	0	0	5	1	0	1	4
19A	Marc	0	1	0	0	0	0	0	0	0	0	0	1	3	0	0	1	0	0	0	2	1	1	1	4
20A	Megal	No work																							
21A	Moosa	0	3	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	3	1	1	1	1
22A	Nina	0	1	0	0	0	0	0	0	0	0	0	4	22	0	0	1	0	0	1	3	2	1	2	4

No. of Learners	Group	Web	Animated gif made with Coffeecup Starter or Flash Animator or similar	Drop down box	Feedback form	Guest book	Jigsaw puzzle	Quiz	Mouse over	Thumbnail	Tile puzzle	Crossword puzzle	Animated gif, clipart	Picture, not interactive	Sound clip	Video clip	Background image	Shared borders	Frames	Image map	Spelling mistake - max 5	Levels of information, 1 or 2	Clear structure, 1 or 0	Amount of information, max 2	Technical quality - max 5
23A	Silma	0	0	0	0	0	0	0	0	0	0	0	0	10	1	0	0	0	0	0	3	2	1	2	2
24A	Siv	0	0	0	0	0	0	0	1	9	0	0	5	5	0	0	0	0	0	0	1	2	1	2	4
25A	Skake	1	0	0	0	0	0	0	0	5	0	0	11	13	0	0	1	0	0	0	4	2	1	1	3
26A	Tanya	0	1	0	0	0	0	0	0	0	0	0	3	10	0	0	1	0	0	0	2	1	1	1	4
27A	Tracy	1	0	0	0	0	0	0	0	0	0	0	7	15	0	0	0	0	0	1	4	1	1	2	4
28A	Vuyo	1	1	0	0	0	0	0	3	33	0	0	2	4	0	0	1	0	0	0	2	2	1	2	4
29A	Wafiq	No work																							
30A	Zodwa	1	0	0	0	0	0	0	1	2	0	0	11	0	0	0	1	0	0	0	3	1	1	1	4
1D	Alex	No work																							
2D	Brent	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	1	0	0	0	5	1	0	1	4
3D	Craig	1	1	0	1	1	0	0	1	2	0	0	2	4	1	1	0	1	0	1	1	2	1	2	3
4D	Dale	1	0	0	0	0	0	0	1	10	0	0	0	1	0	0	1	0	0	0	4	1	1	1	4
5D	Gino	No work																							
6D	Imran	0	0	0	0	0	0	0	1	12	0	0	6	14	2	1	1	0	0	0	4	1	1	1	4
7D	Jared	0	0	0	0	0	0	0	8	5	0	0	0	8	0	0	0	0	1	0	0	1	1	1	2
8D	Jason	0	1	0	0	0	0	0	1	1	1	0	0	2	0	0	0	1	0	0	0	1	1	1	5
9D	Jenna	1	0	0	0	0	0	0	1	20	0	0	0	0	0	0	1	0	0	0	20	1	0	1	2
10D	Kader	No work																							
11D	Kate	1	1	1	1	1	0	0	1	28	0	1	0	0	0	0	1	0	1	1	1	1	1	2	3
12D	Kelly	0	4	0	1	1	0	0	4	2	1	0	1	2	0	0	1	0	1	1	1	2	1	2	4
13D	Kurt	0	0	0	0	0	0	0	0	3	0	0	0	5	0	0	5	1	0	0	1	2	1	2	4
14D	Kyle	0	2	0	0	1	0	1	1	48	1	0	0	3	0	0	0	1	0	0	2	1	1	2	4
15D	Lara	2	0	1	1	0	0	0	0	10	0	1	0	3	0	0	1	0	1	1	0	2	1	2	3

	No. of Learners	Group	Web	Animated gif made with Coffeecup Starter or Flash Animator or similar	Drop down box	Feedback form	Guest book	Jigsaw puzzle	Quiz	Mouse over	Thumbnail	Tile puzzle	Crossword puzzle	Animated gif, clipart	Picture, not interactive	Sound clip	Video clip	Background image	Shared borders	Frames	Image map	Spelling mistake - max 5	Levels of information, 1 or 2	Clear structure, 1 or 0	Amount of information, max 2	Technical quality - max 5
16	D	Max	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	1	1	0	0	10	1	1	1	1
17	D	Paul	0	0	0	1	1	0	0	0	7	0	0	0	7	0	0	1	0	0	1	2	1	1	1	4
18	D	Penny	2	2	0	1	1	0	0	1	12	1	1	1	0	0	0	1	0	1	1	3	2	1	2	4
19	D	Ricco	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	1	1	4
20	D	Robert	0	1	0	0	0	0	0	5	5	0	0	0	4	0	0	1	0	1	0	0	1	1	1	3
21	D	Robyn	1	1	0	0	1	0	0	3	8	0	1	0	0	0	0	1	0	0	1	1	2	0	2	4
22	D	Ross	1	5	0	0	0	0	0	21	3	0	0	5	11	0	0	1	1	0	0	1	2	1	2	5
23	D	Safia	1	6	0	0	1	1	1	6	24	0	1	4	3	0	0	1	1	1	1	1	2	1	2	4
24	D	Sarah	0	2	0	0	0	0	1	10	0	0	0	0	35	0	0	1	0	1	0	1	2	1	2	5
25	D	Simon	1	0	1	1	1	0	0	0	13	0	0	0	37	0	0	0	0	1	1	3	2	1	2	5
26	D	Susan	1	0	1	1	1	0	0	1	8	0	1	1	4	0	0	0	0	1	1	1	1	1	2	4
27	D	Tessa	0	1	0	0	0	0	0	1	14	0	1	0	9	0	0	1	0	0	1	2	2	1	2	2
28	D	Vinay	1	1	0	0	0	0	1	2	20	1	0	0	0	0	0	1	0	1	0	2	1	1	1	2
29	D	Yusuf	1	0	1	1	1	0	0	6	6	0	0	2	20	0	1	3	1	1	1	1	2	1	2	4
		Total	19	41	9	10	12	1	4	88	382	5	7	158	506	5	3	36	11	12	20	140	73	47	77	187
		Average	0.4	0.8	0.2	0.2	0.2	0.0	0.1	1.7	7.3	0.1	0.1	3.0	9.7	0.1	0.1	0.7	0.2	0.2	0.4	2.7	1.4	0.9	1.5	3.6
		Maximum	2	6	2	1	1	1	1	21	48	1	1	40	101	2	1	5	1	1	2	20	2	1	2	5
		Minimum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
		Number of 11A who did it	4	10	2	1	0	0	0	6	12	0	0	20	24	2	0	11	3	0	7	26	26	24	26	26
		Number of	13	14	5	9	12	1	4	19	23	5	7	8	21	2	3	19	8	12	12	21	26	23	26	26

No. of Learners	Group	Web	Animated gif made with <i>Coffeecup Starter</i> or <i>Flash Animator</i> or similar	Drop down box	Feedback form	Guest book	Jigzaw puzzle	Quiz	Mouse over	Thumbnail	Tile puzzle	Crossword puzzle	Animated gif, clipart	Picture, not interactive	Sound clip	Video clip	Background image	Shared borders	Frames	Image map	Spelling mistake - max 5	Levels of information, 1 or 2	Clear structure, 1 or 0	Amount of information, max 2	Technical quality - max 5
	11D who did it																								
	Difference	9	4	3	8	12	1	4	13	11	5	7	-12	-3	0	3	8	5	12	5	-5	0	-1	0	0
	Used feature	17	24	7	10	12	1	4	25	35	5	7	28	45	4	3	30	11	12	19	47	52	47	52	52