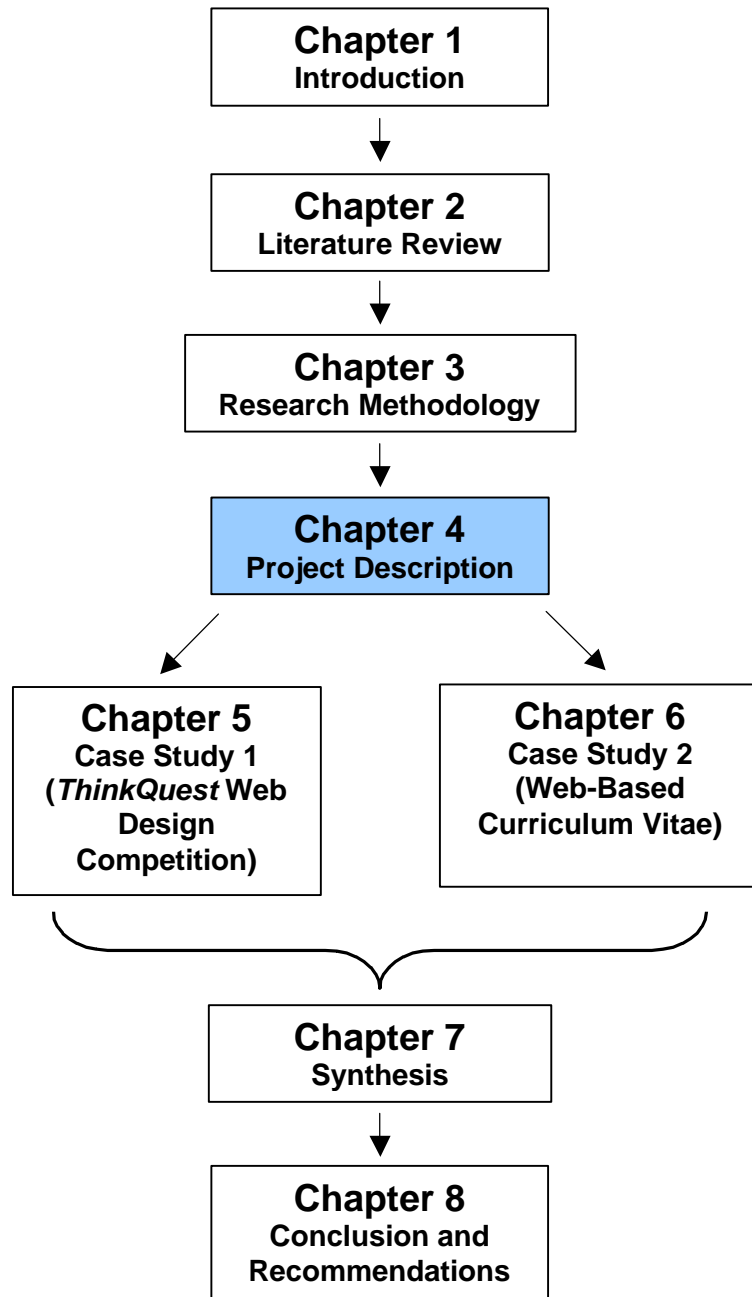


Chapter 4



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.

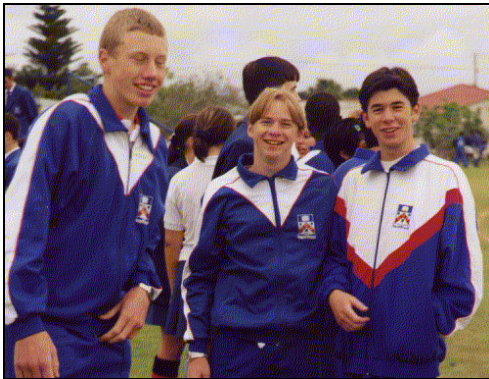
The following section shows the diversity at PHS. From the rich and thick description, including graphs and pictures, it can be seen that PHS contains elements of South African FET learners. The aim of this research is to find the commonality in diversity in a digital environment.

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

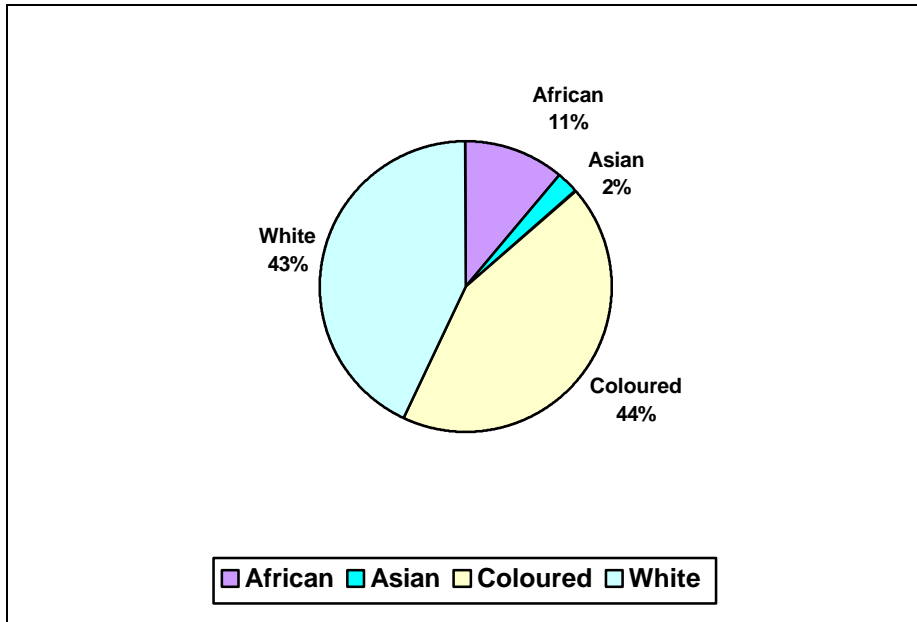


Figure 4 - 2 illustrates the racial grouping of the school and shows that Coloured learners are in the majority.

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

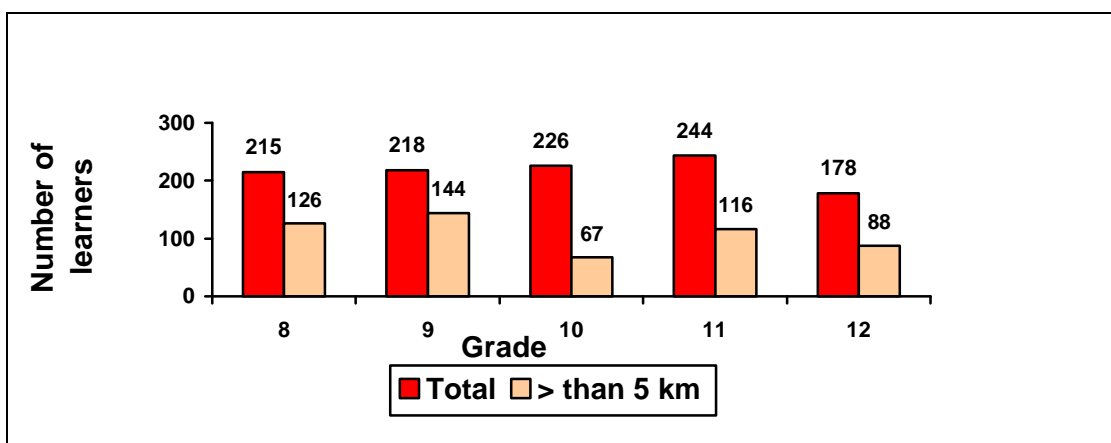


Figure 4 - 3 shows the proportion of learners who live more than 5 km away from the school. This would indicate that many learners are drawn from the neighbouring suburbs of Thornton, Kensington and Langa³.

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

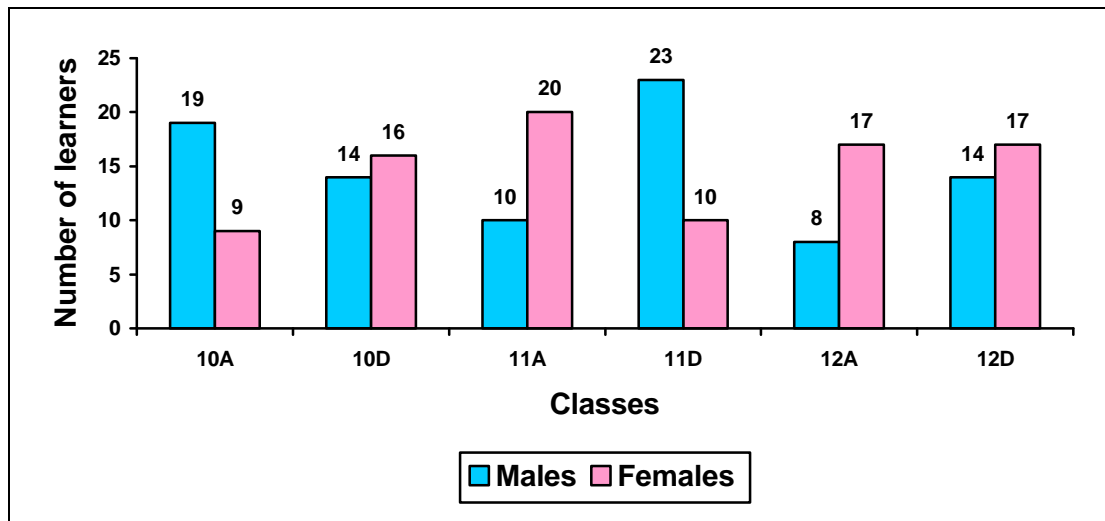


Figure 4 - 5 illustrates the distribution of learners per grade based on their gender. There is no pattern of more males or females in any grade.

Figure 4 - 6 Racial distribution of learners

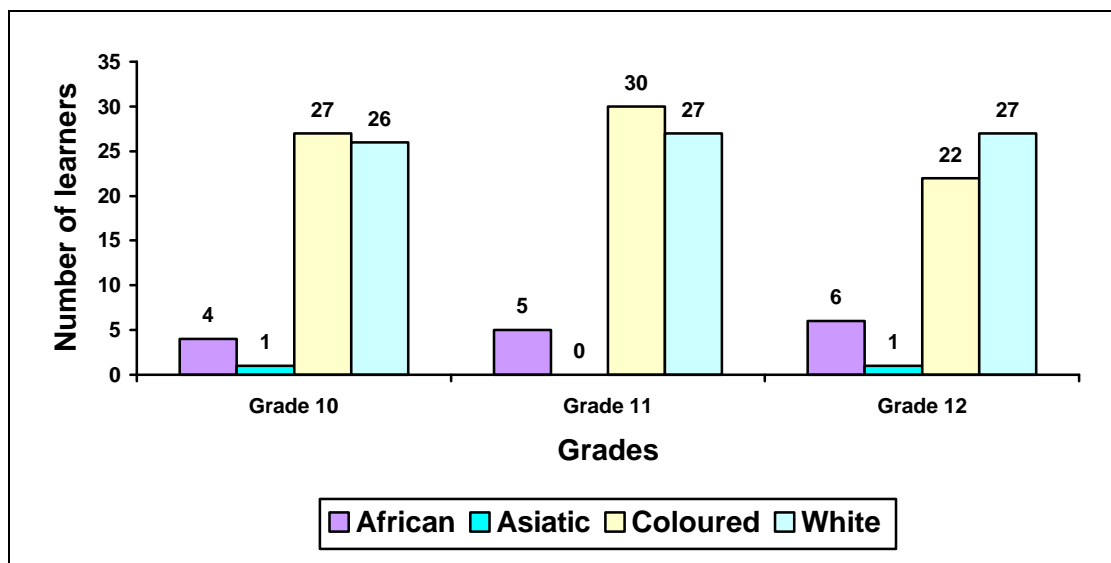


Figure 4 - 6 illustrates the diverse racial distribution of learners.

Figure 4 - 7 Academic performance of learners

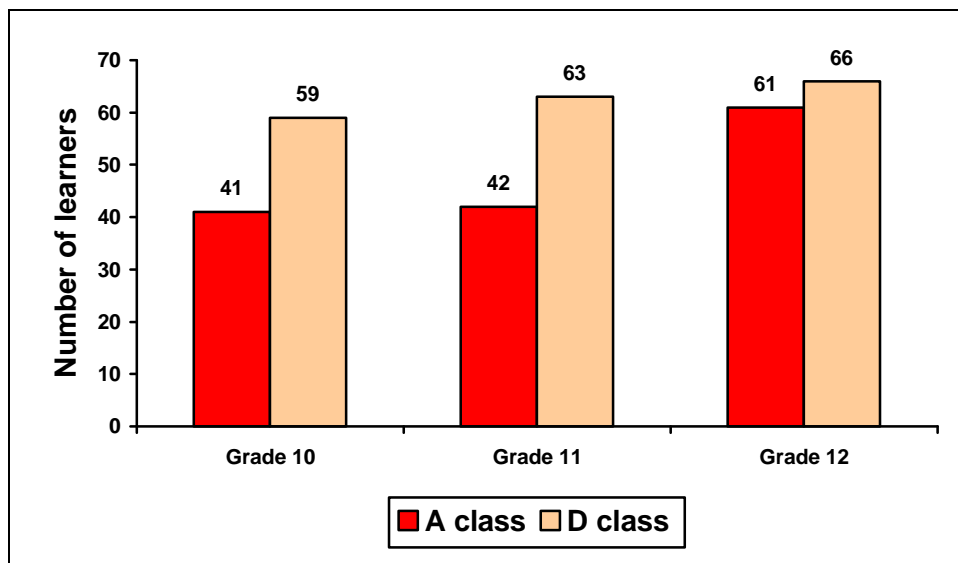


Figure 4 - 7 illustrates the 2001 end of year marks in Computer Studies SG for the grades involved in the research. The marks of the Grades 10 and 11 are determined by internal examinations and class work. The marks of Grade 12 are determined mainly by an external examination set by the Western Cape 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

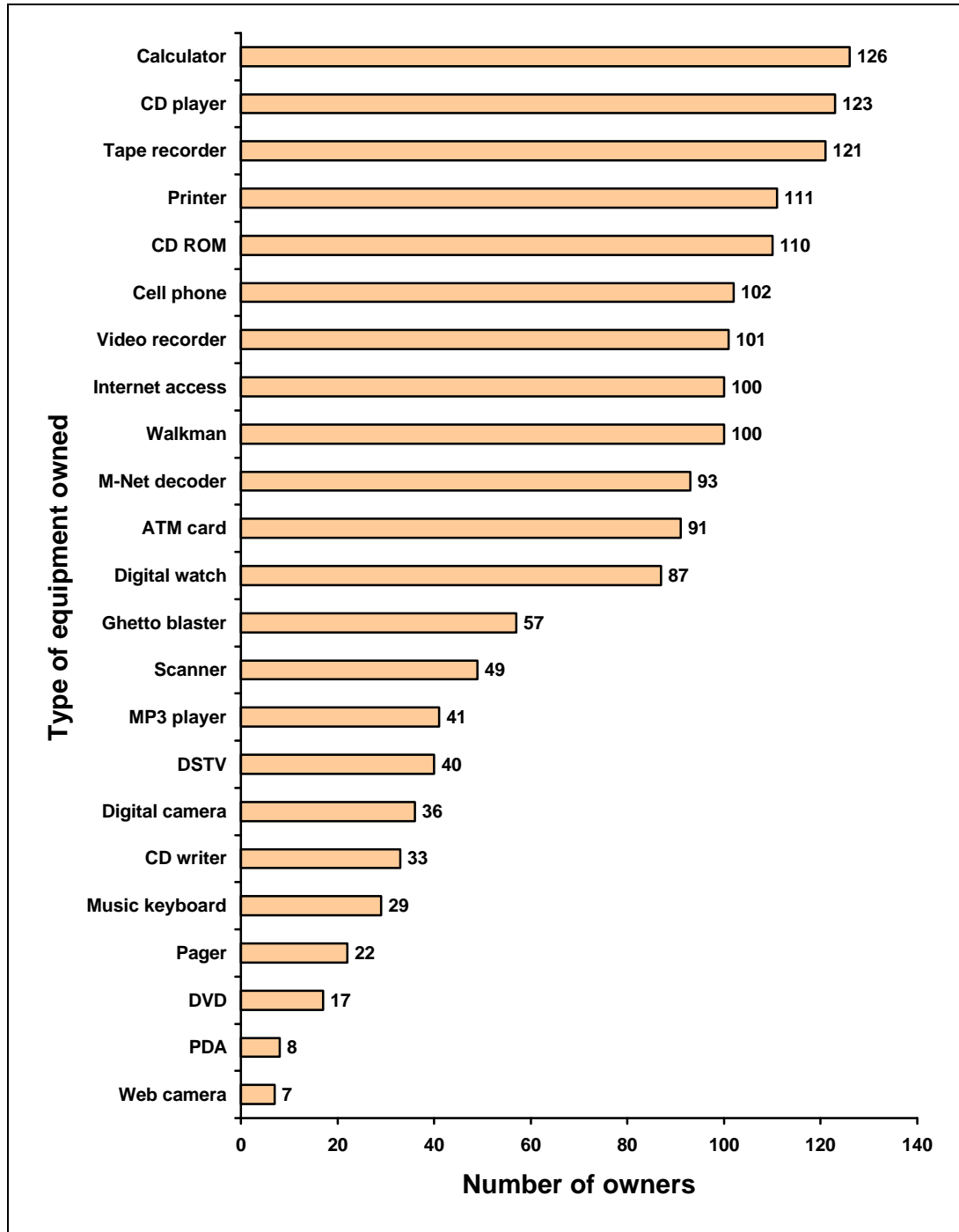
Gender	Average	Maximum	Minimum	Total learners surveyed
Females	12	21	3	65
Males	14	22	5	62

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

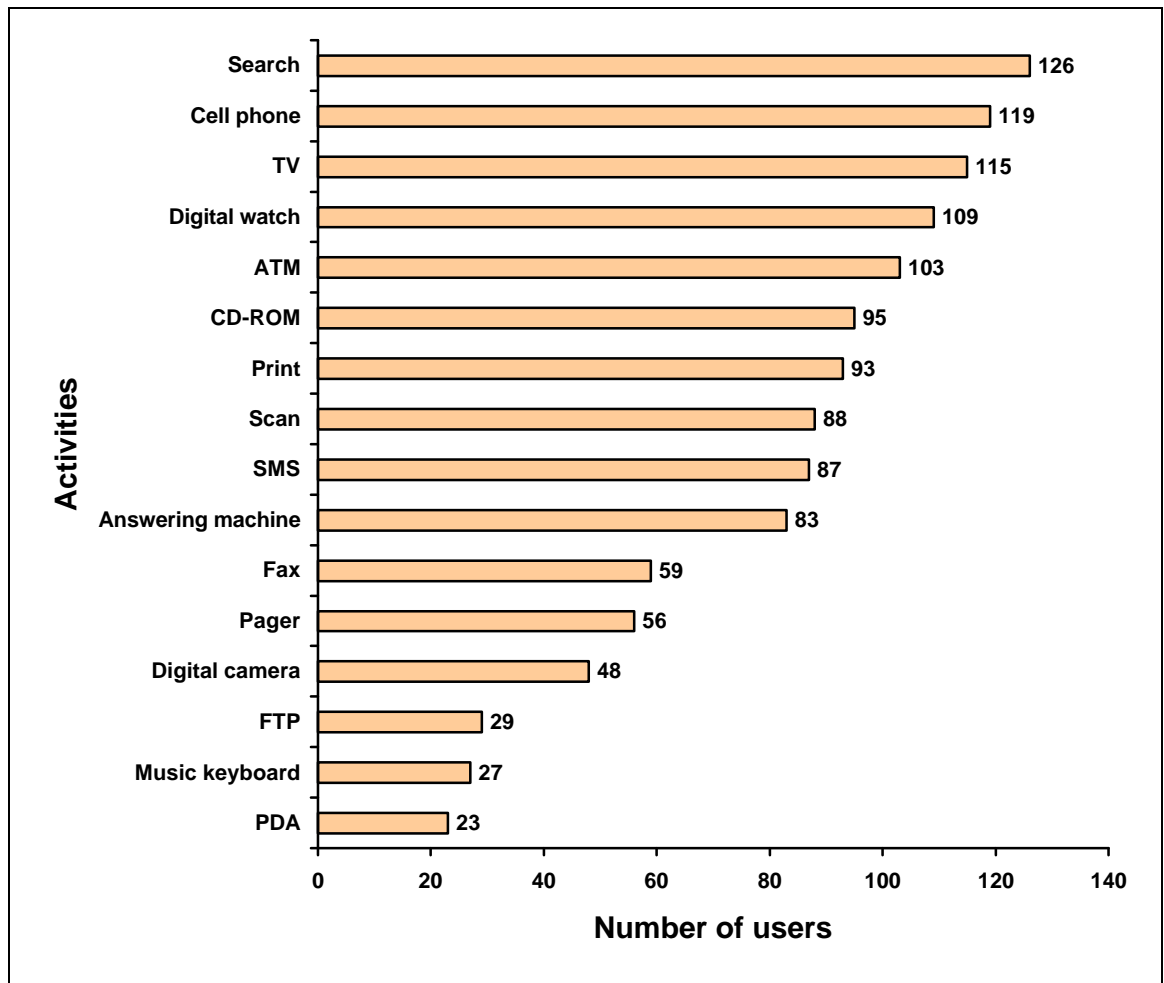
Table 4 - 6 Ability of racially based groups of Grades 10 to 12 learners to perform digital activities

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*

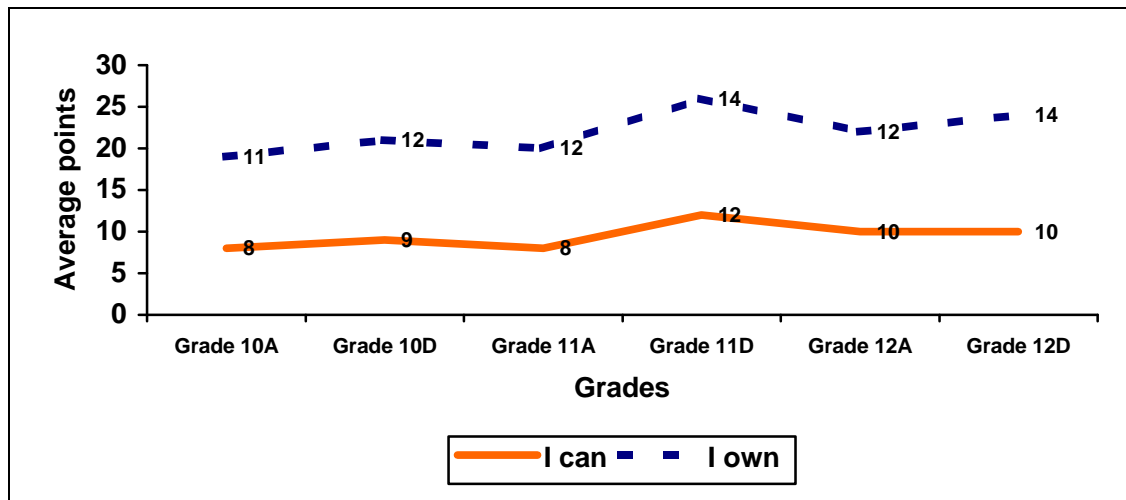
Figure 4 - 9 Ability of 127 learners in Grades 10 to 12 to perform digital activities



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*, *Tab*s 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.