

CHAPTER 4

FINDINGS

This chapter will look at the community of Pinelands, students and staff of Pinelands High, the infrastructure they have in place for computer-assisted education and then how computers have been integrated into education at the school.

1 Objects of the research project

Pinelands High School is in Pinelands on the Cape Peninsula. It is largely a community school but also accommodates students from further afield. In its web page on the Internet it declares (Pinelands, 1996):

“We pride ourselves on our record of excellence; our concern for the needs of the individual; and our endeavour to instill in our pupils the values and skills that will equip them to become thinking, capable, balanced adults ready to cope with the demands of life and the changing employment market.”

1.1. Pinelands

Pinelands is a suburb of the provincial capital city of Cape Town which is in the Western Cape, a province of South Africa. In 1994 the total adult population of Pinelands was 11 000. The 1994 demographic details (Retail Data Library, 1994) in Tables 4.1 to 4.3 below indicate that the average adult in Pinelands is employed, well educated, of a mature age, lives in a house, speaks English and earns a good salary. It is a traditional ‘White’ suburb of middle to upper class inhabitants but is slowly changing to represent the different cultural groups found in South African society.

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Table 4. 1 Gender, age groups and language of adults in Pinelands (Retail Data Library, 1994)

GENDER	1000s
Male	5
Female	6
AGE GROUPS	1000s
18-24	2
25-34	2
35-49	3
50+	5
LANGUAGE	1000s
English/Other	10
Afrikaans/Bilingual	1

Table 4. 2 Education levels and occupations of adults in Pinelands (Retail Data Library, 1994)

EDUCATION	1000s
Up to primary completed	0
Some high school	1
High school completed/Matric	4
Post matric	6
OCCUPATIONS	1000s
Working	6
Housewife	1
Student	1
Retired	2
Unemployed	0

Table 4.3 Housing and household income in Pinelands (Retail Data Library, 1994)

HOUSING	1000s
Live in a house	9
Live in a flat	2
Live in a townhouse cluster	0
Other	0
INCOME (per month)	1000s
R6000+	6
R2500-R5999	4
R800-R2499	1
Less than R799	0

1.2 Pinelands High School

The school opened in 1952. It is a co-educational school and at the time of the survey, August/September 1996, has 963 students from standard six (grade eight) to standard 10 (grade 12).

1.2.1 Students

At the beginning of 1996 the total number of students from standards six to 10 at the school was 963. The majority of high school students in Pinelands attend Pinelands High School. In addition to Pinelands, the feeder areas for the school are

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

According to the senior deputy principal, Pinelands High School is generally seen to offer 'better' schooling than the schools zoned for the above areas (Arguile, 1996).

Besides being a co-educational school, Pinelands High attempts to be multi-cultural, recognising each individual group's traditions, rather than assimilating minor cultures (Arguile, 1996). The school population is becoming increasingly heterogeneous.

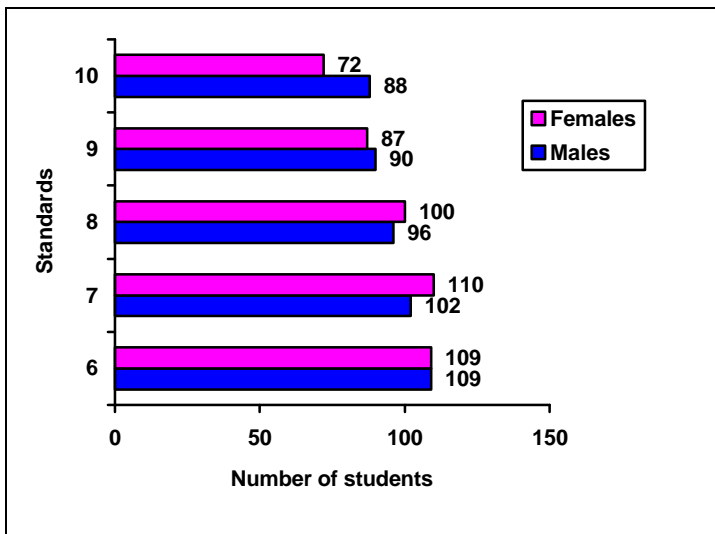
1.2.1.1 Standards and gender of students

Table 4. 4 Standards and gender of students

GENDER	STD 6	STD 7	STD 8	STD 9	STD 10	TOTAL
Males	109	102	96	90	88	485
Females	109	110	100	87	72	478
Total	218	212	196	177	160	963

The standard and gender groupings of the students at Pinelands High School in 1996 are shown in the table above and figure below. The numbers of students in each standard decreases towards standard 10. The gender balance is almost the same in each standard.

Figure 4. 1 Standards and gender of students



1.2.1.2 Home languages and gender of students

Table 4. 5 Home languages of female students

LANGUAGE	STD 6	STD 7	STD 8	STD 9	STD 10	TOTAL
Afrikaans	2	2	2	2	1	9
English	101	97	87	80	64	429
Sotho				1	1	2
Xhosa	6	7	9	3	3	28
Zulu				1	1	2
Other		4	2		2	8
	109	110	100	87	72	478

Table 4. 6 Home languages of male students

LANGUAGE	STD 6	STD 7	STD 8	STD 9	STD 10	TOTAL
Afrikaans	6	0	1	1	2	10
English	94	89	88	83	75	429
Sotho		1				1
Xhosa	7	9	6	6	8	36
Zulu		1			1	2
Other	2	2	1		2	7
	109	102	96	90	88	485

From the two tables below it can be noted that the majority of the students are English speaking. According to the school statistician, many students come from homes where more than one language is spoken but the official statistics do not make provision for two or more home languages (Rundle, 1996b).

Ranked the home languages of Pinelands High School students are:

1. English with 858
2. Xhosa with 64
3. Afrikaans with 19
4. Zulu with 4
5. Sotho with 3
6. Other languages account for 15

1.2.1.3 Age and gender of students

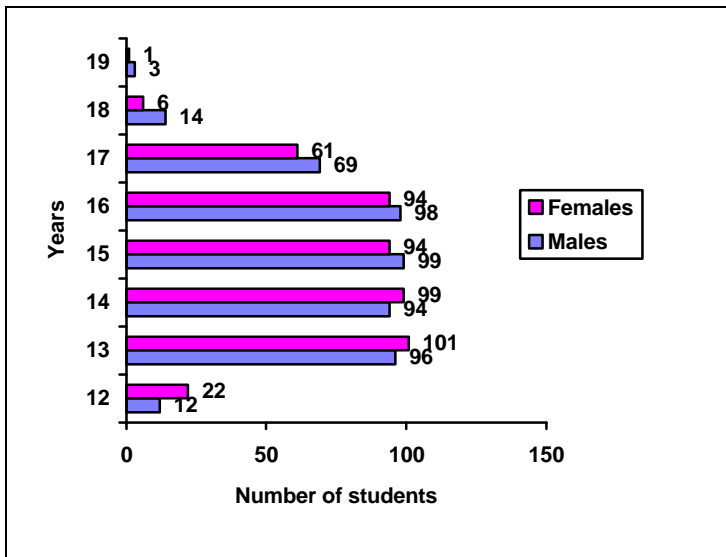
Table 4. 7 Ages of male students

YEARS	STD 6	STD 7	STD 8	STD 9	STD 10	TOTAL
12 years	12					12
13 years	79	17				96
14 years	17	64	13			94
15 years	1	20	65	13		99
16 years		1	17	63	17	98
17 years			1	12	56	69
18 years				2	12	14
19 years					3	3
Total	109	102	96	90	88	485

Table 4. 8 Ages of female students

YEARS	STD 6	STD 7	STD 8	STD 9	STD 10	TOTAL
12 years	22					22
13 years	76	25				101
14 years	11	68	20			99
15 years		14	57	23		94
16 years		3	22	57	12	94
17 years			1	7	53	61
18 years					6	6
19 years					1	1
Total	109	110	100	87	72	478

Figure 4. 2 Age and gender of students



From the two tables and graph above it can be noted that the students are mainly in the 13 to 16 age group, and almost evenly spread between males and females.

Figure 4. 3 Scenes from school-life



1.2.1.4 Student computer ownership

In June 1996 a survey was conducted with 98 standard six students in three classes and with 104 students in standard seven in three classes to determine computer home ownership and whether the students had used computers in primary school.

Table 4.9 Computers at home and school

STANDARD	HOME OWNERSHIP	PRIMARY SCHOOL USE
Standard 6	66%	79%
Standard 7	71%	79%

The table above indicates that a large percentage of the students have computers at home. In the table above it is also indicated that a large percentage of the students come from primary schools where they use computers.

1.2.2 Staff

The teaching staff of Pinelands High School in 1996 comprises the principal, one senior deputy principal, two deputy principals, and 44 heads of departments and teachers, totalling 48. All of the 48 teach classes. These 48 persons are responsible for teaching 963 students in 1996 in:

- six standard 6 classes
- six standard 7 classes
- six standard 8 classes
- six standard 9 classes
- six standard 10 classes

There are 11 administrative staff members who include one laboratory assistant, one caterer, one bookroom administrator, one media assistant, one bursar, one data capturer, one network administrator, one receptionist, two secretaries and one computer administrator. There is one grounds manager, one janitor and one caretaker. There are five members of the grounds staff and two female cleaners. According to the deputy principal, Pam Broster, in 1996 the teaching staff : student ratio is 1 : 22 (Broster, 1996).

For the survey all teachers who had been at the school for more than one year were included. Of the Computer Literacy teachers the network administrator and one teacher were excluded as they had been at the school less than one year.

1.2.2.1 Staff marital status and gender

Table 4. 10 Marital status and gender of teaching staff

MARITAL STATUS	FEMALE	MALE	TOTAL
Divorced	3	0	3
Married	9	9	18
Single	11	8	19
Total	23	17	40

The above table indicates the gender of the staff. Female teachers are 23 (57%) members of the staff complement of 40 in the survey.

Table 4. 11 Marital status and gender of computer department teaching staff

MARITAL STATUS	FEMALE	MALE	TOTAL
Divorced	1	0	1
Married	2	1	3
Single	1	2	3
Total	4	3	7

As can be seen from the table above, the number of male to female computer department teaching staff is almost equal, thus the students do not have a gender stereotype of a computer expert.

1.2.2.2 Staff years of teaching experience

Table 4. 12 Total years of teaching experience of staff

YEARS OF EXPERIENCE IN TOTAL	FEMALE	MALE	TOTAL
10 or more	17	9	26
less than 10	6	8	14
Total	23	17	40

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The table above indicates that 26 (65%) members of staff have more than 10 years of teaching experience. The staff who have less than 10 years of experience number 14 (35%). The average length of teaching experience is 13.2 years.

Table 4. 13 Years of teaching experience of staff at Pinelands High School

YEARS OF EXPERIENCE AT PHS	FEMALE	MALE	TOTAL
10 or more	5	8	13
less than 10	15	12	27
Total	20	20	40

The table above indicates that 13 (32%) members of staff in the survey have more than 10 years of teaching experience at Pinelands High School. The staff have an average of eight years of teaching experience at the School.

1.2.2.3 Computer department staff

The computer department staff of seven have had many years of teaching experience in general as well as in the subject of Computer Literacy. On average the computer department teaching staff

- have taught for 14.3 years;
- have taught at Pinelands High for 8.71 years; and
- have taught Computer Literacy at Pinelands High for 5.8 years.

Table 4. 14 Average years of teaching experience

AVERAGE TEACHING YEARS	GENERAL TEACHING STAFF	COMPUTER DEPARTMENT STAFF
Years experience in total	13.2	14.3
Years experience at PHS	8.0	8.71

From the table above it can be seen that the computer department teaching staff on average have slightly more years' teaching experience than the general teaching staff. It can also be seen that the computer department teaching staff on average have slightly more year's teaching experience at Pinelands High School than the general teaching staff at Pinelands High School.

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The six standard six classes are taught Computer Literacy twice a cycle by

- one teacher who teaches two classes;
- one teacher who teaches one class;
- one network administrator who teaches two classes; and
- one computer administrator who teaches one class.

The six standard seven classes are taught Computer Literacy once a cycle by

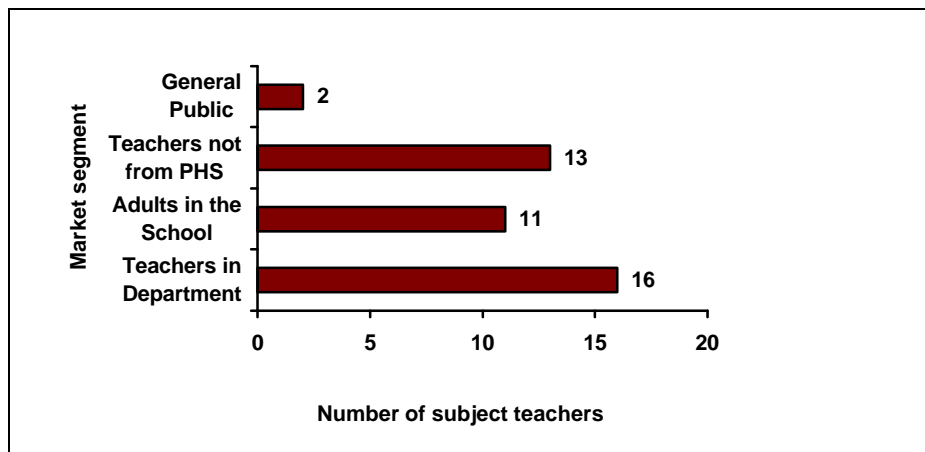
- four teachers who teach four classes; and
- one teacher who teaches two classes.

2 Support infrastructure

2.1 Sharing of skills

2.1.1 Sharing of information about classroom computer use

Figure 4. 4 Sharing of information, skills and enthusiasm by teachers who use computer-assisted education



Of the 40 staff members who took part in the survey 23 have used the computer in their teaching of Pinelands High School at *some* time. It was found that 19 teachers have used the computer in teaching in 1996 and took part in the survey. Data about sharing information in relation to their computer-related lessons was obtained from 18 of those teachers. The Computer Literacy, Geography and Mathematics subject departments have shared their computer teaching experiences with colleagues in

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their departments but not with other adults in the school. Teachers from the English department have shared their computer teaching experiences with teachers from other schools. Findings or experiences about computer-assisted education at Pinelands High School have been published by two teachers.

Of the seven teachers who teach Computer Literacy

- one teaches Accounting;
- one teaches Business Economics;
- one teaches Library;
- one teaches Mathematics;
- one teaches Typing;
- two teach Graphics;
- two teach History;
- two teach Science; and
- two teach Environmental Science.

Where a teacher teaches Computer Literacy and another subject, the other department is also drawn into using computer-assisted education. The departments of Environmental Science, Graphics, History, Mathematics, Science and Typing have teachers who also teach Computer Literacy.

The teachers of the subjects Computer Literacy, Geography, Graphics and Mathematics share information with those in their subject departments. Based on the data in the figure above, sharing with colleagues in the school is not really taking place. The figure above shows the sharing by the 18 of the 19 surveyed teachers who have used computer-assisted education at Pinelands High School in 1996.

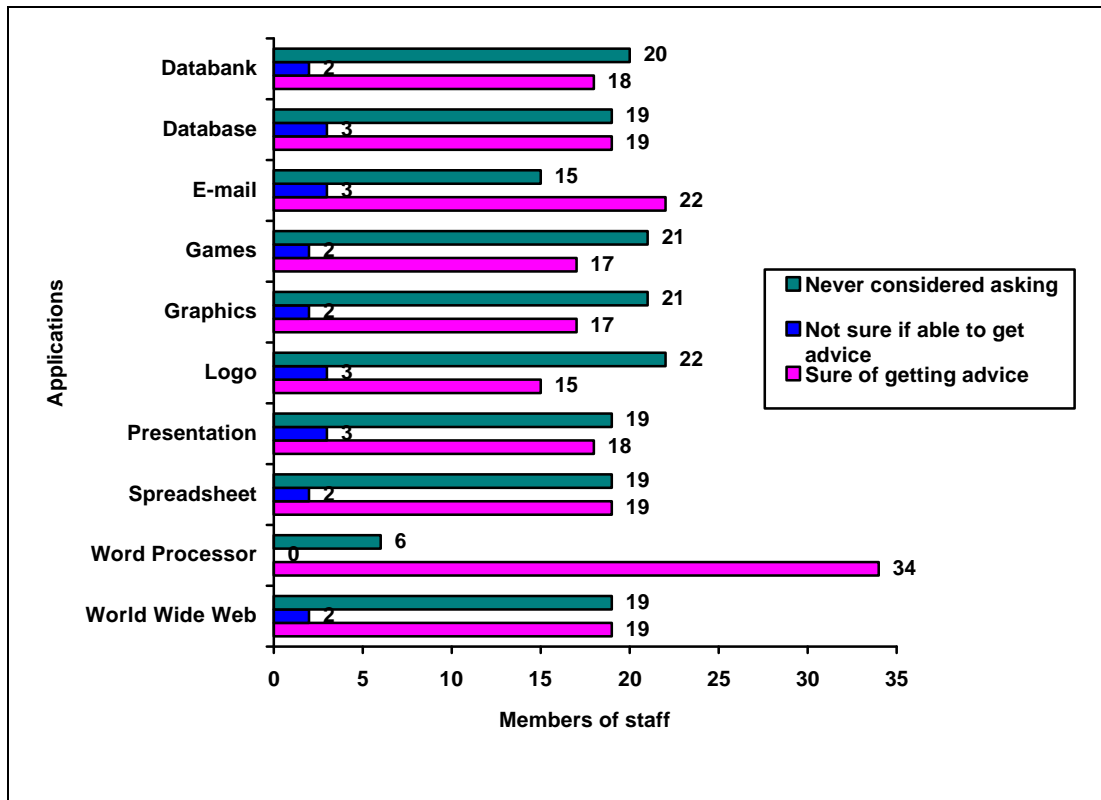
2.1.2 Mentoring of teachers using the computer in the classroom

Mentorship by an experienced teacher is taking place with regard to computer-assisted education. Six teachers in the Computer Literacy, English, Graphics and Mathematics subject departments were mentored by someone in computer-related teaching. Three teachers mentored other teachers in the Computer Literacy, Environmental Science and Graphics subject departments.

In the Computer Literacy and Graphics departments mentoring is taking place between staff who have been teaching Computer Literacy for a long time and teachers new to using the computer.

2.1.3 Providing of advice by the computer department

Figure 4. 5 Perceived availability of advice from the computer department



From the above figure it is clear that staff members believe they are able to get advice from the computer department, when they need it using the applications listed in the figure. A number of staff members have not considered asking for advice on using these applications. Pinelands High School has staff in the computer department who, from the figure above, are believed to have the program-knowledge. This knowledge would give the staff confidence in using the applications.

2.2 Decision-making policy

2.2.1 School decision-making policy

Pinelands High School has, in many fields, an open decision-making policy. For example, during 1995 and 1996 all teaching staff were involved in planning for rationalisation. Quality Circles, comprised of students, teachers and parents,

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discuss key aspects of school life regarding discipline, public relations, communication, academics, arts, sport and buildings; and make recommendations to the appropriate governance structures. The principal follows an open door policy and staff are always able to discuss matters with him. This information has been corroborated by his secretary and the author's experience.

Staff have input in their subject departments. The answers below to questions on the questionnaire (see Appendix A, number 15) indicate the open policy of the school and that of the subject departments.

Table 4. 15 Decision-making within the school by all surveyed teachers

HAVE YOU HAD ANY INPUT INTO THE ...	YES %	DO NOT KNOW %	NO %
1. long term plans of the school as a whole?	75	7	18
2. methodology of teaching in your department?	95	0	5
3. evaluation methods in your departments?	95	0	5
4. content of courses in your department?	98	2	0

The data above indicates that should staff wish to make changes within their departments they are able to do so. Should they wish to add a computer component to their subjects there would be no problem as they do have input into the subject area as shown above. The subject departments are able to take decisions concerning the methodology, evaluation and contents in their departments. Computer-assisted education has been integrated into specific subject departments because the subject departments concerned took the decision.

2.2.2 Computer department decision-making policy

2.2.2.1 Computer department decision-making policy and the computer committee

The Computer Committee meets once a term. It is comprised of three members of the Board of Governors, the principal, the senior deputy principal and three members of the computer department. Requests for the computer department budget are discussed with this committee before presentation to the full Board of

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Governors. The committee acts in an advisory capacity, mainly in the field of capital expenditure (Ingpen, 1996; Paul, 1996).

2.2.2.2 Computer department decision-making policy and computer department teaching staff

Table 4. 16 Decision-making by computer department teaching staff with regard to the computer department

HAVE YOU HAD ANY INPUT INTO ...	YES %	NO %
1. decisions with regard to who teaches the subject Computer Literacy?	100	0
2. decisions with regard to the purchase of computer hardware?	100	0
3. decisions with regard to purchasing of computer software?	100	0
4. discipline code of the computer room?	100	0
5. physical design of the computer room?	28	72
6. hours of the computer room?	72	28
7. long-term plans for the computer room?	100	0

The questions above were asked of the teaching staff of the computer department and shared decision-making is indicated in most aspects.

2.2.2.3 Computer department decision-making policy and general teaching staff

When asked about input into decision-making with regard to computers the results listed in the table below indicate that the staff of the school as a whole have little part in the vision of computer-assisted education at Pinelands High School.

Table 4. 17 Decision-making by all surveyed staff with regard to the computer department

HAVE YOU HAD ANY INPUT INTO ...	YES	NO
	%	%
1. decisions with regard to who teaches the subject Computer Literacy?	18	82
2. decisions with regard to the purchase of computer hardware?	23	77
3. decisions with regard to purchasing of computer software?	40	60
4. discipline code of the computer room?	30	70
5. physical design of the computer room?	10	90
6. hours of the computer room?	13	87
7. long-term plans for the computer room?	23	77

The data above concerning the staff input into the computer department at Pinelands High School indicates that there is not much input and the vision has not been shared with the staff of the school.

2.2.2.4 Computer department decision-making policy and software

Each subject department within the school is free to make suggestions with regard to software and make provision for it within their budget (Paul, 1996). From point 3 of the table above, there are indications that, in general, the staff are not aware that they are able to select and purchase software. However, the Mathematics department recently bought the package, *Geometer's Sketchpad*, on the recommendation of its members.

2.3 Computer department teaching facilities

The computer facility was established in 1984 with two BBC computers. It has developed into a fully-fledged computer department with nine staff involved with teaching Computer Literacy and 21 networked computers. Since its inception at the school in 1984, the subject, Computer Literacy, has changed. Initially the subject taught was programming, but now they are taught computer communication and concepts (Paul, 1996).

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2.3.1 Computer department hardware for teaching purposes

The computer room has 19 x 386 computers with four MB of RAM, two x 486 computers with eight MB of RAM and one Hewlett Packard 4L laser printer. For demonstration purposes there is a large 51 cm television screen and Creative Lab CTV-coder. The system runs on *Novell Netware 4.1* with a 50-user licence. Each student is allocated two MB of space on their account.

The computer department at Pinelands High School is highly regarded in comparison with schools in the neighbourhood. All the computers used in the school for computer-assisted education are found in this computer room. The classes which use the computers the most are standards six and seven and they have an average of 36.3 and 35.3 students respectively. This means that there are more students than the 21 computers available in the computer room.

Figure 4. 6 View of the computer room



Figure 4.7 Plan of the computer room

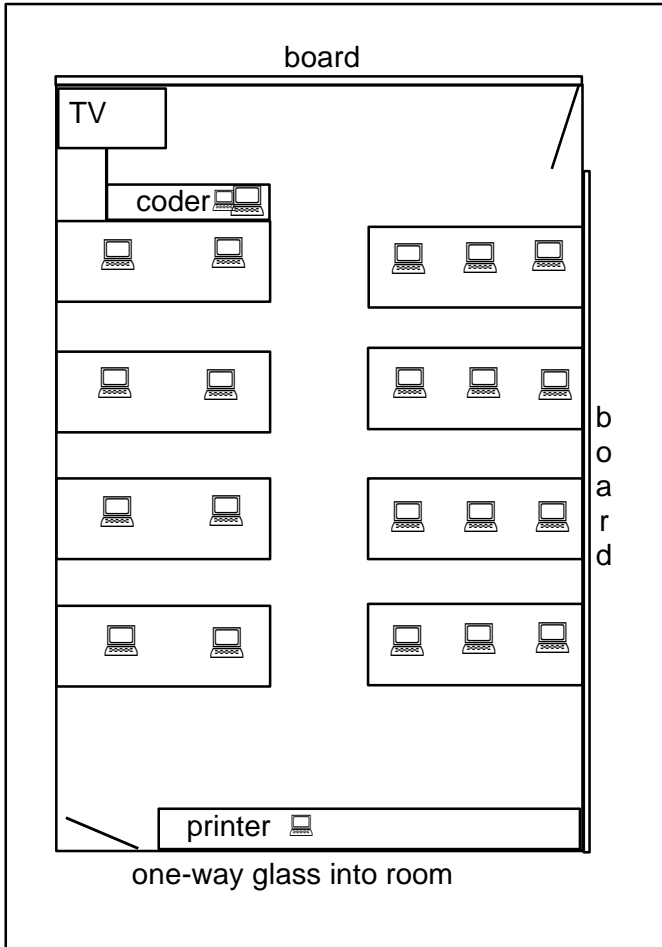
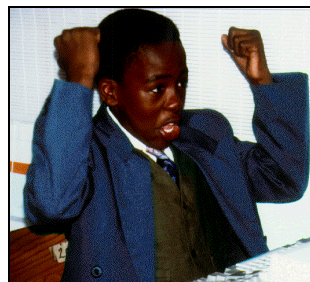


Figure 4.8 Students in the computer room



2.3.2 Computer department software for teaching purposes

The school has a number of applications for teaching purposes available on the network listed in the table below. The programs listed below are the ones currently being used, although the school has bought numerous applications since 1984.

Table 4. 18 Content-free applications available for teaching purposes

APPLICATION	PRODUCER	LICENCES	SUBJECT	TYPE OF PACKAGE
Pegasus Mail	David Harris	Freeware	multipurpose	communication
Geometer's Sketchpad	Key Curriculum Press	site licence	Mathematics	mathematical drawing
Logo	Harvard Associates	site licence	Mathematics	programming language
MSWord for Windows	Microsoft	21 licences	multipurpose	word processor

Table 4. 19 Applications available for teaching purposes

APPLICATION	PRODUCER	LICENCES	SUBJECT	TYPE OF PACKAGE
PCGlobe	PCGlobe, Inc.	21 licences	Geography	databank
Knowledge Adventure	Knowledge Adventure, Inc.	1 licence	multipurpose	databank
Orbits	Software Marketing Corporation	21 licences	Sciences	databank
Guido	University of Delaware Academic Computer Instructional Technology	3 licences	Music	drill and practice
Simcity	Maxis	1 licence	Geography	game
Zip Zap Map World	National Geographic	site licence	Geography	game
Windows 3.1	Microsoft	21 licences	multipurpose	operating system

Where there are not enough licences for the whole class, usage is limited. The content-free software includes a word processing, communications and graphics package but there are no spreadsheet, database or presentation applications. The databank programs, *Orbits*, *PCGlobe* and *Knowledge Adventure* are content-rich

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programs available for use as information resources. The single drill and practice package of *Guido* is used by Music students only.

In 1991 a project was initiated by the Cape Education Department where teacher training in packages such as *Lotus 123* and *MSWorks* was begun (Kratzenstein, 1994, p.26). Pinelands High School started teaching the application *MSWorks* during Computer Literacy classes at that time. The replacement of *MSWorks* with *MSWord for Windows* is a possible reason for the current use of the content-free application and so few curriculum-specific applications. According to the heads of Science and Mathematics respectively, the school does not have or use any drill and practice applications in their departments as they have not found any suitable for their needs (Jacoby, 1996; Rundle, 1996a).

2.4 Finance

2.4.1 Computer department finance for teaching purposes

Should members of a subject department find an application they would like, they are required to make provision for it in their departmental budget and it is then purchased and added to those available on the network. *Logo* and *Geometer's Sketchpad* were purchased by the Mathematics department in 1996. The English department is currently discussing buying *Plato 2000* for its academic development department. According to the head of computers, there is little to prevent any department from obtaining the software it requires (Paul, 1996).

At the school the standard six and seven students are currently required to pay R10 a year to cover the cost of paper and ink used in printing. Therefore there are no real limits to their printer usage. The costs of computers at the school are borne by general school fees, and donations from the Continuing Education Programme.

The computer department is responsible for budgeting for maintenance and upgrading of the computer system. The costs of the computer department change from year to year, depending on whether the room is being expanded or systems upgraded (Paul, 1996). The department has to motivate their requirements when

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presenting their budget. There has not been any major cut in funding and this factor as well as careful planning has enabled Pinelands High to continue to purchase new applications and do upgrades.

2.4.2 Staff computer purchase and ownership

Currently 29 of the 40 teaching staff members surveyed have a computer at home. Fourteen teaching staff members have made use of the school's scheme of providing low cost loans at 8.8% for the purchase of computers and printers. Of these 14 teachers, 11 (78%) use computers in their teaching. The technical staff member of the computer department provided advice to 17 staff members when they purchased or up-graded their computers of whom 13 (76%) use the computer in teaching. These figures do not include those who use the computer in lesson preparation.

The salaries of the 40 staff members who took part in the survey are tabulated in the table below (Department of Education, 1996, p.30). The majority of the teachers are at Post Level 1. At the highest of the salary range of Post Level 1 they would have a gross monthly remuneration of R5921.25. This gross monthly salary is less than the cost of a multi media personal computer in 1996, let alone software or a printer.

Table 4. 20 Salaries of surveyed teaching staff

POST LEVEL	GROSS ANNUAL SALARY RANGE IN RAND	NUMBER OF STAFF
Administrative staff	Not available	2
Level 1	23526 - 71055	25
Level 2	32988 - 92661	10
Level 3	40836 - 98463	1
Level 4	53487 - 106941	1

2.4.3 Staff software ownership for lesson preparation

Most of the staff who use computer-assisted education have the software applications they use in teaching on their computers at home as tabulated in the table below. The school does not provide assistance to purchase the software.

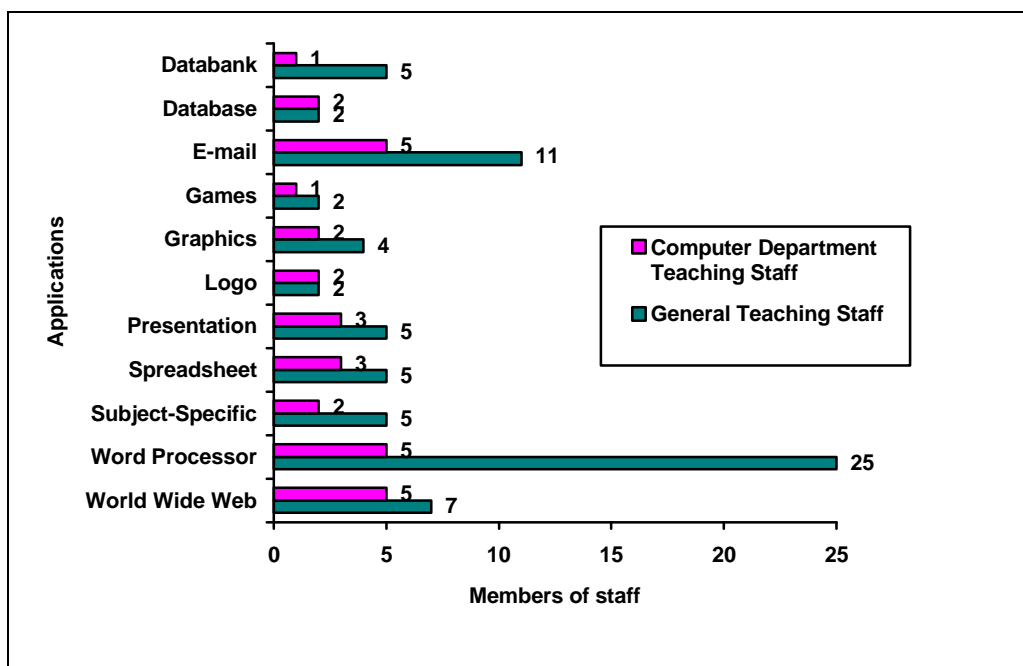
Table 4. 21 Staff usage of and ownership of software

APPLICATION	STAFF WHO TEACH WITH APPLICATION	STAFF WHO HAVE APPLICATION AT HOME	STAFF WHO HAVE APPLICATION AT HOME AND USE IT IN TEACHING
Geometer's Sketchpad	3	3	100%
Logo	5	2	40%
MSWord	10	6	60%
Orbits	9	6	66%
PCGlobe	5	4	80%
Pegasus Mail	7	5	71%
Zip Zap Map World	2	1	50%

2.5 Staff training in the use of computers

2.5.1 In-house computer training

Figure 4. 9 Staff in-house computer training during the day



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The figure above indicates the large number of staff who have attended in-house training courses during the day particularly in word processing and e-mail. A large number of the computer department teaching staff (total seven) in comparison to the general teaching staff (total 40), have had in-service training. From the data it appears that in-service training classes were small, aimed at those in the computer department, or for those who expressed a desire to know a particular application, apart from word processing and e-mail.

The school offers evening courses, under the auspices of the Continuing Education Programme, where 16 teaching staff members have been able to take free courses in *MSWord* and *Windows 3.1*. Twelve (75%) of the teachers who have attended evening classes use the computer in teaching. Two of the course leaders of the Continuing Education computer classes, are members of the computer department teaching staff.

Pinelands High School has offered classes during the day where 25 (63%) of the staff have received training in word processing, and evening classes where 16 (40%) of the staff have received training in word processing. A total of 25 teaching staff members (62%) have received word processing classes offered by the school during the day or evening.

2.5.2 Extra-mural computer training

Pinelands High School has financially assisted eight staff members, six of whom are members of the computer department teaching staff, attend extra-mural computer courses at teachers' centres, universities, technikons, and conferences. Four members of staff, three of whom are computer department teaching staff, have paid for their own computer training at teachers' centres, universities and a computer school.

2.6 Computer department public relations

2.6.1 Public relations in school

The computer department convenes an annual staff meeting to make its activities known to all the teachers. In the 1995 meeting the head of computers and the data capturer described their visit to Melbourne and the International Education and Research Network (I*EARN) conference and a demonstration of Internet World Wide Web browsing was given.

At parents' meetings the computer room is usually mentioned and is open to view with computer department staff on hand to show them the facilities. When new parents are shown the school, one of the first places they are shown is the computer room where they are able to view material on display. In the normal course of events parents are not able to see how the students work affectively or cognitively in a normal classroom teaching situation.

The teaching staff are not compelled to use the computer facilities at any time, except for entering their examination marks. Their marks are then collated and their reports printed. This measure was introduced in 1994 to force staff members to use the computers a little. Initially staff were fearful but the system is now accepted, especially as the computer administrative staff are always there to assist (Paul, 1996).

Sharing of the vision of computer-assisted education seems to emanate from the teachers of Computer Literacy in the subject departments, other than Computer Literacy, in which they work. The internal public relations of the computer department is handled by a small team of Computer Literacy teachers.

2.6.2 Public relations in community

Information about the Western Cape Schools' Network is often published in the metropolitan newspapers, *Cape Times* and *Argus*, and Pinelands High School is often the school mentioned. The computer activities at the school were highlighted

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at the I*EARN conferences in Melbourne in 1995 and Budapest in 1996. As a result of e-mail activities, overseas visitors often visit the school and the computer centre. The local community newspaper often carries reports about computer use at Pinelands High School. The computer department also desktop publishes programmes for concerts involving the school. The school's music department does a great deal of performing; the latest performance being one in the Cape Town City Hall in aid of the Red Cross War Memorial Children's Hospital, a major fund-raising event. The programmes indicate their designers and this helps to make the school's computer facilities known. The school's web page with photographs of some students, is on the Internet.

The school has an adult Continuing Education Programme which offers a variety of courses every quarter. Courses in computers have been offered every term for at least the last 10 years. These courses are open to the public at very reasonable prices and are advertised in Cape Town newspapers. Currently the courses offered are *Windows 3.1* and *MSWord for Windows*.

3 Use of the computer, applications and computer facilities

3.1 Use of the computer in teaching

There are 40 teachers from 25 subject departments at Pinelands High School. The following are the subjects offered in 1996: Accounting, Afrikaans, Art, Biology, Business Economics, Ceramics, Computer Literacy, English, Environmental Science 1, Environmental Science 2, Geography, German, Graphics, History, Home Economics, Latin, Library, Life Skills Junior, Life Skills Senior, Mathematics, Music, Physical Education, Science, Typing, Woodwork and Xhosa. Some teachers work in more than one department.

Table 4. 22 Staff members and number of subjects which they teach

NUMBER OF STAFF MEMBERS	NUMBER OF SUBJECTS EACH TEACH
22	1
13	2
3	3
0	4
2	5

A number of teachers teach more than one subject as illustrated above. Afternoon Sports and Life Skills are not included.

Table 4. 23 Staff members and number of subjects which they teach, and their computer use in the classroom

STAFF MEMBERS	SUBJECTS EACH TEACH	USE COMPUTER IN TEACHING	
		NUMBER	%
22	1	7	31
13	2	11	84
3	3	3	100
0	4	0	0
2	5	2	100

From the table above it can be seen that teachers who teach more than one subject use the computer more in teaching, than those who teach just one subject.

3.1.1 Computer use and group work

A large number, 38 of 40 (95%) members of staff, use group work and 28 of 40 (70%) members of staff, use cooperative group work. An educational consultant specialising in cooperative learning ran two afternoon training sessions for all teaching staff during 1995 and 1996. A number of staff members have also attended weekend training sessions with him.

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Fifteen staff members representing seven teaching departments, i.e. Computer Literacy, English, Environmental Science 1 and 2, Geography, Graphics, History and Mathematics use group work which involves the computer.

3.1.2 Computer use by subject departments

The departments which have used the computer for teaching in 1996 are Computer Literacy, English, Environmental Science 1 and 2, Geography, Graphics, History, Mathematics, Music, Typing and Xhosa.

Table 4. 24 Subject departments use of computer-assisted education

SUBJECT	SUBJECT TEACHERS	
	NUMBER	%
Computer Literacy	7	100
English	3	50
Environmental Science 1 and 2	7	100
Geography	4	100
Graphics	4	75
History	1	25
Mathematics	2	33
Music	1	50
Typing	1	100
Xhosa	1	100

The departments which have bought applications since 1984 are Environmental Science 1 and 2, Geography, Latin, Mathematics, Music and Typing. The teachers from the Mathematics, Music and Latin departments indicated that they assisted in the selection of the applications. The Mathematics and Music department staff received training on the packages they bought. The departments which purchased software are using the software in teaching.

3.1.3 Computer use and lesson focus

Different subjects use different methods and have different numbers of students which influences their method of teaching and lesson focus when using the computer in education. The questionnaire answered by the staff who have used the computer in teaching at Pinelands High School in 1996, indicates that 28 of the 29 subject-classes-and-teachers regard themselves as the facilitators in the lessons. One teacher indicated that he was a facilitator or a focus of the lesson depending on the type of lesson.

Many of the classes using the computer room are large, with too many students for one-computer-one-student. In 16 of the 29 subject-classes-and-teachers the students work in pairs, but only in 12 of the 29 classes would the teachers prefer the students to work in pairs.

Teaching at Pinelands High School has followed the traditional mode. In this mode, when using the computer for teaching purposes, the teachers require one computer per student. Of the teachers at Pinelands High School, 14 of the 29 subject-classes-and-teachers want one computer per student. Three of the subject-classes-and-teachers do not mind the students working in pairs or alone.

It would appear that the subject-classes-and-teachers who use computers in teaching

- act as facilitators of the lessons;
- are forced to have students working in pairs in 16 of 29 (55%) of the classes because of a lack of work stations; and
- would prefer the students work on their own in 14 of 29 (48%) classes.

3.1.4 Computer use and the curriculum

Computer Literacy is not an examination subject at Pinelands High School. Four of the seven Computer Literacy teachers link the content material of their lessons to an examination subject, i.e. Environmental Science, Graphics, History and Mathematics. Of the teachers who teach Computer Literacy, two of the seven are administrative staff who teach the subject in addition to their other duties. One of these persons manages to relate the lesson content to an examination subject; and

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the other teacher relates the lesson content to general matters such as graffiti or the city of Cape Town and the Olympic Games. Two other teachers of Computer Literacy do not relate the content of their work to an examination subject. The other teachers who use the computer facilities are subject teachers who use computer-assisted education in their subjects.

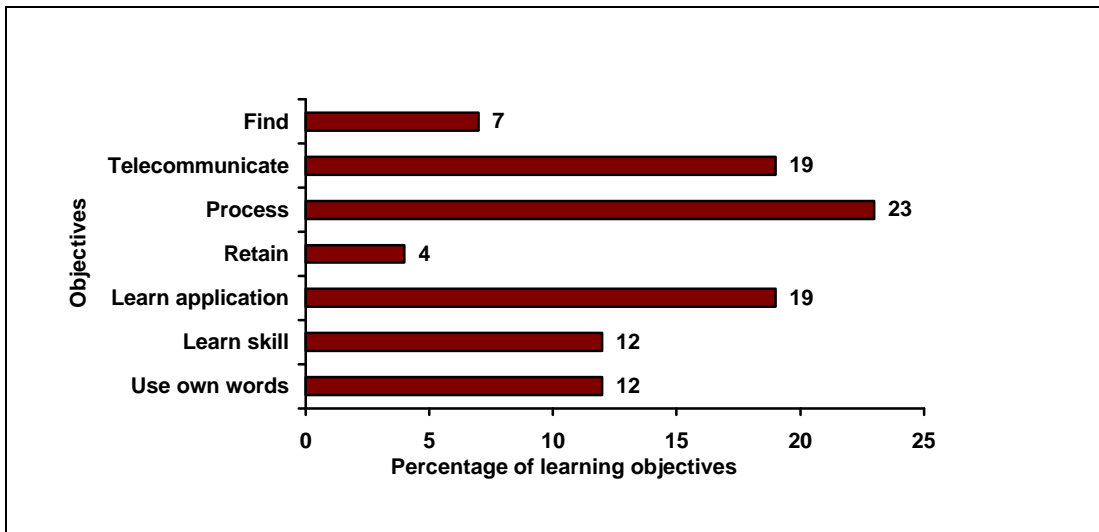
3.1.5 Computer use and lesson objectives

The computer is used for a variety of purposes at Pinelands High School. Based on the objectives of the teachers who have used computer-assisted education in 1996, the computer and its software applications are used to

- find information and possibly draw conclusions using packages such as *PCGlobe* and *Orbits* - 7%;
- telecommunicate using a package such as *Pegasus Mail* - 20%;
- process information by typing/drawing using a package such as *MSWord* or *Paintbrush* - 24%;
- retain information using a package such as *Guido* - 4%;
- learn a specific application using any of the packages on the network - 19%;
- learn a specific skill using any of the packages on the network - 12%; and
- learn concepts which can be applied to whatever package a student uses later using any of the packages on the network; explore relationships in geometrical diagrams; experience and discover in a package such as *Geometer's Sketchpad*; and discover and learn new skills in a package such as *Logo* - 12%.

The objectives of computer-assisted lessons at Pinelands High School during 1996 are illustrated in the figure below.

Figure 4. 10 Objectives of computer-assisted education lessons

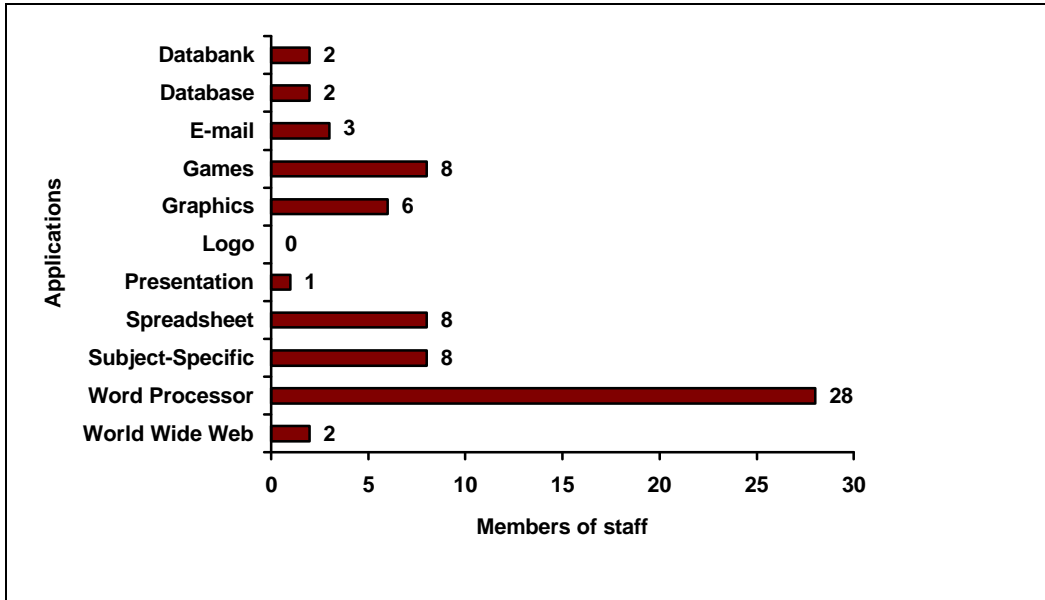


The main objective in the computer-assisted education lessons is the processing of information i.e. the processing of text and pictures using a word processor or graphics package. The second purpose of the computer-assisted education lessons at Pinelands High School is for telecommunications. The range of objectives of the lessons is varied which may indicate various uses to which computer-assisted education is put.

3.2 Use of computer applications

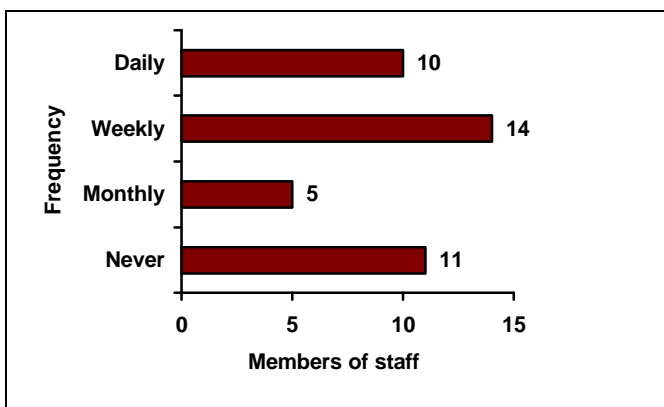
3.2.1 Use of applications at home by teaching staff

Figure 4. 11 Use of computer applications at home by staff



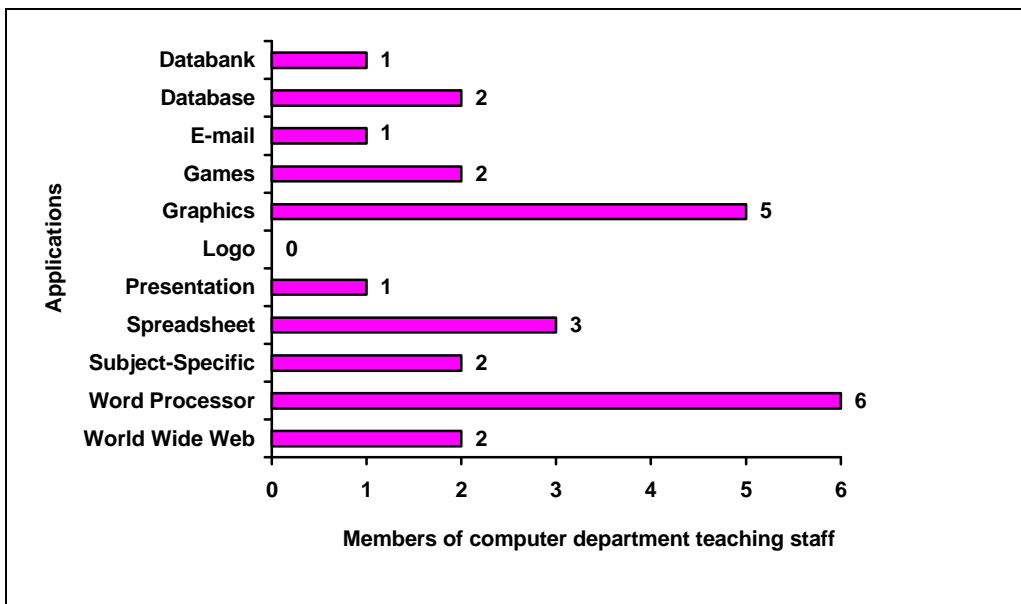
The figure above indicates the use of computer applications at home for lesson preparation or private use by staff members at least *once a month*. From this it can be seen that 28 (70%) of the staff members who completed the questionnaire use a word processor at home at least once a month.

Figure 4. 12 Use of the word processor at home by staff



The figure above indicates the frequency of word processing at home. Fourteen (40%) members of staff use the application on a weekly basis.

Figure 4. 13 Use of computer applications at home by computer department teaching staff

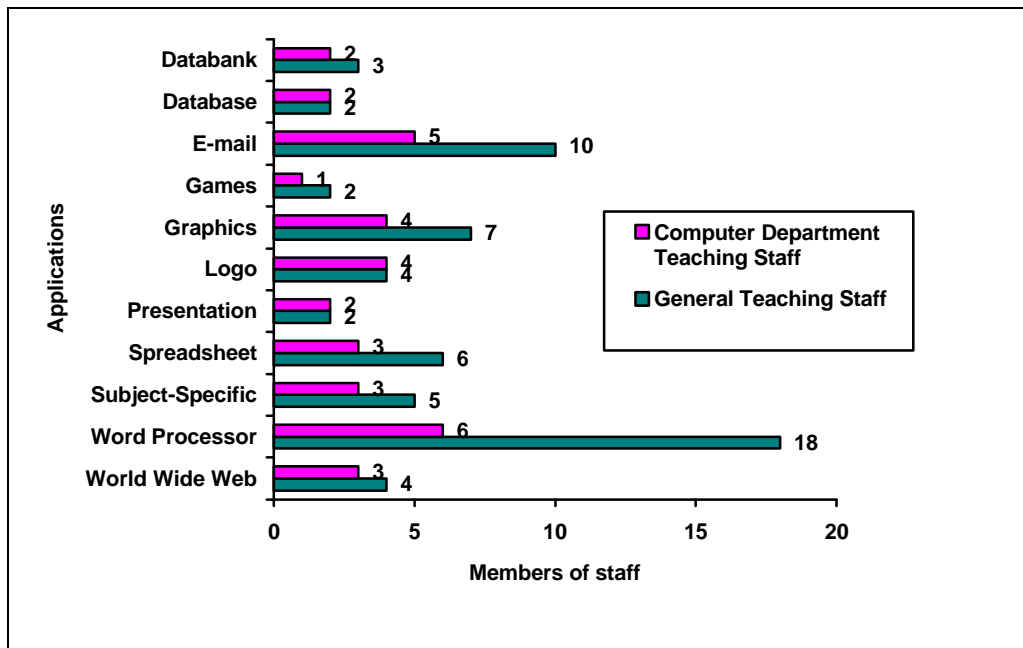


From the above figure it can be seen that a large number of staff from the computer department teaching staff use the computer at home for lesson preparation or private matters, at least once a month. One member of the computer department does not have a computer at home. The illustration indicates that six of the seven department's teaching staff uses the word processor regularly at home. It must be noted that the computer teaching department includes two staff members who are administrative staff who teach Computer Literacy in addition to their administrative duties and thus do not really have to do much lesson preparation at home.

From Figures 4.11, 4.12 and 4.13 it can be deduced that the staff of Pinelands High School use the word processing application more than any other application at home in lesson preparation. The staff of the computer department use the word processor more than other groupings of the staff. The data in Figures 4.11, 4.12 and 4.13 indicate that the computer department team uses the word processor the most in lesson preparation, almost to the exclusion of other applications.

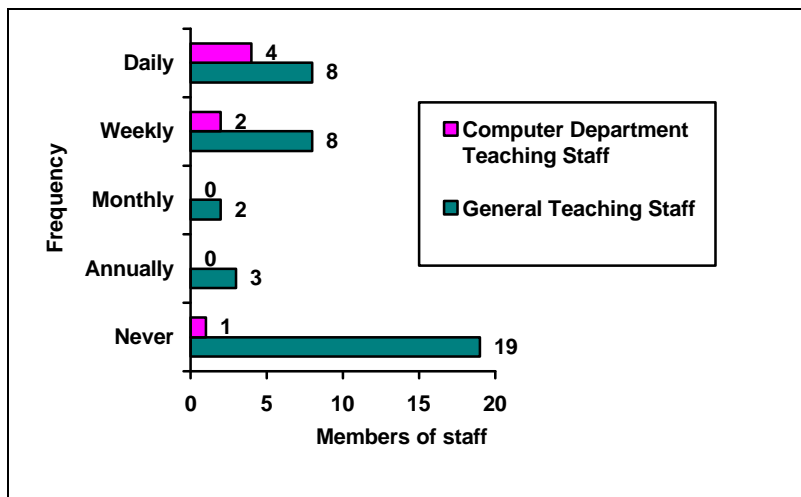
3.2.2 Use of applications at school for lesson preparation

Figure 4. 14 Use of computer applications at school for lesson preparation



The figure above indicates computer use at school for lesson preparation by teaching staff, total 40, at least *once a month*. Note that the word processor is the most commonly used application and that e-mail is also used by a fair number of staff members. The overall use of the computer must be seen against the use made of it by teaching staff from the computer department. It must be noted that the computer teaching department, total seven, includes two staff members who are administrative staff who teach Computer Literacy in addition to their administrative duties.

Figure 4. 15 Use of the word processor at school for lesson preparation



From the figure above it can be noted that most staff do not use the word processor at school for lesson preparation possibly as their lesson preparation is done at home. The staff who do use the computer at school for lesson preparation and use the word processor, are mainly from the computer department.

The word processor is the application used at home the most and is used in the main by the computer department staff. The data in Figures 4.14 and 4.15 indicate that the computer department team uses the word processor in lesson preparation, almost to the exclusion of other applications.

3.2.3 Use of applications at school for teaching purposes

Table 4. 25 Computer use in teaching based on marital status and gender

MARITAL STATUS	FEMALE		MALE		TOTAL	
	NUMBER	%	NUMBER	%	NUMBER	%
Divorced	2	66	0	NA	2	66
Married	5	55	5	55	10	55
Single	6	54	5	62	11	57
Total	13	56	10	43	23	57

From the data above it appears that a greater percentage of female than male members of staff use the computer in teaching in the classroom. The evidence of three divorced staff members is too small to be used to form a judgment regarding their marital status influencing computer use in the classroom for teaching purposes. There is a small difference in computer use in teaching by married and single teachers.

Table 4. 26 Computer use in teaching based on total years of teaching experience

YEARS EXPERIENCE IN TOTAL	FEMALE	MALE	TOTAL
10 or more	10	4	14
less than 10	3	6	9
Total	13	10	23

It was suspected that there may be a correlation between gender, years of teaching experience and use of the computer in teaching. The calculations below were carried out to discover if any pattern could be found.

Table 4. 27 Statistics on computer use in teaching based on total years of teaching experience

TEST	VALUE	p-VALUE
Chi-square ($df=1$)	3.24	0.0721
Fisher exact p one-tailed		0.0857

The Chi-squared statistic, calculated from a two way table, follows approximately the Chi-squared distribution. The approximation improves as the numbers in the table increase. The numbers given in this table are small and thus the Chi-squared approximation becomes questionable, thus Fisher's exact test has been performed to serve as a check on the Chi-squared p-value. The p-values of both tests are similar suggesting that the Chi-squared approximation is reasonable.

Generally a p-value greater than 0.05 is considered as weak evidence against the null hypothesis that, as far as computer usage is concerned, gender and experience are independent. There is therefore no difference in computer usage between male or female members of staff; less or more than 10 years (Fresen, 1996).

Table 4. 28 Computer use in teaching based on years of teaching experience at Pinelands High School

YEARS EXPERIENCE IN TOTAL	FEMALE	MALE	TOTAL
10 or more	4	1	5
less than 10	9	9	18
Total	13	10	23

It was suspected that there may be a correlation between gender, years of teaching experience at Pinelands High School and use of the computer in teaching. The calculations below were carried out to discover if any pattern could be found.

Table 4. 29 Statistics on computer use in teaching based on total years of teaching experience at Pinelands High School

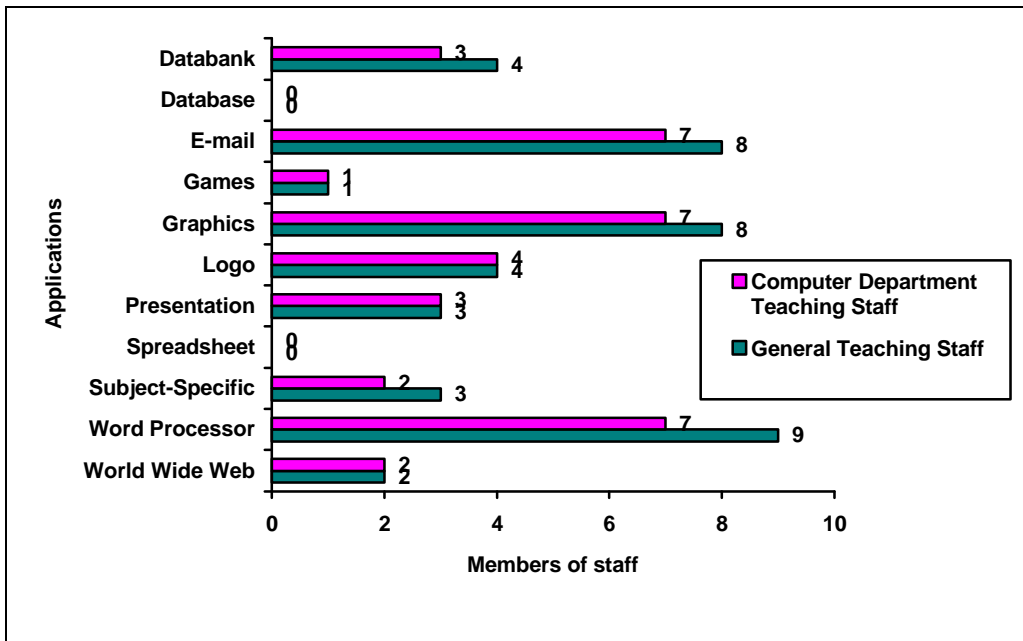
TEST	VALUE	p-VALUE
Chi-Squared ($df=1$)	1.43	0.2313
Fisher exact p one-tailed		0.2507

The Chi-squared statistic, calculated from a two way table, follows approximately the Chi-squared distribution. The approximation improves as the numbers in the table increase. The numbers given in this table are small and thus the Chi-squared approximation becomes questionable, thus Fisher’s exact test has been performed to serve as a check on the Chi-squared p-value. The p-values of both tests are similar suggesting that the Chi-squared approximation is reasonable.

Generally a p-value greater than 0.05 is considered as weak evidence against the null hypothesis that, as far as computer usage is concerned, gender and experience are independent. Therefore there is no difference in computer usage between male or female members of staff; less or more than 10 years (Fresen, 1996).

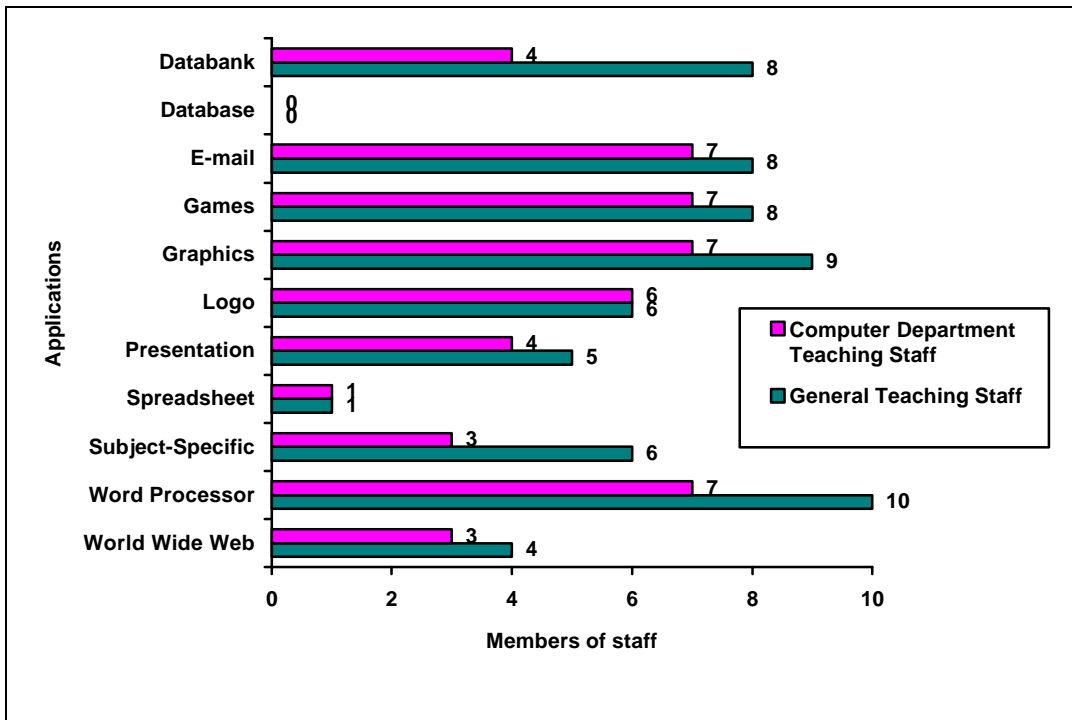
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Figure 4. 16 Use of computer applications at school for teaching purposes at least once a month



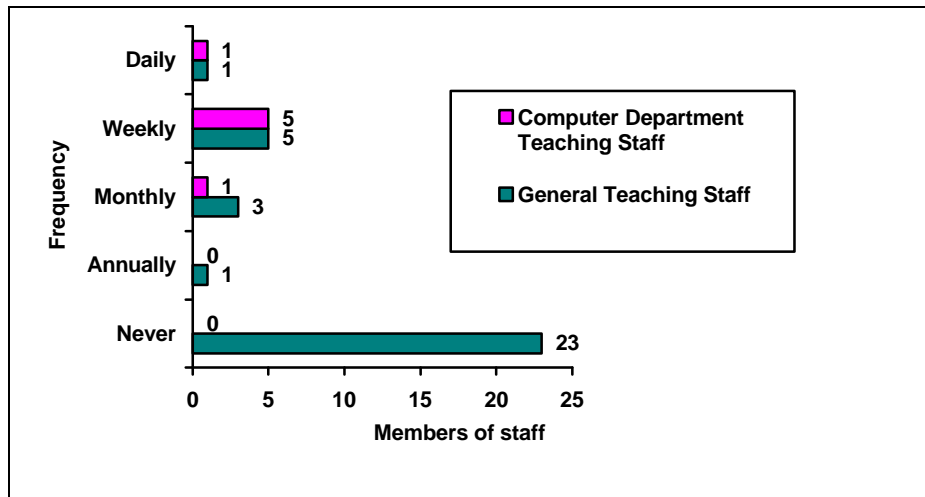
The above figure indicates the use of computer applications for teaching by all teaching staff. The figures above indicate computer use at least *once a month*. Note that the word processor, e-mail and graphics packages are used the most. Also note the correlation between the number of computer department teaching staff, total seven, and general staff, total 40, using the computer for teaching.

Figure 4. 17 Use of computer applications at school for teaching purposes at least once a year



The above figure indicates the use of computer applications for teaching by all teaching staff. The major difference between the Figures 4.16 and 4.17 is that the former illustrates computer use in teaching at least monthly and 4.17 at least annually. It appears that a number of staff, although they use the applications, only use them annually. Note that the word processor, graphics, games, e-mail and databank applications are used the most. Also note the correlation between the number of computer department teaching staff, total seven, and general staff, total 40, using the computer for teaching.

Figure 4. 18 Use of the word processor at school for teaching purposes



From the above figure it can be seen that the word processor is seldom used for teaching purposes by the 40 staff members. When the word processor is used for teaching purposes, the computer department teaching staff are the main users. The word processing package is used relatively seldom although it is one of the most commonly used applications as seen from Figure 4.16 and 4.17. From the data in Figure 4.16 and 4.17 it is apparent that use of word processors, e-mail and graphics applications are the most common. The timetable of the computer room may give an indication as to the reason for lack of use of computer applications.

3.3 Access to computer facilities

3.3.1 Access to computer room

The computer room is timetabled for classes for 68% of the time. The subjects which have timetabled periods are illustrated in the table below. In a two-week cycle the room is only available for 18 out of the possible 58 periods for non-timetabled classes. The limited access for other subjects could be a limitation to the use of computer-assisted education at the school. All the teachers who use the room for the timetabled periods are teachers who are also part of the computer department. The timetable has been rescheduled to allow for the Graphics, Mathematics and Typing departments to use the room in addition to that of Computer Literacy.

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Table 4. 30 1996 computer room timetable

	Mon A	Tue A	Wed A	Thu A	Fri A	Mon B	Tue B	Wed B	Thu B	Fri B
1	9 Typing			6M CL	6L CL	9 Typing			6LDK Maths	
2	6D CL				7J CL			9 Graphics		7M CL
3	9 Maths	LSJ1		7EMW Maths	LSJ2	9 Graphics	LSJ1		6D CL	LSJ2
4		LSS1	7E CL	8 Graphics	LSS2	6GNM Maths	LSS1	6G CL	7R CL	LSS2
5	6M CL	7T CL	6N CL		6G CL	7RTJ Maths	7W CL	7L CL		6K CL
6		6K CL		6N CL	10 Maths	7EMW Maths			10 Maths	8 Maths

The computer room is used for the periods below as indicated in the table above:

Computer Literacy (CL)

- the six standard 6 classes receive classes twice per cycle
- the six standard 7 classes receive classes once per cycle

Graphics

- the standard 8 Graphics teacher has a period booked on Thursday A
- the standard 9 Graphics teacher has periods booked on Monday B and Wednesday B

Life Skills Junior 1 and 2 (LSJ1 and LSJ2), and Life Skills Senior 1 and 2 (LSS1 and LSS2)

- two mixed groups of standards 6 and 7 students have Life Skills on Tuesday A and B, and Friday A and B
- two mixed groups of standards 8, 9 and 10 students have Life Skills on Tuesday A and B, and Friday A and B

Mathematics (Maths)

- the standard 6 Mathematics teachers who between them have six classes, have two periods booked, Monday B and Thursday B
- the standard 7 Mathematics teachers who between them have six classes, have three periods booked, Thursday A, and Monday B twice
- the standard 8 Mathematics teachers have a period booked on Friday B
- the standard 9 Mathematics teachers have a period booked on Monday A
- the standard 10 Mathematics teachers have a period on Friday A and Thursday B

Typing

- the standard 9 Typing teacher has periods booked on Monday A and Monday B

Table 4. 31 Use of computer room for timetabled subjects and applications

SUBJECT	NUMBER OF PERIODS	%	SOFTWARE APPLICATION
Computer Literacy	18	31	Logo, MSWord, Orbits, Paintbrush, PCGlobe, Pegasus Mail, Windows, Zip Zap Map World
Graphics	3	5	Paintbrush
Life Skills	8	13	Logo, MSWord, Windows,
Mathematics	9	15	Geometer's Sketchpad
Typing	2	3	MSWord

The computer room is used mainly for Computer Literacy, Mathematics and Life Skills classes as indicated in the table above. Access is limited for non-timetabled classes. The software used in the timetabled classes is listed in the table above. The applications are mainly *MSWord* used in three subjects and *Paintbrush* used in two subjects.

Table 4. 32 Use of software in non-timetabled periods

SUBJECT	SOFTWARE APPLICATION
English	MSWord, Pegasus Mail
Environmental Science 1 and 2	MSWord, Orbits, PCGlobe
Geography	PCGlobe, Orbits, Zip Zap Map World
History	MSWord, Paintbrush, PCGlobe
Music	Guido

Subject teachers, apart from the Computer Literacy, Graphics, Mathematics and Typing teachers, endeavour to use the computer room by fitting their classes into the unused periods. The table above lists the subjects which use the computer room and the software used during non-timetabled periods.

3.2.4 Access to computer applications

The physical access to computer applications for lesson preparation or teaching purposes as illustrated below in Figure 4.19 indicates that the staff in general have

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not considered access to many applications. At the time of the survey, of the applications listed below, the staff at school only had access to

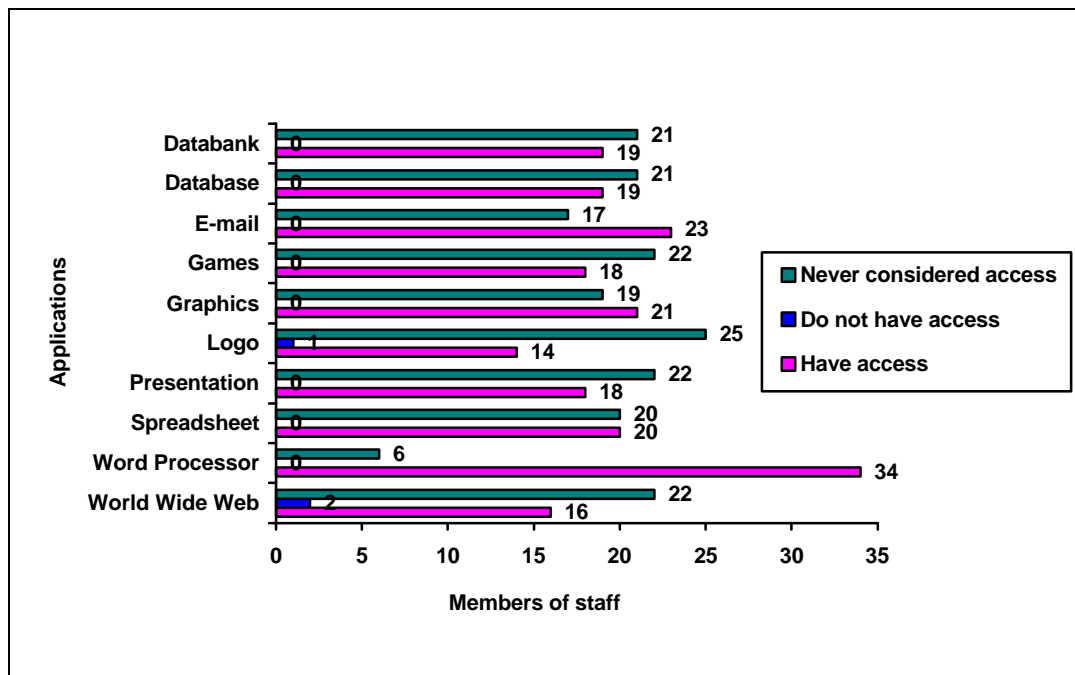
- the World Wide Web on one computer which is not available for teaching use;
- a presentation package, *Powerpoint*, on three computers; and
- a spreadsheet on three computers which had enough RAM.

There was no database for teaching purposes, only administrative purposes, although 19 of the 40 staff *believed* that they had access to a database application.

The staff believed that they had access to the applications. Note, in the following figure, the number of teachers who have neither considered inquiring about access to the following applications nor using them.

In general the staff show a lack of interest in the applications which can only be put down to knowing that they could not get access to the computer room for teaching, or lack of knowledge about the use of the application for teaching purposes.

Figure 4. 19 Physical access to computer applications by staff



4 Summary

The survey of computer-assisted education at Pinelands High School was done in order to be able to compare the integration of computer-assisted education at

Pinelands High School with the **Evolutionary Model** developed in Chapter 2. The following aspects were investigated and discussed.

4.1 Pinelands and Pinelands High School

Pinelands is a middle class town where most of the high school students attend the local high school, Pinelands High School. The school has approximately 960 male and female students drawn from Pinelands itself and neighbouring suburbs. The students mainly speak English. Students come from homes where about 70% of them have computers. The 48 male and female teachers teach 25 subjects in 32 classes from standard six to standard 10.

4.2 Summary of support infrastructure

4.2.1 Sharing of skills

Computer-assisted education has been used by 23 of the 40 teachers surveyed. Teachers from the computer department spread their enthusiasm outwards to the other subject departments in which they work.

Mentoring of some staff members is taking place with novices to computers on a small scale. Apart from sharing the vision of computer-assisted education in their subject departments not much sharing of information, skills and enthusiasm of computer-assisted education takes place at Pinelands High School.

4.2.2 Decision-making policy

The school has a decision-making policy where staff have the opportunity for input in long and short term planning of the school via staff meetings and quality circles. Within subject departments the staff are able to discuss and plan their methods, evaluation and subject content. The vision and enthusiasm of the computer department does not appear to have been shared with the general staff with respect

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to software, hardware, plans for the department and day-to-day running of the department. The computer department staff themselves have reached general consensus with regard to their planning and future.

4.2.3 Computer department teaching facilities

The computer room is networked with 21 computers and one printer. All computers for teaching purposes are found in this room. The software comprises a word processing application, a telecommunication application, databanks, a mathematical drawing application, a programming language application, a drill and practice application and games applications, i.e. mainly content-free applications.

4.2.4 Finance

Each subject department is responsible for budgeting for their own computer software to add to those on the network. Finance for the computer department requires discussion in the Computer Committee before presentation to the Board of Governors.

The school has helped staff to purchase computers with low cost loans, and technical advice from the computer department has been utilised by the staff. Many teachers who have bought computers with school assistance use the computer in teaching. An interesting point raised is that the cost of a multimedia computer is more than the monthly salary of 25 of the 40 teachers surveyed, and possibly more.

4.2.5 Staff training in the use of computers

Two-thirds of the staff have attended evening or day-time in-house classes in word processing. Other applications on the school's network have not been taught to more than seven members of staff, apart from e-mail where 11 out of 40 have received training. This would indicate that not much staff training has been done. The staff who have received the most training are teachers who are members of the computer department. The training which has taken place is using an application, and not on how to use the application in teaching. The exception to this is the use

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of subject-specific applications where the Music and Mathematics staff have received training on applications they selected.

4.2.6 Computer department public relations

Computers are part of the administration of the school. Computers are usually spoken about at parents' meetings. Computer generated posters are found throughout the school. The computer department office is open for staff to use and advice is readily available from computer department staff. The broader community is offered the opportunity to learn more about computers at evening classes. In respect of computers Pinelands High School is well known and highly regarded.

4.3 Summary of computer use in teaching, applications and facilities

.3.1 Use of the computer in teaching

The staff use group work in their general teaching and have attended a course in group work. Group work is used by 15 of the 23 teachers who have used computer-assisted education. This groupwork has almost been forced on the teachers because of a lack of computer stations and the general traditional method of teaching.

Computer Literacy is not an examination subject at Pinelands High School. Standards six and seven are taught the subject Computer Literacy by a number of teachers some of whom are not official qualified teachers. The Computer Literacy teachers are not required to integrate computer work into the curriculum. The work being done in computer-assisted education is used mainly to support traditional classroom work i.e. mainly processing information using a word processor or graphics application, whether taught by a subject or a Computer Literacy teacher.

4.3.2 Use of computer applications

The computer is being used mainly for word processing, e-mail and graphics. At home the word processor is used by 70% of all staff for lesson preparation or private matters. At school the word processor is used the most by staff in lesson preparation. E-mail is also apparently used in lesson preparation as well. In teaching the common applications used are e-mail, graphics and word processors.

A total of 23 teachers have used the computer in teaching at Pinelands High School but the core teachers are those of the Computer Literacy subject department. In every graph indicating computer usage where the general staff are compared with that of the Computer Literacy subject department, the Computer Literacy subject department are the major users of the computer in teaching, at home and in lesson preparation.

4.3.3 Access to computer facilities

Computer Literacy has been timetabled for standards six and seven, and Graphics, Life Skills, Mathematics and Typing for different groups. The timetable has been adjusted to facilitate these classes and they fill most of the available periods in the computer room. During such lessons content-free applications are used the most.

Many staff members do not know what computer applications are really available at Pinelands High School. The staff believe they are able to get access to normal computer applications, whether they are on the network or not, or have never considered getting access.

5 Conclusion

Chapter 5 comprises an evaluation of the integration of computer-assisted education at Pinelands High School, the infrastructure to support computer-assisted education and its integration based on the **Evolutionary Model**. This evaluation will be done based on the information collated in this chapter.