APPENDIX SIX
Using Computer Technologies in Schools

In this appendix we outline some of the ways in which computers can be used by teachers in schools –to support their own work and integrated them into their teaching. The text is directed specifically at classroom teachers and not at educators more generally. As such, the language and exaples used are intended to have relevance to teachers and ideas pertaining to administrators and management staff at schools are directed at teacher titled Using Media in the Classroom[1]. This extract on computers is one of several chapters on using a range of media in the class room. It has been included in this report as it outlines some of the ways in which teachers and learners could benefit from having computers available at schools

COMPUTERS IN SCHOOLS: HYPE OR HELP?

Computers have rapidly become a familiar part of our lives. In many cases computers (and the Internet) are spoken of as a new miracle cure to our educational problems. If only it was that simple.

Throughout history, new technologies have been hailed as miracle cures. When television was first introduced, many people believed it would take education to the masses and solve problems of illiteracy and so on. It didn't. After an initial period of optimizm about its educational potential, educational potential, educationists started criticising television for being educationally restrictive as it did not allow for two-way communication. Today we have a more sophisticated understanding of what television can and can't do. We recognize that television won't solve all our educational problems, but is a useful resource on which teachers can draw.

The current optimizm about computers makes it easier to find funding for projects that involve computers than it is to find sources willing to contribute to teacher development or basic infrastructure like toilets, chairs or chalk. Computers and the Internet are 'sexy' and easy to generate enthusiasm about. As with television, though, we need to view such enthusiasm for computers critically: we can't ignore the impact that computer technologies are having on our society, but we shouldn't believe it will solve all our problem.

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[1] SAIDE has produced several modules for teacher education programmes under a Study of Education title. This particular extract has been adapted from a modules titled *Using Media in the Classroom* and is soon to be published by Oxford University press.

WHY USE COMPUTERS AT SCHOOLS?

How are computer technologies currently used in South African Schools? And why is it important for all teachers to consider their use?

FIRSTLY, COMPUTER LITERACY IS BASIC TO OUR SURVIVAL IN MODERN SOCIETY

Computer technologies are increasingly an essential component of any office or work environment. Even where we do not need to know how to use computers, it is useful to know how they work. For instance, cashiers at supermarkets ring up our purchases using computer technology; when we draw our money from ATMs we use computer technology, our microwave ovens measure their cooking time using computers: we live in a computer world. In order to live socially useful lives, we need to become computer literate. Even where learners don't actually learn to operate computers, they need to *understand* the role and functions. In many ways it could be argued that *computer literacy* becoming as important as the ability to read and write.

Secondly, employment opportunities are big for those who are computer literate.
As computers become so widespread, so more and more of us will be directly employed in computer-related work. In this case learning to operate computers is an important competency for all school leavers. In some cases the level of skills will need to be pretty advanced, but in other cases we may just need the skills to do basic word-processing. For instance, the writers of this module are not computer experts, but have learnt to write this module using a computer. So, there is a vocational imperative to learn about computers and learn how to use computers: it will offer better opportunities for employment.

THIRDLY, COMPUTER TECHNOLOGIES PROVIDE A POWERFUL RESOURCE FOR EDUCATION

We can learn from computers. Computers function as a source of information, and can be used to expose learners to topics and experiences beyond the classroom walls. Many people have argued that computers will replace teachers in classrooms because they can provide access to so much more *information* than any ordinary teacher can ever know. They can also be programmed to respond to every individual learner's answers, so their *teaching* is also superior – at least in some ways – to that which most ordinary teachers could provide. However, we will change the ways in which teachers need to be able to teach, they are unlikely to replace good teachers.

FOURTHLY, COMPUTER TECHNOLOGIES ARE FACILITATORS OF CHANGE IN OTHER AREAS

We said earlier that computer technologies are likely to change the ways in which teachers teach and schools function. Computer technologies are *catalysing* change (bringing it about in other spheres) in many parts of our society. For instance, banks have changed owing to computers. ATMs would not be possible without computer technology. Computers are symbols of change. More importantly, they are driving massive changes in schooling. For instance, the growth in home schooling is a direct result of the availability of educational resource online. Teachers' role as conveyors of information is also being challenged by computers, which do this far more effectively than we can ever do!

ARGUMENTS AGAINST USING COMPUTERS EDUCATIONALLY

There is still opposition to using computers educationally in a country like South Africa. The substance of the opposition relates to issues of access and equality. They say that there are more urgent things to be addressed in schools than getting computers. 'How can we think about computers in our schools when we do not have running water, toilets, textbooks or chalk?' people say.

According to the 1996 Survey of School Needs, only 8% of schools reported having two or more computers. Only 38% of schools have grid electricity and exchange line telephones – the minimum necessary infrastructure to run computers This makes the widespread use of computers difficult. It certainly puts into doubt the idea that computers can be some kind of miracle cure!

These are powerful arguments. The stark reality is that few teachers or learners have computers in their homes or their schools. Nevertheless, it is also the reality that some schools and homes do have them, and that new educational and communications policies prioritize the provision of computers and the Internet to historically marginalized communities.

These inequalities, though, do raise important questions we need to ask ourselves as we consider the use of computer technologies in schools:

- What does this unequal access to computers do to our society
- How does access to computer privilege some learners and disadvantage others?
- How does the introduction of computer technologies change power and knowledge dynamics?
- Is it possible that a new societal divide – not only between 'the haves and the have nots' but between 'the knows and the don't knows'- will emerge?

These are not easy questions to answer. Implications of computer – or technology-related changes in society are complex. People concerned with equity push to increase public access to computers (at libraries, multi-purpose community centres, and at schools). These concerns have led our government to create an enabling policy environment which encourage projects that increase public access to computers. Nevertheless, implementing policy is slow and difficult process – we can expect public access to computers to increase, but for inequalities in access to persist for the foreseeable future.

With this reality in mind, we also realize that it would be futile to throw up our hands in despair and wait until all schools have access to computers before focusing on them in a course such as this. We must look to the future and begin to prepare for an environment where we can assume that every South African learner has access to a computer.

WAYS OF USING COMPUTERS

In this section we will explore how computers can be used as:

- A tool that makes all sorts of work processes more efficient;
- A teacher (or tutor) which provides us with new ways of educating learners; and
- A learner (or tutee). In order to assist us with administration, or as an educational tool, computers need to be 'programmed', or 'taught' how to help us.

USING COMPUTERS AS ADMINISTRATIVE TOOLS

Human beings have manufactured tools throughout history to help them do their work. We have simple tools, like hammers, sewing needles, wheelbarrows and pens, through to more complex machines like cars, video recorders or newspaper printers.

Computers are simply the most recently developed tools. Like all other tools, they were developed by human beings in order to assist us with our work. They can do some things well, and other things not so well. They can, for instance, be used to assist in tasks like typing and bookkeeping that would otherwise be done manually. But in order to help us with various tasks, computers need to be instructed as to what they must do for us. Computers only work according to these instructions which, in computer language, are called *software programmes*.

As with other tools, it was not long after they had been invented that computers and various software packages were manufactured in large numbers by numerous companies. So, in the same way as a *transporting tool* like a motorcar comes in a number of different brands – Ford, Toyota, Mazda or BMW – so similar software programmes manufactured by different companies have different names. For example, if we want assistance with typing we would need to buy word-processing software. But we have a choice: while one company – Microsoft – manufactures a word processing package called MS Word, its competitor, WordPerfect, will try and sell us WordPerfect 7. Both are similar *tools* – they assist us with word-processing – but, as with motorcars, each company's brand adds a few features that would make their software slightly different from that of their competitors.

This table presents some of the different types of computer products that can be used to help with different tasks.

TASK/PURPOSE	**Tool**	BRANDS
Type notes, newsletters, correspondence, worksheets, tests, Examinations.	Word Processor software package	Ms Word, WordPerfect, Word Pad
Bookkeeping, record, budgets	Spread Sheet software package	Quattro Pro, Excel
Draw pictures and diagrams	Graphics Package	Paint, Ms Image Composer, Paintbrush, Corel Draw
Keep records and catalogues of	Data Base package	Access

contact details, library books, or sales		
Give a speech, lecture or slide show	Presentation packages	PowerPoint or Presentations

All these packages are designed to help with tasks. They do not give you information or content on what to write about, how to budget or what to put into your slideshow. As such they are sometimes referred to as *'content free'*. They can be used by both teachers and learners as tolls to assist with school tasks. They can be used to make mark schedules, reports, tests, worksheets, assignment, notes, general correspondence (for example letters to parents, or confirmation for sporting fixtures). These functions are not new additions to teacher's workload, as they are done manually or by an administrator in the absence of computers. The advantages of using a computer is that a teacher is able to:

- *Automate some of the processes,* for example working out averages or percentages using a spreadsheet rather than a calculator, thereby making their work more efficient;
- *Improve presentation,* for example by typing handouts or correspondence that look better and more professional than hand-written ones;
- File outputs electronically and *thereby allow for easy retrieval and minor changes to be made* without substantial additional effort.

Often, new users of computers find the effort of using a computer or new application does not seem to justify the added effort. Learning a new computer programme can be frustrating and difficult, but as you become more computer competent you will find many advantages. For examples:

- If you keep the contact details of your learners and their parents, and a record of all correspondence, electronically (in other words, on computer), the tracking of students progress and dealing with parents can be handled far more efficiently.
- Worksheets, tests and assignments stored electronically can be easily changed to suit different classes or updated across years.
- Mark-sheets stored electronically make for the quick and easy recording of marks and progress, as well as for converting marks to percentages.

Not surprisingly using a computer as a *tool* to support these management and administration functions of a teacher's role is the most common use of computers in school.

USING COMPUTERS AS TEACHER OR TUTORS

> *'My teacher showed us the extra science notes on computer: I read all the notes and then answered the tutorial questions. It's like having a textbook on computer but less boring'* (Matric science student).
>
> *'I don't mind the multiple choice questions in the examinations. I have practised*

*so many questions on the computer: What is nice is that I know right away whether I got it right or wrong.'(*Grade 7 student).

These learners are talking about computers as *tutor or teacher.* They can do this in two ways:

- They can operate as new "teachers' or textbooks where a great deal of methodological design skill is involved in the development of software.
- They can operate as a giant 'resource centre' which both teacher and lea4rners can access and learn enormous amounts from.

Using Programmed Educational Tests

Obviously the computer cannot think. People have designed software applications – computer programmes – that are taught to present content (like notes and diagrams) to learners in a particular manner. Learners then move through the material on the computer screen by using a mouse and clicking on different parts of the screen.

Teachers have expressed fear that these kinds of programmes will replace them. It is true that these programmes carry huge amounts of information – including video and photographs. In many ways they offer opportunities that teachers simply cannot. So it is true that they do pose a threat to teachers who see their jobs purely as one of information transfer. Computers are much better at this.

But computers are *programmed*: they can't respond flexibly to individual learner difficulties. As a consequence, many learners can begin to feel lost in the huge amount of information they receive. This suggests that teachers do have a role to play, but not simply as information deliverer. Instead, they must increase their skills in teaching learners how to select and make sense of all the information they now have access to. They must assist them in engaging with learning. With this approach, computers and the Internet simply become another resource, like textbooks or the popular media, which teachers can use in their classrooms to enrich the learning process.

Often these types of computer programmes are designed by breaking down the syllabus and writing textbook-like content for each section. This is followed by a series of tutorials or exercises. The computer environment mirrors many traditional textbooks, but has the advantages of allowing each learner to proceed at their own pace and for immediate feedback on responses to questions.

The programme does provide a massive amount of information, and is able to do so through a range of media. Lectures and teachers simply cannot compete with computers at level.

When using an educational programme you may have found that you wanted to ask questions, relating either to content or to the technical process. Computers cannot provide this kind of assistance as well as teachers can. Learners still need guidance and assistance. While learners often find using computer programmes fun, especially where regular drill and practice for procedures are needed to meet the intended outcomes of a

particular learning area being learnt, there is still a need to talk about their learning. Likewise, learners like programmes of this sort because they let learners know immediately whether their answer is correct or not. But, again, this response is programmed and because of this is either:

- Not particularly in-depth;
- Not geared to your particular needs.

This suggests a particular kind of role for teachers and lecturers using computer technologies.

'Programmed' learning packages have been criticised as unimaginative and educationally restrictive. Nevertheless, such programmes can be very useful for certain outcomes. Powerful developments in these programmes now allow for tracking of student progress and for offering various pathways and dynamic testing routes to be followed. For instance, if a learner answers a set of questions in a certain way, the learner is directed to additional content. These programmes are better suited to learning areas with hierarchical and structured content in which single solutions are expected.

USING COMPUTERS AS RESOURCE CENTRES

Tutors not only coach learners by setting exercises and assignments, and giving feedback on these, but can serve as a source of information as well. One of the major educational uses of computer technologies is their ability to store and catalogue vast amounts of information. Individual computers, but more particularly the Worldwide Web or Internet, are a powerful source of information – a massive Resource Centre – for both learners and teachers.

Teachers can find huge numbers of lesson plans, worksheets and even tests on the Internet. Many are American, and would need to be adapted for teaching in South Africa, but nevertheless, are useful. Learners will find the kinds of information they currently find only in reference libraries on the Internet and on CD-Rom encyclopaedias.

Both CD-Roms and the Internet can be used as a source of information for learners. This use will be discussed in detail for each technology later.

COMPUTERS AS LEARNERS

As we said earlier, computers can't think. Computers follow the instructions that other human beings –computer programmers – programme into them. In other words, computers are 'taught by human beings, and so can be thought of as 'learners'.

In order to 'teach' (programme) computers, you need to learn a language that computers understand. One such language is HTML, which stands for *Hypertext Mark-Up Language*. This is the language used to design sites on the Worldwide Web (or the Internet).

When computers were first introduced to schools in Europe and the United States, the most common use of computers was to teach learners programming skills. Learners were

taught how to programme computers and learnt various computer languages (like *Cobolt, Basic or Logo)*. They were expected to write simple com0puter programmes.

Today very few schools offer computer programming courses. Instead, computer programming is regarded as a specialized skill which can be taught in senior and further education phases to those who choose computer studies as a subject or learning area.

However, schools do sometimes teach simple programming languages in order to develop skills like logical thinking, or problem solving, rather than computer programming. *Logo* is one language that is used quite often for this purpose. It is a simple command-based language that is popular with young children. The language consists of simple commands that are given to a turtle (the cursor) to move in various directions. As the turtle moves it leaves a trail behind it, thereby enabling users to draw pictures by writing simple programmes.

CONCLUSION

Computers can be used in a number of ways by teachers.

First, they can assist with lots of administrative tasks like typing, record keeping, bookkeeping and so on. This enables teachers to spend more time on educational functions rather than time-consuming administrative matters. Computer applications – like word processing, spreadsheets and graphics software – have been designed to help with these tasks. While many, like WordPerfect and MS Word, operate in very similar ways, different companies have made different brands of these applications.

Second, computers can be used as a source of information or curriculum content. These can be of two kinds. Some programmes are structured to guide learner through their learning. Learners can go at their own pace through the work and get immediate feedback from questions. However, too many of these programme work only when the learning to be achieved is 'information-thick' and has predefined answers. Learning that requires critical discussion still needs teachers.

Third, computers, can only do what we tell them to do: they must be programmed to do any task. This is growing field of employment, and South Africa needs many more people who are able to programme educational programmes or administrative tools. Some schools provide learners with the opportunity to learn simple programming languages, but often this only becomes a choice later in schooling, or at universities or technikons.

DEVELOPING COMPUTER LITERACY

Computers only make work more efficient if you know how to use them and can easily find one to use. Where this is impossible, it may well be better for teachers to focus on improving their manual procedures and systems. For instance, if there is only one computer in a school and it is used mainly by administrative staff, and made available for

limited periods in the afternoon for teachers, then it might be difficult to make all your work electronic.

But computers are relatively cheap and becoming increasingly so. Most teachers do not require a high-powered expensive computer all the time. Typing out and storing worksheets, or keeping a record of marks, for instance, requires a relatively simple and cheap computer. Even where schools do not have computers, we believe the first step to computer literacy for a teacher should be beginning to use a computer in his or her professional life. It is very unlikely that you would feel comfortable introducing computer use into your classroom teaching if you have not used a computer regularly yourself.

WHAT IS YOUR CURRENT LEVEL OF COMPUTER COMPETENCE?

The following questionnaire can be used to rate your current level of computer literacy
USING COMPUTER AS A BASIC ADMINISTRATIVE TOOL

- **Basic Computer Operation**
  1: I do not use a computer
  2: I use the computer to run a few specific, pre-loaded programmes
  3: I run two programmes simultaneously, and have several windows open at the same time.
  4: I trouble-shoot successfully when basic problems with my computer or printer occur. I learn new programmes on my own. I teach others basic operations to my students.

- **File Management**
  1: I do not save any documents I create using the computer.
  2: I select, open and save documents on different drives.
  3: I create my own folders to keep my files organized and understand the importance of a back-up system.
  4: I move files between folders and drives, and I maintain my network storage size within acceptable limits. I teach students how to save and organize their files.

- **Word Processing**
  1: I do not use a word processing programme.
  2: I occasionally use a word processing programme for simple documents. I generally find it easier to hand-write most written work I do.
  3: I use a word processing programme for nearly all my written professional work: memos, tests, worksheets, and home communication. I edit, spell-check, and change the format of a document
  4: I teach students to use word processing programmes for their written communication.

USINGTHE COMPUTER FOR SLIGHTLY MORE ADVANCED ADMINISTRATIVE USE

- **Spreadsheet Use**
  1: I do not use a spreadsheet.
  2. I understand the use of a spreadsheet and can navigate within one. I create simple spreadsheets and charts.
  3: I use spreadsheets for a variety of record-keeping tasks, I use labels, formulas, cell references and formatting tools in my spreadsheets. I choose charts which best represent my data.
  4: I teach students to use spreadsheets to improve their own data keeping and analysis skills.

- **Database Use**

1: I do not use a database.
2: I understand the use of a database and locate information from a pre-made database such as Library Search.
3: I create my own databases. I define the fields and choose a layout to organize information I have gathered. I use my database to answer questions about my information.
4: I teach students to create and use databases to organize and analyze data.

- **Graphics Use**
  1: I do not use graphics in my word processing or presentations.
  2: I open, create, and place simple pictures into documents using drawing programmes or clipart.
  3: I edit and create graphics, placing them into documents in order to help clarify or amplify my message.
  4. I promote student interpretation and display of visual data using a variety of tools and programmes.

- **Presentation Skills**
  1: I do not use computer presentation programmes.
  2. I present my information to classes or groups in a single application programme such as a word processor, a spreadsheet, or a publishing programme.
  3: I present my information and teach my class using presentation programmes such as Powerpoint or SuperLink, incorporating various multimedia elements such as sound, video clips, and graphics.
  4: I teach my students how to use presentation software. I facilitate my students' use of a variety of applications to persuasively present their research concerning a problem or area of focus in their learning.

USING COMPUTER AS RESOURCE AND COMMUNICATIONS TECHNOLOGY

- **Internet Use**
  1: I do not use the Internet.
  2: I access school and district websites to find information. I follow links from these sites to various Internet resources.
  3: I use lists of Internet resources and make profitable use of Web search engines to explore educational resources
  4: I contribute to my school or district Web sites. I teach students how to effectively use the resources available on the Internet.

- **Telecommunications Use (E-Mail)**
  1: I have an e-mail account but I rarely use it.
  2: I send messages using e-mail – mostly to district colleagues, friends, and family. I check my e-mail account on a regular basis and maintain my mail folders in an organized manner.
  3: I incorporate e-mail use into classroom activities. I use e-mail to access information from outside sources.
  4: I involve my students in using e-mail to communicate with other students and various kinds of experts from other states and nations.

- **Information Searching**
  1: I am unlikely to seek information when it is in electronic formats.
  2: I conduct simple searches with the electronic encyclopaedia and library software for major topics.

3: I have learned how to use a variety of search strategies on several information programs, including the use of Boolean (and, or, not searches to help target the search.
4: I have incorporated logical search strategies into my work with students, showing them the power of such searches with various electronic sources to locate information which relates to their questions.

MORE ADVANCED USES AND UNDERSTANNGS OF COMPUTER USE

- **Ethical Use Understanding**
  1: I am not aware of any ethical issues surrounding computer use.
  2; I know that some copyright restrictions apply to computer software.
  3: I understand district or my building holds a site license. I understand the school board policy on the use of copyrighted materials
  4: I model ethical usage of all software and let my students know my personal stand on this issue.

- **Video Production**
  1: I do not use a video camera.
  2: I create original video tapes for home or school projects.
  3: I create original video tapes using editing equipment.
  4: I use computer programmes to edit video tape presentations and I teach my students to create and edit video tapes.

- **Technology Integration**
  1: I do not blend the use of computer-based technologies into my classroom learning activities.
  2: I understand the district technology plan supports integration of technology into classroom activities, but I am still learning about what strategies will work and how to do it. I accept student work produced electronically, but do not require it.
  3: From time to time, I encourage my students to employ computer-based technologies to support the communicating, data analysis and problem solving outlined in the district technology plan.
  4: I frequently model and teach my students to employ computer-based technologies for communication, data analysis, and problem-solving as outlined in the district technology plan.

DEVELOPING YOUR COMPUTER COMPETENCE

If most of your responses to the above questionnaire were level 1, you probably do not have access to a computer and therefore have a low level of computer literacy. Obviously if the majority of your responses are 3s or 4s, it is likely that your level of computer competence is good. It is likely that many teachers will demonstrate a relatively high level of competence in the first two categories.

You obviously need to find ways to get to use a computer in order to develop your computer skills. The above self-assessment form gives you an idea of how computer competent you are, and shows where you need to start to focus for your development. In order to develop your own competence, you may want to consider taking some of the following actions:

- *Consider buying own computer for use at home.* Some schools have decided to negotiate package deals with computer suppliers, which reduce the costs for personal purchases by staff when this is done by a number of staff or when the school is buying a number of computers. Others have negotiated computer loans for staff that

can be paid off over several months. You may want to explore similar options with colleagues and your principal.

- *Try to ensure that a computer available at school for teaching staff use*. Such a computer may be placed in a staffroom, library or staff work space. You may need a booking procedure to avoid unnecessary disputes. You may want to use the argument to convince senior staff and governing bodies that unless teachers have meaningful access to computers for their use, learners are unlikely to get the necessary exposure to computers, as they will not be integrated into classroom teaching.
- In the absence of a computer being available for your use, *try to make the best administrative use of computers in the school.* For example, where a secretary is available to type out tests, worksheets or correspondence, ensure that you collect an electronic copy of these (on a disc) for future reference and amendments – to avoid having to duplicate work the next time these are needed.
- If you have a computer available for your use, *consider going on courses designed for teaching specific applications to develop your competence.* These courses are widely available commercially, or through NGOs or teacher centres, and could form part of your professional development.

But you should be careful about who you register with to do your course. Because computer training is in such demand at the moment, there are many 'fly-by-night' computer schools operating.

Before you register for a course, ask potential providers the following question:

- *Are the programmes you teach the programmes I want to use or have access to?* (There is no point studying a word processing programme that you have no access to !)
- *How many computers do you have? Will I have access to my own computer most of the time?* (Computer literacy requires hands-on training. Good institutions will ensure that most of your time is spent at a computer.)
- *Who teaches your courses? Are they qualified professionals? Or do you rely on a computer-based programme to do the teaching?* (Some institutions rely entirely on packaged online courses. While many of these are good, you should check that the staff running these courses have enough expertise to offer good support.)
- *What kind of support do you offer?* If it's a lecture-based course, do you offer supporting notes? Are staff available after hours for queries? (Ideally, courses should offer both good course materials – so you can learn on your own – and access to a help-line or staff member so that you can get assistance when you get stuck. This support should be offered for a period after the face-to-face training has ended)
- *Does the course offer some form of accreditation?* (This is not vital, but useful. But beware of 'attendance certificates', they mean nothing. If you wan accreditation, go for a course that has some reliable form of assessment).

Without being able to practice and use what is taught in such courses, they are generally recognized to be ineffective. For example, a one-week course on using a word processor is likely to be of little value unless you are able to start to use a word processor on a regular basis to support your daily work.

DEVELOPING YOUR LEARNERS'COMPUTER COMPETENCE

There is currently a strong push to ensure that learners are computer literate and able to use basic computer application. Computer literacy is fast becoming a core competence for many work and learning environments. In fact, Curriculum 2005 lists it among the Critical Cross Field Outcomes (CCFOs) as well as a specific outcome in learning areas like Technology, and Language and Communications. As teachers in schools, how can we contribute to realizing this outcome?

Obviously you could begin by measuring the computer literacy of your learners by using the Bellingham form 9or, preferably, an adaptation of this form. Then you could:

Establish Special Computer Literacy Classes

One way to develop computer skills is to timetable special computer literacy classes. Each class spends a certain amount of time in a computer room or laboratory 'learning computers'. Like the above-mentioned courses on computer applications, this is likely to have little impact on learners unless use of these application is integrated into their daily routine through other learning areas. In other words, as a CCFO, all teachers are expected to integrate computer use into (at least some) of their lessons. This section focuses on how this can be done.

One of the most obvious places to use computer-based learning programmes is for teaching basic computer competence.

Developing Computer Literacy through Learning Area lessons.

Instead of having a separate subject for 'learning computers' we can also introduce computer use into all our lessons. In this way, we can extend what is done in special classes – but we can also encourage learners, the number and availability of computers in the school, and the subject area, but here are a few examples of integrating computer use into lessons.

Get learners to word process normal assignments

Some teachers expect their learner to submit written assignments that have been typed This is very straightforward addition to a written task which can be done at almost any age and for any subject area It does, however, require additional attention from the teacher Before doing this ask yourself:

- How can I make sure my learners can easily get access to computer? (Arrange with a computer support teacher, book the computer room for x number of lessons, make sure the computers are available after hours, and if necessary book them for your learners)
- Can my learners use a work processor? What type of support do they need?
- Why am I making this requirement? What computer competence outcomes are expected? How will these be assessed, if at all?

Get learners to use programme for time-consuming mathematical tasks
Teachers can get learners to use a computer to cut down to tedious tasks In mathematics for example, a mathematics teacher can use the computer as a tool to help learners draw graphs quickly. He or she is not wanting to see whether the class can draw graphs, but wants to see whether they can notice patterns Using a computer lets students see the effect of changing a number in the equation very quickly.

Getting learners use word-processing in a 'process' writing exercise

Taking another example form a different learning area, an English teacher can get learners to use a wordprocessor to edit and improve on their own and other class members writing tasks. The teacher uses the fact that making changes on a computer is quick and easy to help her class develop writing skills. Instead of having to re-write their essays, the learners can make changes and correction using a word processor. The teacher also introduces peer review and team work to get a better piece of writing.

How any computer application is integrated into a lesson depends entirely on you as the teacher, and on the learning outcomes of the lesson. Many teachers design worksheets to guide learners through activities using a computer. This lets learners work at their own pace through the tasks, and means that you can help individuals without holding up the entire class.

Like all lessons, lessons using computers need to be carefully planned to be successful.

USING COMPUTER TECHNOLOGIES IN TEACHING

USING CD-ROMS

CD-Roms (Compact Disk-Read Only Memory) are similar to commercial audio CD-disks (music CDs) but can store audio (sound), video, text (typed words) and graphics (pictures). This mix of media in a single technology is referred to as 'multimedia'.

Multimedia resources can either be distributed or accessed using CD-Roms or the Worldwide Web. The text that appears on your computer screen when you open a site on the WWW, or open a CD-Rom programme, will look much like what you are used to finding in books. But it has at least one important difference: the existence of what *hyperlinks'*. You may notice that some words in the text appear in a different colour, or are underlined This generally indicates that they are hyperlinks – which indicate that you can move directly from this word to linked ideas elsewhere on the CD-Rom, or anywhere on the WWW.

Hyperlinks have made navigation through multimedia materials much easier, as with the click of a mouse button, a user can bring up different screens, play a video or audio clip, or switch to a standard computer application.

As CD-Roms store and play back huge amounts of data, they are commonly used for storing any type of computer files (for example, for archiving files), as an alternative way of publishing books, for storing hand distributing computer software, games and educational materials. The data can either be plain Text (like a dictionary or thesaurus, or word document) or include pictures, photographs, audio or video clips (like an encyclopaedia).

CD-Roms as a reference or source of information

CD-Roms are often used as reference sources and therefore have been introduced into a number of libraries and resource centre CD-Rom encyclopaedias best illustrate this type of use.
Encarta includes an atlas that enables the user to click anywhere on the globe, and access information about specific locations and a timeline. This type of reference CD-Rom resource is used in a similar way to reference books and encyclopaedias.

There are many CD-Roms available for this type of reference material. Some focus on a range of topics (like an encyclopaedia) while others focus on a specific topic (topics such as World War 11, Music Instruments, Endangered Animals, the Human Body seem to be popular). Most of these types of CD-Roms are not made in South Africa and are usually produced in the United States of America or the United Kingdom.

'Talking books' or interactive stories

Another common use of CD-Roms, particularly in Primary Schools, is for 'talking-books'. These are used for teaching and encouraging reading, and have the potential to:

- Develop reading skills by giving children an overview of the story before reading it,
- Encourage independent reading though the audio clips that sound out works;
- Encouraging collaborative reading when a small group of children (3-4) work on one computer.

Whether these potentials are realized or not depends on the way the teacher interacts with the learners before, during and after the computer session. For learners to benefit fully from CD-Rom talking books, they need to be coaxed and encouraged to talk to each other.

These types of multimedia resources are also available on the Internet. While the Internet offers a much wider range of materials than a CD-Rom does, the best materials or parts of materials can often only be downloaded and used at a cost. Downloading video (especially) and even audio takes time, and requires a high-powered computer. Images can be retrieved and viewed much more quickly on CD-Rom. However, the Internet does offer the ability to communicate – something the CD-Rom doesn't offer. So it is possible to 'converse' with a fellow learner or teacher 'online'. But this also comes at a cost: to remain that you are logging up telephone bills. On the other hand, the cost of each 'conversation' will be that of a local telephone call.

Designing lessons using CD-Roms

Again, the way in which this type of CD-R is integrated into lessons depends on the way you set the task. Learners can easily be swamped by the volume of information available to them. They need to be guided in how to use the product, and to navigate through the CD-Rom using search facilities. When using CD-Roms (and the Internet we often ask:

- How do we discourage or stop learners printing out reams and reams of information?
- How do we know when learners are learning or just casually browsing and looking at irrelevant (or inappropriate) stuff?

These are not really new questions to teachers. We have always been concerned about the mindless copying out of books, or by exactly how much actual 'work' goes on when learners are set loose in a library or resource centre. It is no different with multimedia resources, although perhaps the scale and likelihood of the problem is different as multimedia resources now have the potential to present much more information in more appealing ways. We need to guide our learners through focused tasks to be able to select appropriate pieces of information and present these in a coherent and sensible manner. This means we have to design tasks that we know will build information management skills.

A task like '*Use the CD-Rom to find something about Nelson Mandela and write it down'* will test whether a learner can use a CD-Rom and run a search, but it is unlikely to achieve anything else – it is in fact likely to encourage poor information processing habits. In order to make these types of activities more meaningful, you need to answer several questions:

- Do you – as the teacher – know what type of information is available on the topic you set? In other words, is it possible for your learner to find the information you ask for, given the available resources?
- What do you want learners to do with the information?
- How structured or open-ended will you make your tasks and questions?
- Will the task be mainly teacher-directed or learner-directed (both have important uses)?
- Is it aiming to encourage casual browsing or purposeful browsing (both have merits)?

Again, these are not new questions that have been introduced because you are using a new technology. But they are important questions that are often forgotten in the excitement of using a new technology. When using CD-Roms as a reference, you should set structured but open-ended tasks that require using a few sources and some organizing of information. These types of tasks are generally more engaging and meaningful for learners.

How do we select CD-Roms appropriately?

How we select from the range of available products is important. Here are some initial criteria for evaluating CD-Roms:

- How has information presented on the disc been selected and presented? Is there a clear bias or prejudice towards the northern hemisphere, race, gender or anything

else? How current and accurate is the information? Is the source of information acknowledged?

- Does the software design encourage interaction? Is there a search facility? Can users get to information through a range of pathways (through an alphabetical list, an atlas, a timeline and so on)? Is there a built-in 'note pad' or calculator? Can learners easily switch to use 'content-free' applications'?
- How are the multimedia data organized? Are the information categories sensible and easy to use? Is it easy to view a video, read an article and listen to an audio clip about a single topic, or is each medium stored separately?

USING THE INTERNET

The Internet is a global web of computers that are connected to each other. This connection enables computer users to share information and resources. In simple terms, the Internet has two main parts – the Worldwide Web (WWW) and e-mail. No one owns the Internet, and any one can use it. You can put your own information onto the Internet by making your own web site, or you can visit the web sites that other people have created. You can also send and receive e-mail as long as you have an e-mail address. In this, we look at the ways you can use the WWW and e-mail to support you teaching.

THE WORLDWIDE WEB

The Worldwide Web (WWW) allows computer users to view multimedia materials (like those on CD-Roms) through a computer software programme called a *'browser'* (such as Netscape Navigator, Internet Explorer or Mosaic). This means that you can visit web sites that have been created by other users, or that you can create your own web sites. You can use the WWW in a number of ways for you teaching, as these teachers' reports illustrate.

General news and information

> *'I use the WWW to get the cricket score and latest news. I also find it useful for printing out topical newspaper articles to discuss in class. I once needed to know the population of India and didn't have up-to-date statistics about the country. I found the most recent census figures on the WWW'.* (Geography teacher)

> *The WWW can be used as a source of information –you could think of it as being a like a very big library. Like the Geography teacher mentioned above, you may want to use it for finding general information (such as current affairs, sport the weather, entertainment, travel plans, or for buying things). To do this, you need to know where to look for the type of information you or your learners require. On the WWW there is a wide range of web sites that aim to be a one-stop-shop for your information needs. These types of sites often focus specifically on current affairs and news, and have lots links and categories to enable you to find the information you are looking for. Many of them are linked to a 'search engine'(which we will discuss later on) and some offer free e-mail services.*

This general information can help you to up-to-date and relevant information to use in your lessons. As it is easy to print out information from the WWW, you may bring interesting articles and reports into your class. You can also encourage your learners to browse the WWW to find information about topics that interest them. Using WWW, you will soon realize that there is a huge amount of irrelevant information or 'junk' on it. Remember what may be junk to you could be useful for someone else (at least one person – the person who created the web site – thinks that each web site is useful!) Both you and your learners can spend hours browsing the WWW to find relevant content. You need to decide what the educational value of this would be, and how much time you and your learners should be spending on 'mindless' browsing. To save time, it is useful to start collecting the web addresses or URLs (Uniform Resource Locators) for interesting useful sites.

Educational News and Information

> *I use the Internet to get information about to get information about educational issues, debates and policy. I don't have to wait for the government gazette or newspapers – I access the latest development directly'*. (District officer)

It is possible to find useful educational information on the WWW – you just need to know where to look. There are basically two ways get such information – start collecting URLs, or use search engines or directories to find relevant sites for you.

Teaching Resources

> *'I use the WWW to find lesson ideas for specific topics. I visit educational resource link sites and print out suitable lesson plans. I have found lots of children's stories which I have printed out and filed in may classroom library corner.'* (Foundation Phase teacher)

The WWW has various archives and databases on lesson ideas, lesson plans and case studies designed for parents and teachers. Most of these allow for searches using the subject area and age or grade of students as criteria. Most of these databases have been created in for North America or Europe, and have grown through contributions from teachers.

Learner Resources

Some web sites have been specifically designed for educational content. These take users through carefully designed content, in much the same way as was discussed under *Using the computer as a tutor*. The biggest difficulty here (besides the expense of being online) is that there is at this stage very little relevant content for South African learners. Some tertiary education courses are now being offered online, but there is currently very little available for South African school learners.

Increasingly, though, learner site are being d3eveloped. Here are a few useful

- **Cyberschool Africa** (www.cyberschool.co.za) has developed online materials for matriculants in mathematics, science and biology.

- **The Learning Channel** at *www.learn.co.za* has materials based on Science, English, Business Economics and geography for grade 12 and some additional materials for grades 9, 10 and 11.
- **The Mathematics Learning and Teaching Initiative** (MALATI) at *www.wcape.school.za/malati* is an excellent resource site for mathematics teachers.
- The University of the Western Cape has created an Online South African **Grade 10 Biology textbook** at Http//www.botany.uwc.ac.za/scied/index.htm. it is text-based and content driven, and has links to other resources on each Grade 10 Biology syllabus topics.

Navigating the Internet: Using Search Engines

Search engines or directory web sites enable you to enter key words and phrases, and scour the WWW for web sites on any topic you wish to explore. They perform roughly the same function as a catalogue cabinet (or computer search programme) in a library.

In a library, though, there is a librarian in charge and only a finite number of resources. So, if what you are looking for is not in the catalogue, you know it's not in library. No one is in charge of the Internet, and anyone can contribute information. As a result, there is no central catalogue of web sites, so finding what we are looking for would be much more difficult without search engines and directories.

One of the main difficulties is that information comes from all over the word. It is therefore often helpful to limit your search to web sites from a specific place (like South Africa). There are two main ways in which we can search the WWW:

- **Search engines** use computer programmes to wander through the WWW and follow links collecting details from these web sites to catalogue and index.
- **Directories** look like search engines and perform the same functions, but finding and cataloguing the web sites is done by human researchers, not through programmes.

Here are a number of South African search engines you can use to search the WWW:

- Max (*www.max.co.za*) a newcomer from M-Web, combines a search facility with a Web directory. With more than a thousand subsections, Max catalogues more than 10 000 South African websites. It has clear descriptions, an easy-to-use navigational structure, and very few dud links.
- Ananzi, (www.ananzi.co.za) is the oldest South African search engine. It indexes more than 87 000 Web pages, and offers a free Web-based mail service, chatlines, news and weather updates.
- Aardvark, (*www.aardvark.co.za*) provides percentages for its search results, giving a good idea of how relevant they are.
- Voted best search engine of 1998 by *The Sunday Times*, Zebra (*www.zebra.co.za*) currently indexes more than 100 000 pages.
- Gogga, (*www.gogga.ru.ac.za*) indexes articles from the local online media. It searches the major online newspa0per publishers.
- Fanagalo, (*www.fagalo.co.za*) is also dedicated to scouring South African news sites, allowing searches to be narrowed down to the past 24 hours.

Getting learners to produce their own websites

> *'My afternoon computer club students have all learnt to design web sites. They have entered the Thinkquest competition, and are really working hard at it'.* (Computer supervisor)

Both you and your students can design web sites. The basics are relatively easy to learn, and there are a number of software programme that make web design very similar to word processing (for example FrontPage or HotDog Express). Several Hyper Text Mark Up Language web sites (HTML –the coding language for web sites) are available online, as are several sites on the latest web developments and developers' tips. If this becomes a personal interest for you – is certainly sufficient information on the Internet and various short course offerings to get you started.

USING E-MAIL

The other major component of the Internet is e-mail that allows computer users to send messages to each other. Text messages and computer files (like word documents) can be sent from one computer to another. It is possible for computer users to have e0-mail but not be connected to the WWW.

This type of arrangement is quite common in schools that use dial-up networking. While each teacher or learner has an e-mail address and can send and receive e-mail from any computer in the Local Area Network (LAN), only one computer is actually connected to the Internet. It is through this computer (the LAN server) that e-mail messages are collected and distributed. E-mail can be used for virtually any correspondence that would probably otherwise have been done using the postal system or facsimile.

Its major advantage is that messages reach their destination very quickly and cheaply. Sending and e-mail message anywhere in the word takes less than an hour and costs, at most the charge of a telephone call to your Internet Service provider (ISP). You can also check whether someone has received and/or read your message using a tracking programme. E-mail can be used for all types of administrative communication (like organizing a sporting event, writing a note to a parent, receiving a district newsletter) as long as the recipient has an e-mail address.

An additional advantage of using e-mail is that you can send the same message to a group of people with very little additional effort. By typing in several addresses, you can set up a *distribution list* which will send the same message to a whole group. This may be useful for sending invitations to a function, for example, or sharing progress on a project. This function also allows you to receive e-mails on topics of interest by subscribing to distribution lists.

If you have e-mail, you may want subscribe and/or contribute to these South African e-mail information services:

- Edufax; A weekly newsletter directed at South African educators. It includes announcements, job offers and training workshops and courses.
- Telematics for African Development Consortium: A regular information service (sent out about 2-3 times monthly), it deals with the use of technologies for education and

development. It includes the latest snippets from the Internet on technology trends, recommended online resources, and news articles and announcements of new products and events. E-mail *neilshel@icon.co.za*, and include a line stating that you would like to subscribe to TAD.

You can also subscribe to discussion groups – where every message sent by any of the group member is received by the whole group. This means that the content is not monitored and, depending on the group, you may be inundated by many irrelevant messages.

Learners can use e-mail to communicate with people outside of their school and community. Collaborative Internet projects can be established between groups of learners in very different contexts. The learning process is greatly enriched by both groups working through similar content, or on joint projects and sharing their findings.

Through the Dialogues Project, learners at a few schools in the Western cape have been working collaborative with schools in the United Kingdom. Each class teacher sets his or her class a project on their school and community. The children have been writing about and taking photographs of their environment. These have been sent to the children on the other continent, who could comment on and ask questions about the project. Through working on similar topics, teachers were able to plan together and support one another, while the children made new 'friends' and leant about their own and other contexts.

One of the greatest strengths of the Internet is that it integrates the WWW and e-mail communication. This means that when visiting a web site, you can 'interact with it' by responding to questions, filling in forms or wring comments which are delivered using e-mail.

Getting Connected

Any individual or school can 'get connected' to the Internet if they can afford it. How you choose to connect to the Internet is very relevant. Either you can use a telephone connection (dial-up networking) through a modem, or you can have a dedicated line that permanently connects you to Internet through an ISDN line. With a dial-up connection, the user pays for a monthly subscription to an Internet Service Provider (ISP), and the costs of the local telephone calls to the ISP. A dedicated connection is much more expensive, but downloading information from the Internet is much faster. Users are charged a monthly subscription for the line, as well as a specified amount for traffic (how much it is used)

SUMMARY

Why are Computers Important?

- Computers are used in almost all office and workplaces. They are an important part of society and cannot be ignored.
- People who know how to use computers have more chance of getting a job.
- Computers can improve the quality of teaching They can be used as an educational resource.
- Learners like using computers – and are motivated by them
- But most South African schools do not have computers. This is a problem as computers can make the gap between the well-resourced and under- resourced schools and communities even wider.

First Steps

- For you to use computers in your teaching, you need to be computer literate.
- To do this you can go on a course, buy your own computer or try to get a computer for staff use at you school.
- Computer competence is one of the Criteria Cross Field Outcomes of the new curriculum. All learners must be computer literate.
- Learners can be taught how to use computers in a special computer literacy period in a computer lab.
- But, computer literacy classes are not enough. Teachers must also introduce computers into their subject area lessons.

Tips About Using CD-Roms in Education

- CD-Roms can have written text, pictures, video clips and sound on them. They are called multimedia resources.
- CD-Roms can be used as a source of information like a reference book in a library.
- CD-Roms are often used for interactive stories, or talking books for primary school children.
- When evaluating a CD-Rom, plan your tasks carefully so that questions are open but structured.
- When evaluating a CD-Rom or deciding whether to buy it, consider:
  - How the information has been selected
  - What it looks like and how easy it is to use
  - How the information has been organized
  - The quality of information or content.

Tips About Using the WWW

- WWW can be used to find information of general interest on almost any topic;
- It also contains news about education (such as policy developments, research reports, news and journal articles) as well as lesson ideas, worksheets and notes from education sites.
- Teachers can use it to set class activities on a specific web site or couple of web sites;
- They can also get learners involved in designing their own web site

E-mail can be used:

- For personal and administrative communications;
- For sharing computer files;
- to send or receive distribution list messages;
- to subscribe to or initiate discussion group;
- for collaborative projects between geographically separated learning groups.