DEVELOPING AND IMPLEMENTING AN OUTCOMES-BASED COMPUTER LITERACY PROGRAMME IN DISTANCE LEARNING MODE FOR SOUTH AFRICAN STUDENTS

by

Marita Oosthuizen

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SUPERVISOR: DOCTOR GJ SCHLEBUSCH

Central University of Technology, Free State

DECLARATION

I, the undersigned, declare that:

DEVELOPING AND IMPLEMENTING AN OUTCOMES-BASED COMPUTER LITERACY PROGRAMME IN DISTANCE LEARNING MODE FOR SOUTH AFRICAN STUDENTS

is my own work, that all the sources used or quoted have been indicated and acknowledged by means of complete reference, and that this dissertation was not previously submitted by me for a degree at any other university.

Marita Oosthuizen

April 2003

Soli Deo Gloria

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LIST OF ACRONYMS

Acronym	Description
ANC	African National Congress
CAL	Computer Assisted Learning
CEPD	Centre for Education Policy Development
CL	Computer Literacy
DL	Distance Learning
FET	Further Education and Training
GET	General Education and Training
HEQC	Higher Education Quality Committee
HET	Higher Education and Training
ICDL	International Computer Driving License
IDE	Innovations in Distance Education
IT	Information Technology
ITV	Instructional Television
IV	Interactive Videoconferencing
NQF	National Qualifications Network
OBE	Outcomes-based Education
OTEN	Open Training and Educational Network
PGCC	Prince George's Community College
SAQA	South African Qualifications Authority
UNISA	University of South Africa
USA	United States of America
VUDEC	Vista University Distance Education Campus
WWW	World-wide Web

CHAPTER ONE

INTRODUCTORY ORIENTATION

1.1 INTRODUCTION

"Computers" is the buzzword of our time. Never before has technology spread so rapidly. Never has an invention enabled so many people to do so many things that are strategically important to life in the information society. So strategic that being able to use a computer has become a basic skill, even a literacy in its own right (Hofstetter 1998:xii; Long and Long 1999:xvii; Shelly 1999:1.1).

The term "digital divide" is increasingly being used in articles, discussions and conferences. The digital divide is defined as "the technology gulf that separates the computer-literate rich from the world's poor masses". (Itano 2001:6) South African president Thabo Mbeki has announced that the reduction of this digital divide is a top priority, and states that technological literacy should be a key feature for South Africa's future in an increasingly globalising world (Itano 2001:6).

Trying to build a technological infrastructure, however, does not have any meaning without people knowledgeable enough to utilise the technology. Providing the training to build a computer literate society is thus of utmost importance. Although the ideal situation would be for children to start using computers at a very young age, the reality in South Africa is that many adults have never been exposed to using computers, neither did they have the opportunity to undergo computer literacy training. These adults are no longer part of the formal schooling system and may not be able to attend full-time classes at a college or university. Furthermore, the National Qualifications Framework (NQF) has introduced a new approach to education and training, called life-long education. This new approach strives to provide opportunities

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for individuals to learn regardless of age, circumstances or previous level of education (Isaacman 1996:3). One way of achieving the goal of life-long education is for educational institutions to present programmes in distance learning mode.

Distance learning (*cf. 1.6.3)* presents an ideal alternative to people who, for some reason, cannot attend contact tuition on a daily basis. Many computer literacy programmes were, and are still taught at various training colleges and tertiary institutions in South Africa, but because of the practical nature of the training, most of these programmes are taught on a full-time basis through contact tuition. With the growing number of distance learning students, the need to design an effective computer literacy programme in distance learning mode, is becoming a matter of urgency.

An important aspect of this study is not only to develop a distance learning computer literacy programme, but an *outcomes-based* computer literacy programme that can be presented in distance learning mode. The South African government has recently decided to bring about a paradigm shift in the education system (Department of Education 1997a:3). In 1998 a new outcomes-based curriculum was implemented in Grade 1 and the principles underlined by outcomes-based education are meant to filter through to the highest level of education. The change to an outcomes-based education system is seen to be an acknowledgement that the processes of teaching and learning must be functional, relevant and accountable (Malan 1997:8).

The term *outcome* generally refers to the result/product/output of some or other process. Roy Killen, an Australian expert on outcomes-based education (Killen 2001:2) defines outcomes in education as "that what the student can do and understand - the contextually demonstrated end-products of the learning process. Outcomes can thus be seen as the result of the learning process: knowledge, skills, attitudes and values within a particular context so that knowledge is applied, skills developed into competencies and attitudes and values harmonise with those of the workplace". Bearing this definition in mind, it is clear that teaching a computer literacy programme can no longer

only be a matter of disseminating knowledge about computers, but that there is no alternative than to bring students to the computer and teach them how to productively use the computer as a tool (Spear 1999:2).

With the introduction of outcomes-based education in 1998, the South African government has constituted the South African Qualifications Authority (SAQA). The aim of SAQA is to accredit all programmes that are presented by South African educational institutions. One of the challenges in this study would thus be to develop the proposed programme in such a way that it will ultimately be approved by SAQA to form part of future distance learning programmes at Higher Institutions.

1.2 STATEMENT OF THE PROBLEM

As the use of computers in society increases, so does the demand for training people to attain the skills necessary to use the required technology. The goal of life-long learning adds to the need for computer literacy being offered in an alternative mode than the traditional contact tuition. Distance learning has for some time been part of our education system, but with the practical nature of computer training in mind, the questions to be answered in this study are:

- What is the role of distance learning in education?
- What impact does outcomes-based education have on a computer literacy programme?
- What factors should be taken into account in developing a computer literacy programme in distance learning mode?
- Can an effective computer literacy programme be successfully developed and implemented for distance learning education?

Answers to the above-mentioned questions form the basis of this study.

1.3 AIMS OF THE RESEARCH

The researcher's primary aim with this study is to establish the factors that should be taken into consideration in developing an outcomes-based computer literacy programme in distance learning mode, and to develop such a programme through which effective teaching and learning can take place.

This research further aims to:

- establish the role of distance learning in education by researching the different methodologies that can be used in presenting distance learning programmes;
- determine the impact of outcomes-based education on a computer literacy distance learning programme by researching the principles of outcomes-based education and linking that to the requirements for a computer literacy programme;
- investigate the most appropriate way to go about developing an outcomes-based computer literacy programme in distance learning mode and
- establish how an outcomes-based computer literacy programme in distance learning mode can be implemented to enable more people to have access to computer training and support the goal of life-long learning.

1.4 RESEARCH METHODOLOGY

The qualitative method of research, and in particular the action research component thereof, will be used for this study. Furthermore, the research will be backed by a thorough literature study.

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1.4.1 Qualitative research

The qualitative method of research is chosen for this study as it allows the study of selected issues in depth and in detail, producing detailed information about a smaller number of people and cases (Patton 1990:14). Using qualitative research, the researcher can examine people's words, actions, perceptions and feelings in narrative and descriptive ways closely representing a situation as experienced by the participants (Maykut & Morehouse 1995:2). Hummelvoll and Da Silva (1998:465), as well as McMillan and Schumacher (1993:372-373), state that qualitative researchers accumulate data by interacting with selected individuals in their settings and by acquiring documents relevant to the study. This is what is intended for this study.

Semi-structured interviews will be conducted with senior faculty members in the fields of distance learning and computer literacy training. Through qualitative interviews the researcher can understand experiences and reconstruct events in situations where no previous participation occurred (Rubin & Rubin 1995:1). The rationale for employing the semi-structured approach is that the asking of structured questions can be followed by elucidative open or unstructured questions. The open questions should ease the explanation and understanding of the responses to the structured questions. Therefore, a combination of perspicacity and objectivity can be secured.

The participants for semi-structured interviews will be selected by using the method of theoretical sampling, which according to Mason (1996:93), "... means selecting groups or categories to study on the basis of their relevance to your research questions, your theoretical position ... and most importantly the explanation or account which you are developing." In this case, four senior faculty members from different community colleges in the United States of America (USA) will be interviewed. All these professors are experts in the field of distance learning and/or computer literacy and are

extensively involved in presenting distance learning training workshops in different countries around the world (*cf. 4.5.1*).

Due to the differences in background of South African students compared to those from the USA, it is pre-empted that it would not be possible to implement a programme in exactly the same way it is being done in the USA. For this reason experienced South African instructors, who have been teaching computer literacy on a full-time basis to South African students, will be interviewed (*cf. 4.5.1.2)*. The inputs of these instructors will be of crucial importance to bring the lessons learnt from the USA into the South African context.

1.4.2 Action research

According to Elliot (1992:49), the fundamental aim of action research is to improve practice rather than to produce knowledge. Action research integrates teaching and instructor development, curriculum development and evaluation, research and philosophical reflection into a unified conception of a reflective education practice (Elliot 1992:54). Research in this study will be done by developing a computer literacy programme, implementing it and evaluating it with the aim to improve the programme. The following methods for gathering data as proposed by McKernan (1996:81-91) will be used:

- The researcher will keep a diary, which will contain personal accounts of observations, feelings, reactions, interpretations, reflections and explanations of the implementation of the programme.
- A profile of the envisaged programme will be set up. This profile will provide a structure to evaluate the success of the implementation of the programme. The profile will include evaluations of the contents of the programme, the study manual that will be developed, the media or technology that will be used and the implementation strategies that will be followed. Evaluations will be done by conducting focus group interviews. Focus group interviews provide the researcher with a chance to develop

the concepts and theories that are grounded to reflect the knowledge of the participants. These interviews also allow a more thorough knowledge of the opinions and experiences of people with regard to the implication of educational arrangements at ground level, as well as an opportunity to investigate the potential implications of new practices (Schurink 1996:314).

- The researcher will use checklists (sets of questions one answers oneself) to, from time to time, evaluate the process of implementing the programme. Crucial questions that should be answered would be: "*Am I satisfied with the average result obtained by students for the assignment / test / examination?*"; "*Am I satisfied with the way the practical workshops were conducted?*"; " *Am I satisfied with the response I got from students or can I do anything to improve students' participation in the programme?*"; "*Do I feel that the time schedule built into the academic year is satisfactory or should it be changed?*"
- Document analysis will be done involving all documentation relevant to the programme, e.g. the study manual, structure of the curriculum, tests, examination papers, examination results and student assignments.

According to Schmuck (1997:50) and Sagor (1992:23), action research should consist of a number of cycles, each consisting of three basic phases, i.e. initiation, detection and judgement.

- In the initiation phase an action researcher should reflect on the future and inquire about what actions might be taken first. This phase is referred to as "research for action".
- Detection calls for an action researcher to monitor and adjust his/her actions from time to time. Detection requires reflection on the present. This phase is called "research in action".
- In the judgement phase, researchers collect data on the results of their own actions over a period of time and is called "research of action". Judgement entails a kind of reflection on the past; it is systematic inquiry

into what has or has not been achieved after testing the actions over a considerable period of time.

The research in this study will be performed in two cycles – each incorporating the above-mentioned phases. During the first cycle the initiation phase will be performed by undertaking a thorough literature study. Furthermore, semi-structured interviews will be conducted with a number of experienced faculty members, in the fields of distance learning and computer literacy training. During the detection phase an outcomes-based computer literacy programme will be developed according to the data gathered through the literature study and interviews. This programme will then be implemented at the Vista University Distance Education Campus (VUDEC). The judgement phase will constitute an evaluation of the implementation of the programme. The research will then move into the second cycle where the initiation phase will consist of analysing the data collected and changing the programme according to the required trends detected. The changed programme will be implemented during the following academic year and the evaluation thereof will constitute the detection phase of the second cycle. The research will be concluded with the judgement phase of the second cycle where the programme will be evaluated. The final outcome of the study will be an improved outcomes-based computer literacy programme that can efficiently be presented in distance learning mode to South African students. A detailed research methodology is discussed in Chapter Four.

1.4.3 Literature study

The rationale for employing a literature study is explained by Ary, Jacobs and Razavieh (1990:67) when they put forward that knowledge in any given area consists of the accumulated outcomes of numerous studies carried out by generations of researchers, as well as the theoretical studies to integrate this knowledge. Silverman (2000:226) indicates that a literature review should combine knowledge with critical thought. One should critically appraise the literature for the purpose of detecting a link between one's own study and the accumulated knowledge in the field of research.

As the proposed programme will be introduced in distance learning mode, a literature study on the methodology of distance learning will be outlined in Chapter Two of this study. The focus will be on different techniques that can be employed to present distance learning programmes.

The literature study continues in Chapter Three with an in-depth look at outcomes-based education. The reason for studying this particular educational practice, is that the programme has to be implemented in the South African context. As described in the introductory paragraph of this chapter, the South African government has decided to bring about a paradigm shift in the education system.

1.5 DELIMITATION OF STUDY

This sub-section explains the delimitation of the study by relating it to the different stages and methodology that will be used.

The study will be performed in the field of Didactics. The qualitative method, and in particular the action research component thereof, will be used. The research will be performed in two cycles – each incorporating three phases, i.e. initiation, detection and judgement.

- During the first cycle the initiation phase will be performed by undertaking a thorough literature study. Furthermore, semi-structured interviews will be conducted with a number of experienced faculty members, in the fields of distance learning and computer literacy training. Four senior professors from tertiary institutions in the USA – all experts in the field of lecturing computer literacy and other distance learning programmes - will be interviewed to establish the underlying practical implications of distance learning, and more specifically computer training in distance learning mode. These professors are extensively involved in distance learning in

the USA as well as training staff members in a number of other countries worldwide (*cf. 4.5.1.1)*. In addition, six instructors at Vista University's contact campuses will be interviewed to establish the specific needs of South African students. These instructors are responsible for lecturing the computer literacy programme in contact mode. To establish the way that computer literacy programmes are currently presented in distance learning mode in SA, the researcher will further consult documentation from the two leading distance learning institutions in the country, i.e. Technikon SA and University of South Africa (UNISA).

- During the detection phase an outcomes-based computer literacy programme will be developed based on the data gathered through the literature study and interviews. This programme will be implemented at the Vista University Distance Education Campus (VUDEC) during the year 2000. It is expected that more than 100 students will enrol for the programme during this year of implementation.
- The judgement phase will constitute an evaluation of the implementation of the programme by monitoring the events during implementation using the techniques described in sub-section 1.4.2. The researcher will also conduct focus group interviews with at least half of the registered students.
- The research process will then move into the second cycle where the initiation phase will consist of analysing the data collected and identifying themes for change.
- During the detection phase, the programme will be changed according to the feedback acquired from the previous phase and the revised programme will be implemented in the year 2001 with a new intake of students.
- The research will be concluded with the judgement phase of the second cycle where the programme will once more be evaluated. Evaluation will again take place by conducting focus group interviews with more than half of the students.

The final outcome of this study will be an improved outcomes-based computer literacy programme in distance learning mode that will run at Vista University from 2002 onwards.

1.6 EXPLANATION OF CONCEPTS

This sub-section aims to explain some of the concepts that will be used regularly in this study.

1.6.1 Computer literacy

The acronym CL will be used to refer to computer literacy. CL is defined by O'Leary and O'Leary (1996:xiii) as being able to employ a microcomputer to increase productivity and effectiveness. Productivity software, that includes applications such as word processing, spreadsheets, database, presentation graphics, personal information management, accounting, project management and other related types of software, is designed to make people more effective and efficient while performing daily activities (Shelly 1999:2.7). A CL programme would thus have to aim to teach people to use at least one or two of these important software tools. Furthermore, people from all walks of life are using the Internet on a daily basis (Hofstetter 1998:5). The Hobbes' Internet Time Line provides information as to how the number of Internet users has grown during the past few years (Hobbes:2001). The number of Internet hosts, which each has a number of Internet users, grew from 313 000 in October 1990 to 109 574 429 in January 2001. Taking this into consideration, it could therefore be assumed that people enrolling for a CL programme, should also learn to use the Internet and be aware of the various kinds of possibilities it offers.

1.6.2 Outcomes-based education

The acronym OBE will be used to refer to outcomes-based education. An outcome can be seen as the result of the learning process and refers to what the student knows and can do (Isaacman 1996:4; Department of Education

1997a:1). Malan (1997:10) summarises OBE by stating that "education is outcomes-based when it accepts as its premise that the definition of outcomes should form the basis for all educational activity, including the description of qualifications, the development of curricula, the assessment of students, the development of educational structures and even the planning of resources". In the traditional approach, knowledge was seen to be absolute and education and training as being different entities. In contrast, Spady (1994a:93) says: "OBE means clearly focusing and organising everything in an educational system around what is essential for all students to be able *to do successfully* at the end of their learning experience". It could thus be deducted that an outcomes-based CL programme would be a programme that will lead students to *know how* and *be able to use* a microcomputer to increase their productivity and effectiveness. The above-mentioned programme indicates a practical approach rather than merely learning about the concepts of computers.

1.6.3 Distance learning

The acronym DL will be used to refer to distance learning. DL is defined as a formal educational process in which the majority of the instruction occurs when the student and the instructor are not at the same place at the same time (Commission on Higher Education 1997:1). In this process, information or information technology is the likely connector between the student, the instructor or the site of programme origin.

DL has been part of the South African education system for many years, but till recently mainly consisted of correspondence programmes (Jacobs 1999:9). With the rapid development of information technology (IT), a whole new world of diverse DL technologies has opened up. Technology like video/audio tapes, CD-ROMs, video/audio conferencing, voice mail, computer conferencing and the Internet can all be used to improve a correspondence DL programme (Spear 1999:2). This study aims to investigate new possibilities in developing DL programmes.

1.6.4 Students, instructors and programmes

In this paper, the term "student" is used to refer to anyone engaged in the learning process. It includes those who are conventionally referred to as pupils or learners.

Likewise, the term "instructor" is used to describe the person responsible for guiding the instructional process and includes those who are conventionally called lecturers or teachers.

The term "programme" is used to describe a study unit of related material and includes units that are conventionally called courses or modules.

1.7 LIMITATIONS OF THE STUDY

The fact that most students of Vista University come from a disadvantaged background and thus would probably not have access to modern technology like the Internet, may limit the technological aids that could be used in introducing the envisaged programme.

1.8 THE DIVISION OF CHAPTERS

This section provides an outline of how the chapters in this study will be divided:

Chapter One: Introduction

In Chapter One the researcher briefly explains the rationale for this study. The problem is stated and the aims of the research are laid out. An overview of the research methodology that will be used is given. The researcher also explains some of the key terms that form the basis of this study.

Chapter Two: Review of related literature on distance learning

Chapter Two will contain an in-depth study of the methodology of DL. Some of the key issues surrounding traditional and modern DL techniques will be explored. The literature study will relate to the programme that will be developed in the final chapter.

Chapter Three: Linking outcomes-based education with computer literacy

Chapter Three will give an outline of a literature study on the principles of OBE. This study will set up a framework for developing an outcomes-based CL programme.

Chapter Four: Research methodology, data collection and analysis

Chapter Four will contain information on the research methodology that will be used in this study. It will further summarise the data collection and results of the investigation of how CL and other DL programmes are conducted in the USA and SA. The results of data collected through action research will be reported in this chapter.

Chapter Five: Conclusion and recommendations

Chapter Five will give a short overview of the findings of the research. It will further indicate the limitations of the study and explore some opportunities for further research.

Chapter Six: An outcomes-based computer literacy programme in distance learning mode for South African students

Chapter Six will contain the final, improved outcomes-based CL programme to be presented in DL mode.

CHAPTER TWO

REVIEW OF RELATED LITERATURE ON DISTANCE LEARNING

2.1 DISTANCE LEARNING – AN OVERVIEW

The following section aims to give an overview of the basic concepts surrounding DL.

2.1.1 What is distance learning?

In the words of Portway and Lane (1994:195), the term DL refers to teaching and learning situations in which the instructor and the student(s) are geographically separated, and therefore, rely on electronic devices and printed materials for instructional delivery.

Keegan (1996:50) gives a very comprehensive definition by indicating that DL is a form of education characterised by:

- the quasi-permanent separation of the instructor and student throughout the length of the learning process;
- the influence of an educational organisation both in the planning and preparation of learning materials and in the provision of student support services;
- the use of technical media – print, audio, video or computer – to unite instructor and student and carry the content of the programme;
- the provision of two-way communication, in order for the student to benefit from, or even initiate dialogue and
- the quasi-permanent absence of the learning group throughout the length of the learning process so that people are usually taught as individuals

rather than in groups, with the possibility of occasional meetings, either face-to-face or by electronic means.

2.1.2 Distance teaching, distance learning, open learning – what is the difference?

According to Keegan (1996:36-37), the basic characteristic of distance education that distinguishes it from conventional education is the fact that the instructor and the student are separated. He goes further in defining *distance learning* as only the *learning part* of the distance education process and defining *distance teaching* as the *teaching part* of the distance education process.

Comparing the content found in literature the researcher has come to the conclusion that most authors do not distinguish between "distance teaching" and "distance learning" and that the terms are often used to describe the same concept. The researcher has decided to use the term distance learning to refer to the complete process of distance education.

Bates (1995:27) explains the difference between open learning and DL. Open learning is seen as an educational policy: the provision of learning in a flexible manner, built around the geographical, social and time constraints of individual students, rather than those of an educational institution. DL is one means to that end: it is one way by which students can study in a flexible manner. Open learning may include DL or it may depend on other flexible forms of learning, including a mix of independent study and face-to-face teaching. It may also include other concepts such as open access without prerequisite qualifications. Although open learning and DL can mean different things, the one thing they both have in common is an attempt to provide alternative means of high quality education and training for those who either cannot attend conventional campus-based institutions, or do not want to do so.

2.1.3 The history of DL

Teaching and learning by correspondence is the origin of what is today called DL (Holmberg 1995:3). Correspondence education has been known for several generations, mainly as part of adult education. References to what was probably correspondence education occur as early as the 1720s and to what was indisputably correspondence education in the 1830s. (Battenberg 1971:44; Holmberg 1960: 6-7).

Treat (1999) perceives that at the beginning of the 20th century, with the industrialisation of education, the move towards increased efficiency led to a flurry of theories about the psychology of the student, with one of the most famous being Bloom's taxonomy (*cf. 2.4.1)*. At the same time, there was an increased interest in the use of objectives to make the learning process more systematic and scientific. Correspondence programmes were developed using this scientific approach. Simultaneously the use of instructional technology, such as overhead projectors, slides, and film, became more common in conventional tuition. As the two merged, telecourses (programmes where video material form an integral part of instruction) developed (Spear 1999:2). Telecourses were a great leap from the traditional correspondence programmes, because the students' learning styles were better utilised by visualisations, imagery, music, and the instructor's voice and/or face.

Bates (1995:23) asserts that there are three generations of DL. The first generation is characterised by the predominant use of a single technology and lack of direct student interaction with the instructor originating the instruction. Correspondence education is a typical form of first generation DL.

Second generation DL is characterised by a deliberately integrated multiple-media approach, with learning materials specifically designed for study at a distance, but with two-way communication still mediated by a third person.

The third generation DL is based on two-way communications media which allow for direct interaction between the instructor who originates the

instruction and the remote student – and often between remote students either individually or as groups.

Hawkridge (1995:1) predicted a "Big Bang" of DL, relating to the electronic transformation of the London Stock Exchange when there was an overnight switch from paper to computers. Indeed, as technology advances and its capabilities are better exploited in classroom settings, DL and technology integration is expected to become the rule rather than the exception.

2.1.4 Modes of communication

As described in the previous sub-section, the third generation of DL is based on two-way communications media. According to Janssen (1997) communication can either be one-way, two-way, synchronous or asynchronous.

- *One-way communication*
  One-way communication refers to a situation where content is presented to the student and the student does not need to respond, e.g. when material is presented to a student on videotape.

- *Two-way communication*
  Two-way communication refers to a situation where content is presented to a student and the student is required to respond – either in writing or by using electronic media, e.g. e-mail a response back to the instructor.

- *Synchronous communication*
  Synchronous communication takes place when the student(s) and the instructor(s) communicate via electronic media at a given time, e.g. the student(s) and instructor(s) log into a bulletin board system at, for instance, 14:00 and exchange ideas for an hour.

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- *Synchronous communication*
  Synchronous communication takes place when the student(s) and the instructor(s) communicate via electronic media at a given time, e.g. the student(s) and instructor(s) log into a bulletin board system at, for instance, 14:00 and exchange ideas for an hour.

- *Asynchronous communication*

  Asynchronous communication is not time dependent, e.g. an instructor can send e-mails to the class and each student can respond to the e-mail within a given time period – not necessarily at the same time.

2.1.5 Why teach at a distance?

In a guide developed for faculty of the University of Idaho in the USA, Wills (2001) states that although DL poses many obstacles, the obstacles are outweighed by the opportunities to:

- reach a wider student audience;
- meet the needs of students who are unable to attend on-campus classes and
- link students from different social, cultural, economic and experiential backgrounds.

In an analysis done by Powell, McGuire and Crawford (1999:93-94) it is argued that DL has the following strengths and opportunities:

- the ability to remove barriers of time and place of study;
- the ability to accommodate growth without substantial capital investments in classroom space, laboratories, and other physical facilities;
- the ability to utilise off-site academic expertise because contributions to DL programmes and programmes can be made from any place on the planet;
- the introduction of the Internet allows low-cost synchronous as well as asynchronous student-to-student and student-to-institution interactions;
- the information resources available on the Internet can compensate for the lack of campus-based library resources and
- the potential of offering high-quality, interactive DL programmes nationally as well as internationally.

2.2 DELIVERY OPTIONS IN DL

Winn (1990:55) explains that technology can be used to make information permanent and accessible. It is possible to present information to students, either live or in support materials, in a number of formats that have been designed to optimise learning. This section aims to investigate some of the different options that are currently available and how to go about selecting which media to use.

2.2.1 Printed material

Print is the foundation of DL and the basis from which all other delivery systems have evolved. While the technological developments have added to the repertoire of tools available to the distance instructor, print continues to be a significant component of all distance education programmes (Rowntree 1990:233). Wills (2001) agrees with this statement.

Hartley (1995:279) asserts that the DL student often receives a package of study material, which includes a wide variety of printed materials. These could be study guides, books of readings, text on design and quality assurance of assignments, curriculum planning and assessment guides. Wills (2001) agrees that a DL programme should include a combination of printed materials, e.g. textbooks, study guides, workbooks, programme syllabus and case studies.

A number of different printed material that can be used as part of DL programmes, are now considered:

- *Textbooks*

  Wills (2001) asserts that textbooks should be the basis and primary source of content for the majority of DL programmes. Textbooks play a critical role when the student and instructor are not in daily contact.

- *Study guides*

  The main purpose of a study guide is to guide students in their study through the source of content (Holmberg 1995:71). The study guide could contain some of the content of the programme, but the bulk of content comes from a textbook, a collection of readings or a combination of these two sources. Study guides should include activities, related readings and additional resources available to the student. In deciding to use a study guide an instructor can take advantage of using one or more high-quality textbooks. On the down-side, it is unlikely that an instructor will find a textbook which precisely matches the curriculum. Furthermore textbooks can change editions, go out of print or simply become too expensive for students to buy.

- *Self-contained study manuals*

  Kember (1991:12) distinguishes between study guides and self-contained study manuals. A self-contained study manual contains all the content or subject matter, as well as the guidelines that would be included in a study guide. To produce a self-contained study manual, the instructor therefore has to write everything which would go in a textbook, as well as all the activities which turn it into a tutorial in print. Holmberg (1995:71) agrees with the difference between study guides and self-contained programmes and suggest that the latter may be used in cases where the programme content is fairly elementary and does not call for a study of different sources.

  An advantage of using self-contained study manuals are that programme content can be tailored precisely to the programme. Furthermore, content, examples and case studies can be chosen to be appropriate for the local situation and everything the student needs is under the control of the instructor. The major disadvantage of using self-contained study manuals is the time and resources needed to produce a manual of high quality. Rowntree (1990:86) suggests that fifty hours of development time is needed for one hour of student learning time.

- *Workbooks*

  DL workbooks are often used to provide programme content in an active manner. A typical format may contain an overview, the content to be covered, exercises or case studies to elaborate the points being made and a quiz or test (with an answer key) for self-assessment (Wills 2001).

- *Syllabus*

  DL students should receive a comprehensive and well-planned programme syllabus that provides programme outcomes, performance expectations, descriptions of assignments, related readings, grading criteria and a schedule to be followed by the student in order to cover the content within a given timeframe (Spear 1999:3). A syllabus must be as complete as possible in order to guide the students through the programme in the absence of daily contact with the instructor. Sorrentino (1997) adds that a syllabus should include programme goals, performance objectives, examples of student work as well as information as how to contact the instructor.

The following are some advantages of using printed material:

- From a teaching point of view, print is by tradition a powerful medium. Reading is second nature to most students. As a result, they are easily able to focus on the content without becoming mesmerised or frustrated by the process of utilising all kinds of technology (Wills 2001).
- Print materials can be used in any setting without the need for sophisticated presentation equipment. Given adequate light, print materials can be used any time and any place without the aid of supplemental resources such as electricity, viewing screen and specially designed electronic classrooms. This portability aspect is particularly important for rural students with limited access to advanced technology (Kember 1991:40).

- Both Wills (2001) and Kember (1991:40) agree that print materials are typically student-controlled, meaning that a student can decide in which order to access the material. A student can for instance decide to rapidly move through redundant sections and focus on areas which demand additional attention.
- Printed material is undoubtedly the least expensive instructional tool to produce (Keegan 1996:174). Furthermore, there are many established facilities to produce these materials.
- In comparison to technically sophisticated electronic software, print is both easy and inexpensive to edit and revise. New electronic production leads to printing on demand, meaning it is not necessary to have an estimated number of copies duplicated – but material can be printed as students register (Macdonald-Ross 1995:305).
- It can be argued that printed material can be developed time-effectively, because the developer's primary focus remains on content concerns and not on the technical requirements of the delivery system (Wills 2001).

Literature reveals the following limitations of printed material:

- By its reliance of the written word, printed material can only offer a limited view of reality. Despite the use of excellent sequential illustrations or photos, for example, it is impossible to adequately recreate motion in print (Holmberg 1995:79).
- Printed material is passive and self-directed and it could be argued that it takes more self-motivation from students to read a book than for instance watch a television program. Without feedback and interaction, instruction suffers, regardless of the delivery system in use. Even if feedback mechanisms are incorporated in the material, there is a time-delay before interaction from the instructor takes place. This could lead to students loosing interest (Wills 2001).
- If students do not have good reading skills, the effectiveness of printed material could be crippled (Schlebusch 2000:60).

2.2.2 Audio media

According to Bates (1995:138), audio is perhaps the most undervalued of all media. Audio technology is cheap, easy to use, accessible and generally educational effective. There is a wide range of audio technologies available to educators. These can be divided into one-way and two-way technologies where radio and audio cassettes being examples of one-way technology and audio conferencing being an example of two-way technology.

- *Radio*

  Radio has been used in many different ways for education and training. Most frequently it is used for discussion of programme material or issues covered in the printed materials; discussion of alternative viewpoints to that contained in the printed material; providing aural experiences like music, language learning and sound analysis and also for collecting the views of experiences of specialists. The greatest advantage of radio is that it is an easy and familiar technology for most people. No special skills are required to operate a radio set and even people with low levels of literacy can learn from radio (Bates 1995:139). Holmberg (1995:80) asserts that television and radio broadcasts can have a strong motivational influence on students. However, one of the main weaknesses with radio is the lack of two-way communication between the instructor and the students. In theory phone-in radio programmes provide an opportunity for interactivity between students and the instructor, but the level of interactivity and participation rates are often low when this format is used.

- *Audio cassettes*

  In the words of Bates (1995:148) "audio cassettes plus print are the most cost-effective DL teaching media". Audio cassettes can be used to record broadcasted programmes or it can be used to pre-record lessons that were conducted by the instructor. However, the most effective use of audio cassettes is when the recorded content is tightly integrated with other learning material. Some ways to obtain this goal are to:

- talk students through parts of the printed material (e.g. explain a formula or an equation in more detail);
- talk about real objects that need to be observed (e.g. reproductions of paintings);
- talk students through practical procedures so their hands and eyes are free for the practical activity;
- provide feedback on student activities: cassettes allow answers to be more easily tucked away, thus encouraging students to make more effort to answer the questions themselves rather that search for the answers.

Kember (1991:41) agrees that the use of audio cassettes is particularly appropriate where the instructor use spoken commentary to guide students through textbook pages.

For students, study material presented on audio cassettes offers considerable freedom (Holmberg 1995:82). The content can be designed through the use of stopping instructions and segments, followed by activities, to encourage not only stopping, but mastering learning through repetition, interaction with and reflection on the learning materials. Well-designed audio cassettes, when combined with printed and other material, can result in high levels of interactivity between the student and the learning material. The student is not limited to a narrow range of pre-determined responses, but can be encouraged to think individually and interpretively.

Rowntree (1990:247) asserts that tutoring can take place very effectively when audio tapes are combined with printed material. In this case the instructor talks the student through some form of practical session like setting up an experiment or working on a computer. "Each time an activity is set, the student should be requested to stop the tape and start it once the activity is completed." This approach combines the intimacy of talk with

getting the students to do something else besides listening and students who are not too adept at reading specially benefit from this.

A disadvantage of using the audio cassette is that it is one-way communication and that feedback on the student's responses is limited to what is already in the material.

- *Audio-conferencing*

  Audio-conferencing is the scenario where a number of people are connected via telephone and everyone can hear what any individual in the group is saying. It is thus like being in a "virtual" classroom. Audio-conferencing can be classified as synchronous, two-way communication (*cf. 2.1.4)*. Moore and Thompson (1990:25) assert that using this kind of communication permits a more intensive, more personal and more dynamic dialogue than using one-way communication media and this stimulates student participation. Garrison (1990b:44) mentions that when using audio-conferencing, instructors do not require large amounts of time and money to develop a programme since curriculum and its delivery is likely to be similar to their traditional method of instruction - it is too a large extent analogous to the traditional classroom. On the technical side, audio conferencing requires the use of a special telephone switchboard, called a bridge, which allows several lines to be connected simultaneously (Garrison 1990a:102). Organisations can either install a private bridge into their telephone system or use the facilities provided by the public telephone system.

2.2.3 Television

According to Bates (1995:61) there are many forms of educational television, for example:

- educational broadcasting where programmes are broadcasted on public or private television channels;

- teleprogrammes where lessons are pre-recorded and distributed to students on video cassette and
- interactive television where the instructor and students are connected via video-conferencing media and can interact in various ways.

Wills (2001) combines the above-mentioned methods under the name "instructional television' (ITV). ITV is an effective DL delivery system that can be integrated into the curriculum either as a single lesson, a selected unit or a full programme. ITV can either be one-way or two-way communication. One-way ITV typically involves pre-produced programmes which are distributed by video cassette or by video-based technologies such as broadcast, cable, or satellite. In contrast, two-way ITV provides opportunities for viewer interaction, either with a live instructor or a participating student site (*cf. 2.2.4*).

The following advantages of ITV are found in literature:

- As far back as the 1980s, Bates (1987:6) claims that the following characteristics of television make it valuable for educational purposes: "Television are the only medium that can combine words, still and moving pictures, events occurring in real time, slow or accelerated motion, animation and text. This gives it a power to present information that other media lack". Wills (2001) concludes that ITV is an effective way to take students to new environments, e.g. the moon, a foreign country, or through the lens of a microscope.
- According to Sherry (1996:4), researchers have consistently found that instructional television can motivate and captivate students, and stimulate interest in the learning process.
- In his list of advantages of ITV, Wills (2001) continues by saying that since many people have watched television, the medium is familiar and accessible and students will not have any problems using the technology.

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- Sparkes (1993:142) sees videotapes as being a very effective teaching medium. Video recordings are often better than real demonstrations because it can be replayed, stopped or played in slow-motion. Gunawardena (1990:110) elaborates on this point, stating that videotapes are very versatile as they provide flexibility and student control. Well-designed videotapes present students with the opportunity to interact with the lesson material by repeating until they master it and by reflecting on and analysing the information. Furthermore, video segments can closely be integrated with other learning materials so that students can move between lesson material supplied by different media, e.g. study guides.

The following are a few disadvantages or limitations of ITV:

- Bates (1995:87) states that while professional broadcast production can take advantage of the unique presentational characteristics of television, it distances the instructor from the production and often presents problems related to the integration of television programmes with the rest of the programme material. Broadcast quality ITV is also very expensive to create.
- Spear (1999:2) observes that video production is time consuming and can be technically demanding, often requiring relatively sophisticated production facilities and equipment. Unless professionally produced, video programmes often look amateurish.
- Spear (1999:2) also remarks that once completed, it can be difficult to revise and update the content of ITV programmes and videotapes.
- Despite its ability to reach a large section of the student population, open-broadcast television is a one-way communication medium which does not provide for interaction between the student and the instructor (Gunawardena 1990:110). Videotapes could be used passively, without interaction in which case its instructional effectiveness is limited.

2.2.4 Video-conferencing

Video-conferencing can be classified as a type of teleconferencing. According to Spear (1999:3), the term teleconferencing refers to the situation where an instructor in one area lectures to students at various locations via some kind of telecommunications medium. The telecommunication medium could be:

- audio, in which case it is called audio-conferencing (*cf. 2.2.2*);
- live or recorded video, in which case it is called video-conferencing or
- computers in which case it is called computer-conferencing (*cf. 2.2.5.2)*.

The aim of this section is to look at interactive video-conferencing (IV), the set-up where an instructor in one area lectures to students at various locations and there is two-way video as well as two-way audio communication.

Porter (1997:166-167) describes a typical IV scenario as taking place in a classroom dedicated to this type of instruction. The classroom should be equipped with special consoles, in-table microphones and television monitors. Instructors present information and the television cameras show the viewing audiences in remote locations what is being presented at the site where the broadcast originates. The instructor works from a console where documents, transparencies, computer displays, photographs, slides and other graphics can be displayed by controlling a camera. Microphones located at the console, as well as on the students' desks allow students and instructors to talk to each other within the classroom, as well as discuss coursework with students in remote locations. Many rooms are equipped in such a way that the camera can be switched to show the person who is speaking; in this way, the instructor knows who is speaking and can communicate directly with that student.

Students in a remote location can see what is happening in the site originating the transmission, furthermore, the instructors and students at the origination

site can also see and hear the participants in remote sites. Optimally, this format allows audience questions from remote sites that receive an immediate response from the instructor. Ideally there should be a local instructor on each remote premise who can facilitate individualised learning, feedback, and integration following the distant presentation.

Looking at the technological side of IV, Wills (2001) asserts that most IV systems utilise compressed digital video for the transmission of motion images over data networks such as high capacity Integrated Services Digital Networks (ISDN). The video compression process decreases the amount of data transmitted over the lines by transmitting only the changes in the picture. By minimising the bandwidth required to transmit the images, video compression also reduces the transmission cost. IV data are often transmitted on dedicated T-1 phone lines. These high speed lines are very effective for video-conferencing, but they are typically leased circuits with an expensive monthly cost. The fixed monthly charge is usually based on distance, not usage. Therefore, the cost effectiveness of IV systems increases with use. IV systems can operate at different data rates, at various fractions of T-1 capacity, enabling the transmission of multiple simultaneous video-conferences over the same T-1 circuit. An IV system can also share a T-1 circuit with other digital data uses, such as Internet transmissions or file transfers. Porter (1997:167) continues by indicating that IV can involve a satellite up-link and downlink to provide full-motion presentations and a better image but the cost is much higher than compressed video.

IV can be effective because of the following factors:

- IV provides increased contact between instructors and students because it allows real-time interaction. IV creates the illusion of a real classroom because distant students can still see and hear the instructor as well as other students (Porter 1997:168).
- According to Reed and Woodruff (1995), IV allows the integration of different media in a presentation, e.g. blackboard writing, hand-written

documents, videos, computer slides and other graphics may be incorporated and viewed at all sites.

- IV enables connection with experts in other geographical locations (Reed & Woodruff 1995). Instead of the instructor presenting a lesson, an expert in the region could be invited to present information to remote students.
- Porter (1997:168) mentions an importance advantage of using IV, namely that the televised presentation could be videotaped for later reference or use. Students who missed the conference or who want to review a class session may either borrow or buy the tapes.

The following limitations of IV should be mentioned:

- Certainly the most limiting factor of IV is described by O'Rourke (1999:103) as being the initial cost of the equipment and leasing the lines to transmit conferences.
- Porter (1997:167) indicates that due to the technology used, only a limited number of sites can be linked in an interactive video-conference. Furthermore it is advisable that the groups at the remote sites are kept small (for instance less than 20 students) to enable good interaction.
- Wills (2001) points out that students may be shy to communicate in front of a camera and therefore may remain uninvolved in the lesson.
- If visuals, like hand-written or copied materials, are not properly prepared, students may find it difficult to read.
- On the technical side, if the "pipe" that carries the transmission among sites is not large enough, the students may observe ghost images when rapid movement occurs (Reed & Woodruff 1995). Similarly if the system is not properly configured, class members may observe an audio echo effect. The result is audio interference that detracts from the learning environment.
- Porter (1997:167) raises a valid point by indicating that even if the latest technology is used, the quality of the programme still depends on the

instructor's effectiveness in presenting information to students. Being a presenter in IV requires much more of the instructor than merely giving a lecture. The instructor would have to be trained in using the advanced IV technology. Furthermore, the instructor would preferably have to have a presentational personality and be able to present information in a lively way.

2.2.5 Computers

In recent years, educators have witnessed the rapid development of computer networks, dramatic improvements in the processing power of personal computers, and striking advances in magnetic storage technology. These developments have made the computer a dynamic force in distance education, providing a new and interactive means of overcoming time and distance to reach students (Wills 2001).

In the following sub-section the researcher looks at a number of computer applications for DL.

2.2.5.1 Computer assisted learning (CAL)

Raby (2001) defines CAL as a technique that uses the computer as a self-contained teaching machine to present discrete lessons to achieve specific but limited educational objectives. Information can either be delivered via fixed lessons on a compact disc (CD) or live, via the World Wide Web (WWW). CAL provides perhaps the best opportunity for student self-guided learning (Cann 1997). It is self-paced and self-planned, with the students themselves choosing their own paths through the mass of information encompassed by the package. Successful use of such packages will not only increase students' knowledge, but will require them to develop other important skills, including self-assessment and planning of studies, information technology skills, creativity and self-motivation. Interactive CAL courseware also represents a move towards active learning. If CAL is presented via the WWW, a major concern is the bandwidth restrictions as this determines the speed with which

material is accessed. It could lead to frustration if the interaction with the material is slow. Programme developers should therefore rather consider presenting the lessons via CD.

2.2.5.2 Computer communication technology

One of the main advantages of recent developments in computer and communication technology is that the computer can be used as a tool to facilitate instructor-to-student as well as student-to-student communication. This fact opens up a number of possibilities to enhance DL programmes. Some aspects are mentioned here:

- *Electronic mail*

  Electronic mail (e-mail) can be used to send messages or submit assignments. If there are less than 20 students in the class, e-mail discussion groups could be set up. Scarce (1997) indicates that the Internet is an enormously popular medium of communication that has developed its own interactional norms, expected and accepted behaviours of participants. Students participating in e-mail discussion groups learn to present themselves socially through a particular conversational style, they learn to use Internet etiquette and most importantly learn to think critically by interacting with a text and with one another, thereby developing a multiple-way dialogue.

- *Listserv*

  Listserv stands for "list server" and works like an electronic mailing list, sending e-mail messages to people whose names are on the list (Hofstetter 1998:6). Whenever someone sends e-mail to the listserv, every member of the list will receive a copy. A listserv is thus a simple way for groups of people to communicate with one another through e-mail and allows its members to view all of the messages posted to the list and to post their own messages and replies. Scarce (1997) indicates that

listserves can be used to facilitate discussions where more than 20 students are enrolled in a class .

- *Bulletin board*

  A bulletin board service (BBS) functions like an electronic bulletin board, i.e. an instructor can post notices or other information on the bulletin board and students can access the information by logging into the bulletin board (Hofstetter 1998:3). There are many existing bulletin boards, but it is preferable that an instructor uses special software to create a separate bulletin board for a particular programme (Porter 1997:116). Depending on the software that is used, a BBS can be used in many different ways, e.g. the instructor can post information to students, students can respond by posting messages to the BBS where other students can retrieve it, students can have on-line, synchronous dialogue and partake in other on-line activities. The BBS is thus mainly used to facilitate instructor-to-student and student-to-student communication.

- *Computer-conferencing*

  Computer-conferencing is two-way synchronous communication (*cf. 2.1.4)* and involves individuals who are connected via computers equipped with a camera, sound system and computer conferencing software (Porter 1997:170). The individuals can be seen and heard by all participants logged into the conference. Instructors and students can discuss information, ask and respond to questions and share documents and other materials in real time. A major advantage is that participants do not have to meet at a pre-arranged site to be able to communicate. However, although computer conferencing allows participants to work together in real time, it does not create the same classroom feeling as video-conferencing because students still primarily work alone at a personal computer. Furthermore, there are a number of technical stumbling blocks to overcome: every student's computer must be equipped with the required technology; often the response time is slow and there may be a

lag in communication between the moment a person finishes speaking and the moment communication arrives on screen.

- *World Wide Web*

  The *World Wide Web (WWW)* is a networked hypertext system that allows documents to be shared over the Internet (Hofstetter 1998:10). As the WWW's wealth of information and accessibility grows, this medium has taken on a more prominent role in society. An advantage of this technology is the ease and instantaneous access to a magnitude of resources, opening new doors to the educational process. Students no longer have to be satisfied with out-dated videos and books for their information, the WWW showcases the most current materials, which are easily and often updated all over the world (Rosen 1997). Information stored on a web-site can include hypermedia (such as video clips, animation, sound effects, music, photographs and other graphics), hypertext (documents), and other unlinked text or graphics (Porter 1997:21). The prefix *hyper* simply means that the information has been designed to link a piece of information with another related piece of information.

  One of the ways to incorporate the WWW in a programme, is to use it as an electronic reserve shelve. The concept of an electronic reserve shelf is an innovative instructional tool that allows instructors to bring more real-life and frequently-updated material into the classroom (Kuechler 1997). This helps to get students involved in actual research beyond the confines of traditional library research. In its basic form an electronic reserve shelf mirrors the traditional reserve shelf for a particular programme in the campus library. The instructor can put any of the following on this shelf: homework, assignments, guidelines for writing a paper, newspaper clippings, class handouts, additional readings, sample work by students and much more. The advantages are firstly that several students can access the same piece of information simultaneously and secondly that additions and modifications are easy to make so instructors are more likely

to broaden the range of materials. The electronic reserve shelf can be expanded to include web-site links to related documents.

2.2.5.3 Web-based instruction

A web-based programme uses a web-site as a virtual classroom (Spear 1999:2). A web-site forms the basis of the programme and in contrast with simply using the WWW as an electronic reserve shelf, the programme web-site features all activities surrounding the particular programme, e.g. syllabus, work scheme, assignments, students' marks and all other information students need to have. Although the basic coursework may be completed by using information and resources linked through the web-page, it could be assumed that students taking web-based programmes also have access to e-mail, mailing lists, bulletin boards and other Internet services. Therefore, these Internet-related activities are often an expected part of a web-based programme. Vogeler (1997) states that an advantage of web-based instruction is that instructors have the opportunity to re-enforce learning by providing lecture notes, visuals for review, and additional materials quickly and inexpensively. Programme material can easily and constantly be updated by uploading it to the web-site. Furthermore, instructors can have continual feedback from students via e-mail. Teaching and learning simply becomes globally interactive.

2.2.6 Selecting media

According to Bosworth (1991:95), there is a strong temptation to introduce fancy technology just because it is available. Instructors are urged to resist the attitude of "I *must* use this kind of technology", but to rather start by saying "My students have to learn this – how can I best present it to them?" This principle is also underlined by Wills (2001), when stating that although the promise of new and emerging technologies continues to be realised, sound instructional design practices need to be employed in order to maintain the proper focus on the educational process.

According to a report set up through the Innovations in Distance Education (IDE) Project (1995), a thorough analysis of the role of the instructional media and supporting tools in achieving the learning outcomes, an understanding of the impact of the use of technology, and careful consideration of the characteristics of the distance student should drive the media selection and application process. The following principles should be taken into consideration:

- The selection and use of instructional media should be based upon their ability to support the predetermined learning outcomes of the learning programme. One should be aware of the fact that technologies may produce learning impediments as well as benefits. When infusing technology into the learning environment, the potential arises to incorporate superficially innovative strategies that may actually complicate or hinder learning. Such counterproductive activities, however attractive, can rob students of time and hinder their ability to focus on what is to be learned. Williams, Paprock and Covington (1999:108) remark that it is important not to get so wrapped up in the technology that the technology drives the methods. Instructors should focus on the fact that the outcomes determine the teaching methods and techniques.
- The selection of instructional media should be influenced by their accessibility by students. This fact is agreed upon by Holmberg (1995:84) who states that a DL programme should incorporate a technology base that is appropriate for the widest range of students within that programme's target audience. The circumstances of social infrastructure, technical development and cost must be considered. Costs could be controlled by using the lowest-level technologies capable of supporting the student in achieving the learning objectives. Since distance students may not have immediate and ready access to technical support services, technologies should be selected that are stable and predictable and that are positioned comfortably behind the "leading-edge technologies" that represent higher risk of failure.

- The design of DL programmes should reflect the diversity of potential students. The unique contexts, in which students live and work, may influence the way they think about, and use instructional media. The programme designer should take into consideration what influence the student's age, maturity, social, economic, and cultural backgrounds will have on their ability to use and benefit from the selected media. It is imperative that students should have a functional level of familiarity with the media that are being considered – if not, the necessary training and practice required to gain a functional competence with the selected media should be built into the programme.
- If the programme relies on some component of electronic technology for delivery, e.g. video-conferencing (*cf. 2.2.4*), contingency strategies should be planned to provide a quick recovery from technology-related interruptions. Students should be informed what to do, should the supporting technologies fail.

Although the IDE report states that DL programme design should employ a systematic design model to guide the selection of instructional media, Holmberg (1995:84) claims that over the years a number of media selection models have been introduced but that no such taxonomy has shown to be generally useful or applicable. Even in modern times, the statement of Schramm (1977:263) is still applicable: "There is no cookbook recipe for media selection that can be applied automatically in every educational system". A mixed media approach where a number of different types of media are selected in the design of DL programmes often delivers the best results (Spear 1999:2).

2.3 INSTRUCTIONAL DESIGN FOR DL

After looking at the different methods available for presenting DL programmes, the researcher will now explore ways of designing a DL programme.

According to Treat (1999), instructional design (ID) provides a process and framework for systematically planning, developing and adapting instruction based on identifiable student needs and the content requirements. Hodgkinson (1994:60) states that designing a new programme is a complex exercise and needs careful planning. The process of doing so in order to meet flexible needs is best achieved collaboratively, preferably after discussion with experienced instructors. Dick and Carey (1990:5) list a number of different models for ID found in literature. They conclude that most models propose a combination of the stages as listed in *Fig 2.1*:

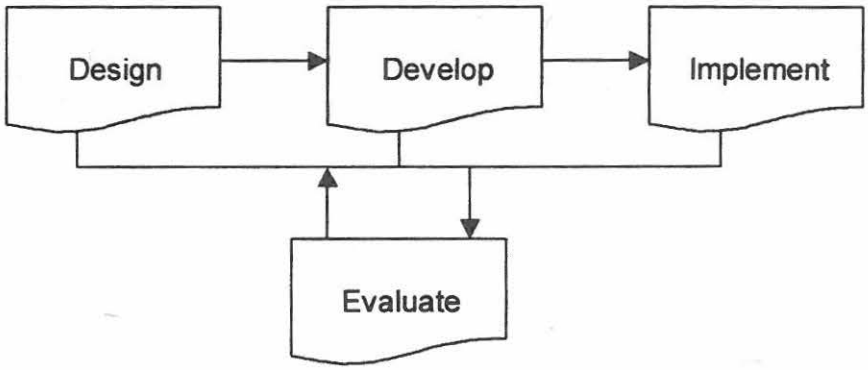

Fig. 2.1

2.3.1 The design process

In the induction pack for writers by the Open Training and Educational Network (OTEN 1994:11), writers of programme material are instructed to start the process by developing an instructional plan. The guide suggests a number of aspects to be included in the instructional plan. A closer look at each of these now follows:

- *Learning outcomes*

  The first step in designing programme materials should be to set out learning outcomes (Treat 1999). It is suggested that these outcomes should be set out clearly at the start of the writing process and should be used for reinforcement and motivation during progress through the programme. Melton (1997:29) defines learning outcomes as statements of

desired outcomes of learning expressed in terms that make it clear how measurement can be achieved. He goes further in saying that these outcomes provide a logical basis for measuring and reporting on student achievement because attention is focused on what is to be learnt rather than on the process of learning. In defining the learning outcomes, one could be guided by the well-known Bloom's taxonomy where intellectual objectives are placed in a system from simple to complex. The following six levels indicated in fig. 2.2 are identified (Van der Horst & McDonald 1997:13):

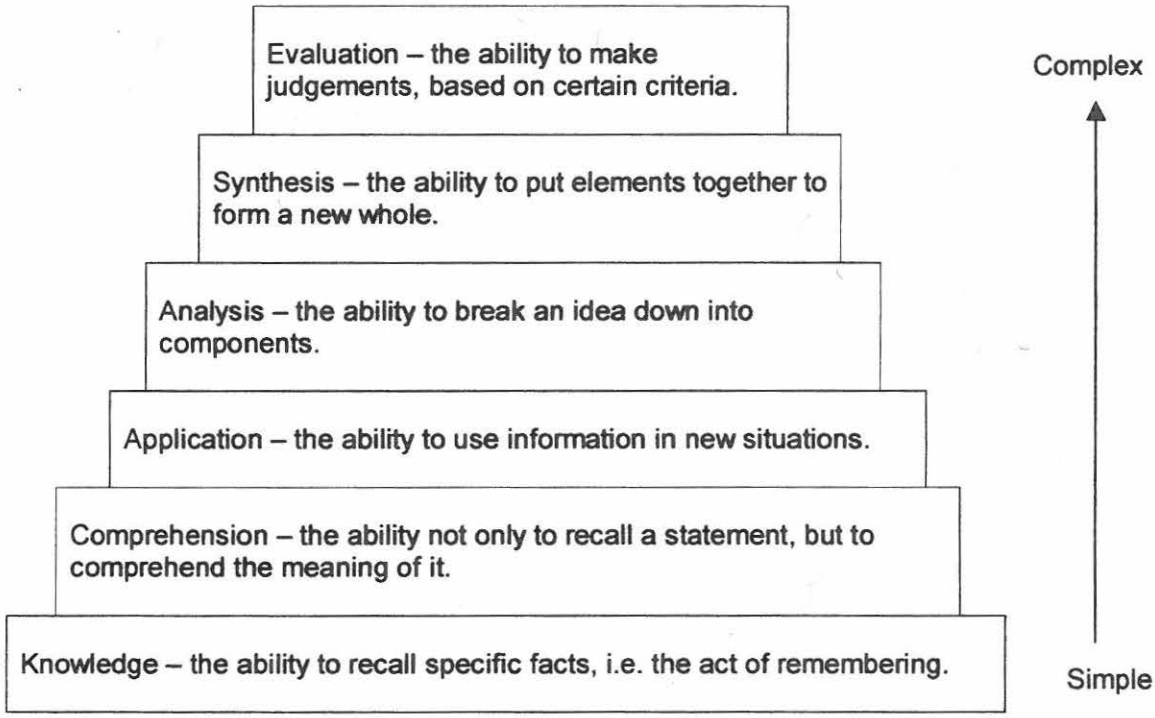

Fig. 2.2

Van der Horst and McDonald provide a list of action words associated with each of the levels (1997:58). Suggestions how these words could be used to write outcomes are given in sub-section 3.2.

- *Framework and content outline*

  Melton (1997:51) states that developing a framework for the programme forms an important part of the design process. The framework must indicate how the programme will be broken down into units of instruction and thereafter into related study sessions. It should also outline a study schedule indicating the time allocated to each of the study units. The content which will be covered in relation to each learning outcome should be identified and outlined. Wills (2001) proposes that before selecting the content, the instructor should analyse the students that will be enrolling for the programme. Factors like their ages, cultural backgrounds, past experiences, interests and educational levels should be considered. The student analysis alongside with the learning outcomes should then form the basis for selecting the content.

- *Media*

  The media which will be used to deliver the content should be selected. As stated previously (*cf. 2.2*), media could include printed material, audio and video cassettes as well as using a wide range of teleconferencing or computer-related communication techniques. A framework for selecting media has already been discussed (*cf. 2.2.6*). The challenge here is to integrate delivery components, based on identifiable student needs, content requirements and technological constraints.

- *Assessment methods*

  The methods that will be used to assess students' attainment of the learning outcomes have to be selected. Kember (1991:140) gives a detailed summary of the types of assessment that are available (*cf. fig 2.3*). The selection of assessment methods will be influenced by the content that will be assessed and whether continuous assessment and/or an end-of-the-programme examination will be used. Continuous assessment, which are done throughout the programme, is both formative and summative (*cf. 2.3.3.4*) whilst end-of-programme examinations are being seen as summative. When using continuous assessment, the timing

of the assessment plays an important role in the overall effectiveness thereof. One should bear in mind that early in the programme the students may not have learnt anything significant enough for testing, but on the other hand an early assignment provides an opportunity for early interaction and feedback. Furthermore it is desirable that assignments be related to major sections of content and that it is spread evenly throughout the programme schedule to generate regular feedback to and from students. Treat (1999) indicates that deciding on assessment procedures and the timing thereof forms an integral part of the design process. Thorpe (1993:67) asserts that apart from formal assessment, student self-evaluation should form an important part of DL assessment strategies. Two approaches can be used, i.e. activities based on the content material and self-review questions. The purpose of both is to help students to reflect back on a period of learning.

	Assessment	**Assessed**	**Advantages**	**Disadvantages**
1.	Traditional essay questions	Memory for facts, understanding of ideas, ability to organise material	Easy to set	Time consuming to mark, marking unreliable, poor coverage of syllabus
2.	Short-answer written questions	Memory for facts, understanding of ideas, theories	Broad coverage of syllabus, fast marking, more reliable marking, more feedback to students	Limited opportunity to show argument or originality
3.	Multiple-choice questions	Memory for facts, understanding of ideas, application of principles	Fast marking, reliable marking, broad coverage of syllabus, more feedback to students	Difficult to prepare without faults, cannot assess skills of organising or originality
4.	Practicals	Practical skills, application of principles	Only valid method for assessing such skills	Time-consuming, low reliability of marking, difficult to standardise questions
5.	Projects	Ability to plan original work, to seek relevant information, to develop an argument, to draw appropriate conclusions	Develops important skills in the student, reveals depth of thoughts	Difficult to assess objectively

Fig. 2.3

- *Miscellaneous*

  The final aspect listed by OTEN (1994:11) to form part of the instruction plan, is a summary of other items of information which would be relevant to the development of the programme, e.g. support services and existing resources.

The following schematic way in which to present an instructional plan is proposed:

Programme Name:					
Learning outcomes	**Content outline**	**Media**	**Teaching strategies**	**Assessment strategies**	**Other**
This should list in clear and assessable terms what students should be able to do after completing the programme. Where relevant the assessment criteria and conditions of performance should be stated as well.	This should provide a detailed and logically structured outline of the content which will be covered for each learning outcome	This should list the media which will be chosen to present the content for each learning outcome, e.g. print, video, etc.	These should list how the content will be taught by the selected media. Both the presentation and practice strategies should be spelt out.	These should specify how, where and when each learning outcome will be assessed. How refers to the type of assessment; where refers to self-assessment, assignment, examination, etc; when must indicate at what point in the programme assessment will take place.	This may contain items like additional resources or support services which will be used in helping students achieve each learning outcome.

Fig. 2.4

OTEN (1994:13) asserts that an instructional plan should be set up for the programme as a whole, but it is also helpful to set up an individual plan for each module. Setting up an instructional plan contributes to:

- clarifying and structuring thoughts on the major issues to be addressed in developing the module;
- ensuring that the focus of the module is on the learning outcomes and that the selected content, media and assessment strategies will enable students to achieve the specified outcomes;
- saving time in writing and rewriting a module and
- ensuring that the instruction is developed systematically and coherently.

2.3.2 The development process

In the development process the focus is mainly on developing the content of instruction, activities and assignments that relate to the learning outcomes (Melton 1997:57).

Harrison (1991:200) addresses a number of practical ways to write good study material. Some basic principles are proposed that will ensure good page design, e.g. that the writer avoids writing too much text on one page, use unjustified right-hand margins as it is easier to read, avoid too many different font types and only use graphics when it really serves a purpose. According to Harrison (1991:203), page design cannot be considered in isolation – if the instructional design is poor then no amount of cosmetic presentation will make it effective. Keeping in mind a clear image of the target group and the performance expected of the students contributes toward writing good content. Hodgekinson (1994:63) agrees that one of the central concepts regarding DL text is readability. This has little to do with the content of text in terms of its complexity and everything to do with print, word length and grammatical structure. An easily readable font and font size should be selected and sentences should be kept short.

Harrison (1991:207) lists some practical guidelines to make writing clear and effective. He suggests to use active voice instead of passive voice sentences, make writing personal by using words like "you" and "me", keep content clear, concise and coherent by using short sentences and cutting out redundant

information. It is also preferable that material is divided into sections. The OTEN guide (1994:16) underlines some of the previous statements by suggesting that the writing style for DL materials should be plain, conversational English. This could be established by using simple, active voice sentences, familiar words, personal pronouns (e.g. I, you, we), contractions (e.g. I'm, let's), a friendly tone and humour, where relevant.

Kember (1991:11) states that one of the ideal characteristics of DL study material should be that it is self-instructional. Rowntree (1990:11) describes self-instructional material as study material specially written with particular programme objectives in mind. Furthermore, it must be structured in such a way that students can do most, if not all, their learning from the materials alone. "The materials must carry out all the functions an instructor would carry out in a conventional situation – guiding, motivating, explaining and so on." The student must be guided through the programme material in such a way that (s)he should be able to attain the learning outcomes with minimal contact by the instructor. One way of reaching this goal is to use the active learning approach where content is combined with activities. The OTEN guide (1994:18) also elaborates on the importance of activities in DL learning materials. It is stated that activities help students to practice newly acquired skills, check their own understanding of material, apply and transfer their learning into realistic situations, think for themselves, become self-directed students, enter into dialog with their tutors and focus on key areas of learning.

Treat (1999) lists the following factors to be considered when designing activities:

- the purpose of the activity, e.g. is it teaching, self-assessment or formal assessment;
- the requirements of the curriculum, e.g. the type of questions that was decided on, the weight of the grades to be awarded in comparison with the final grade and the time allocated for the activity;
- the validity of the task, i.e. will it accurately test the learning outcomes;

- the reliability of the activity, i.e. will it produce similar results with similar target students;
- the institution's policy on assessable activities, e.g. the frequency and logistics of administering assignments, tests and how to provide feedback and
- the characteristics of the target students, e.g. their background, prior knowledge and age.

The following are guidelines for developing activities:

- Melton (1997:87) indicates that good activities are developed to match the learning outcomes. They should be carefully selected to help students achieve the outcomes and should appear in order of increasing difficulty.
- Activities should be realistic and manageable for students to complete in time using the resources they have available (OTEN 1994:19).
- Activities should be varied as much as possible to accommodate a variety of learning styles and maintain student's interest (OTEN 1994:19).
- Kember (1991:56) states that activities should preferably not be grouped at the end of a module, but rather be interspersed with content.

The developing process is not concluded before supplementary audio tapes, video tapes and/or ITV programmes are developed. The techniques for developing each type of media is highly specialised and falls outside the scope of this study.

2.3.3 The implementation and evaluation processes

According to *fig. 2.1*, there are two more processes in instructional design, i.e. implementation and evaluation. It is the view of the researcher that these two processes should preferably be combined, i.e. that a programme be implemented prior to data being collected for evaluation purposes.

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2.3.3.1 Definition of evaluation

In the words of Rowntree, evaluation is "the process of getting various people's reactions to your programme – with a view of improving it" (1990:333).

Thorpe defines evaluation as "the collection, analysis and interpretation of information about any aspect of a programme of education and training, as part of a recognised process of judging its effectiveness, its efficiency and any other outcomes it may have" (1993:5). She further elaborates on the definition by indicating the following:

- Some activities like recording attendance, meeting local sponsors and interviewing tutors, who are not normally thought of as evaluation, can become part of evaluation if so planned.
- Evaluation is not synonymous with assessment. Examination results and continuous assessment are relevant data for most evaluative purposes, because they measure the outcomes, but like many other indicators they do not so much provide the answers as suggest the need for further information and explanation. This view is supported by Calder (1995:200) who indicates that the term evaluation refers primarily to the evaluation of the teaching and organising of activities which support student learning. Assessment of student performance is only one aspect of the process.
- Whatever form evaluation takes, it typically has three components - data collection, analysis and interpretation. Thorpe (1993:5) chooses to use the word *components* rather than *phases*, because they are often not distinct stages, but overlapping - and in some approaches there may be several rounds of collection, analysis and interpretation.

2.3.3.2 Why evaluate?

Within distance education it is axiomatic to undertake programme evaluation in order to assure and improve the quality of programmes offered to students

(Chambers 1996:343). The reason for the above statement by Chambers is that in DL spatial and temporal separation of instructor from student may result in a mismatch between their respective expectations, or programmes may fail to engage students' interest or teach them effectively. Moreover, many of these programmes are expensive to produce. Accordingly, comprehensive evaluation encompasses processes of programme development and systems for production delivery, as well as the quality of programme materials themselves. Such evaluation has a practical purpose, namely to inform policy-makers and managers at various levels within the institution, including programme writer-producers, enabling all of them to strive for improved quality of provision, more efficient use of resources and increased student numbers and rates of retention.

Referring to instructors in a face-to-face class, Treat (1999) asserts that effective instructors use a variety of means, some formal and other informal, to determine how much and how well their students are learning. For example, to formally evaluate student learning, most instructors use quizzes, tests, examinations and homework assignments. These formal evaluation techniques help the instructor to evaluate student achievement and assign grades. Furthermore, instructors typically use a number of informal evaluation techniques like posing questions, listening carefully to student questions and monitoring the body language and facial expressions. Informal evaluations often permit instructors to adjust their teaching, i.e. slow down or review material response to questions, confusions and misunderstandings; or to move on when student performance exceeds expectations. DL, however, differs in many ways from traditional classrooms: instructors may no longer have a relatively homogeneous group of students, face-to-face feedback during class, total control over the delivery system or convenient opportunities to talk to students individually. For these reasons, DL instructors may find it useful to not only formally evaluate students through testing and assignments, but to use a more informal approach in collecting data to determine factors which may lead to the success of the programme (Angelo & Cross 1993: 76).

2.3.3.3 What should be evaluated?

According to Wills (2001), the following factors relating to a DL programme should be evaluated:

- the use of technology, i.e. familiarity, concerns, problems, positive aspects and attitude towards the technology;
- the quantity and quality of interaction with other students and with the instructor;
- programme content, i.e. the relevancy, adequate body of knowledge and layout;
- the assessment methods, i.e. the frequency and relevancy of tests and assignments;
- the support services, i.e. the support that students get from the organisation as a whole as well as the instructor as an individual;
- student achievement, looking at the rate of participation of students and the marks obtained for assignments and
- the instructor, to determine his/her contribution to the effectiveness of the programme through being organiser, leader, facilitator and mentor.

According to Thorpe (1993:7) some of the essential elements of a DL programme that should be evaluated are:

- the achievement of the outcomes of the programme as a whole;
- the effectiveness of the programme materials;
- the scope of the effort that was put into the programme, e.g. the number of staff involved, the number of students involved, the content and number of contact hours and the time spent by students;
- the comparative effectiveness of different ways of providing the same service;

- finding out any unintended effects of a programme, whether on students, clients or DL staff members;
- the kind of help students need at different stages of the programme and
- the factors which appear to affect the outcomes of the programme.

Holmberg (1995:187) stresses the need not only to evaluate the pre-produced programme as a product, but also the tutoring and counselling belonging to it.

Keegan (1996:186) observes that evaluation should focus on the quantity, quality, status and relative cost of the learning achieved:

- In evaluating the quantity that the learning achieved one could consider the number of students enrolled, the number of students that passed the final examination, the number of drop-outs and all other aspects of the programme that could be quantified.
- In evaluating the quality of the learning, one could look at the quality of the learning materials, the extent to which the DL is a suitable vehicle for educating students in the specific subject and the extent to which education is provided as opposed to instruction.
- Evaluating the status of the learning could be derived from the extent to which other educational institutions recognise the studies for credit transfer purposes, the acceptance of the qualification awarded as qualifying students to go on to higher level studies and the recognition of the awards by managers in competitive interviews for employment.
- In evaluating the relative cost of the learning achieved one should determine whether the programme is cost-efficient to be presented in DL mode as opposed to being presented as a contact tuition programme.

2.3.3.4 Types of evaluation

Lockwood (1995:197) indicates that evaluation can either be formative or summative.

- Formative evaluation is an on-going process to be considered at all stages of instruction. It enables the instructor to improve the programme as it proceeds. This kind of evaluation will identify major gaps in the instructional plan or the need for minor adjustments and facilitates programme and content adaptation. Calder (1995:22) explains that evaluation is formative when it is used with the intention of developing or improving the functioning of an activity or the effectiveness of a component. Thorpe (1993:9) ascertains that formative evaluation is concerned with the evaluation of progress towards achieving programme outcomes, during implementation. It typically answers the questions: "How are we/they doing?", "What should we be doing next?". It aims not to measure the effectiveness of a programme, but to identify any changes it requires which will improve it and make it more likely to eventually achieve its outcomes.
- Summative evaluation assesses the overall effectiveness of the finished programme. Because summative evaluation is usually done at the end of a programme, it will not help current students but can be used as a springboard in developing a revision plan or form the baseline of information for designing a new programme. In the words of Thorpe (1993:9), summative evaluation is usually aimed at assessing the effectiveness of a programme on completion and typically aims to answer the questions: "Were aims achieved?", "Was it worth doing?", "Is it worth continuing?"

In this study both formative and summative evaluation will be used to evaluate the DL programme through action research *(cf. 4.5.2)*.

2.4 OVERVIEW OF RESEARCH ON DL

DL is perceived as an increasingly effective method of instruction, therefore many educational researchers have examined issues related to this topic. To conclude this chapter the researcher will now give an overview of research findings in this field.

2.4.1 Distance learning vs. traditional education

Conclusions drawn from this line of research suggest the following:

- In comparing DL to traditional face-to-face instruction, it has been indicated that teaching and studying at a distance can be as effective as traditional instruction when the method and technologies used are appropriate to the instructional tasks, there is student-to-student interaction, and when there is timely instructor-to-student feedback (Verduin & Clark 1991:20).
- The instructional format itself (e.g., interactive video vs. videotape vs. "live" instructor) has little effect on student achievement as long as the delivery technology is appropriate to the content being offered and all participants have access to the same technology (Wills 2001).
- Achievement on various tests administered by instructors tends to be higher for distant as opposed to traditional students (Souder 1993:40).
- No significant difference in positive attitudes toward programme material is apparent between distant and traditional students (Martin & Rainey, 1993:58).
- Conventional instruction is perceived to be better organised and more clearly presented than DL (Egan, Sebastian & Welch 1991:3).

2.4.2 Why are DL students successful?

Research suggests that DL students bring basic characteristics to their learning experience which influence their success. Schlosser and Anderson (1994:20) found that DL students:

- are voluntarily seeking further education;
- have post-secondary education goals with expectations for higher grades;
- are highly motivated and self-disciplined and are older.

Studies also conclude that similar factors determine successful learning whether the students are distant or traditional. These factors include (Ross & Powell 1990:10; Bernt & Bugbee 1993:100):

- willingness to initiate calls to instructors for assistance;
- possessing a more serious attitude toward the programmes;
- employment in a field where career advances can be readily "achieved through academic upgrading in a distance education environment" and
- previous completion of a college degree.

2.4.3 Why is DL instruction successful?

Good DL practices are fundamentally similar to good traditional teaching practices and "those factors which influence good instruction may be generally universal across different environments and populations." (Wilkes & Burnham 1991:46). Because DL and its technologies require extensive planning and preparation, Egan *et al.* (1991:35) suggest that DL instructors must consider the following in order to improve their effectiveness:

- Extensive pre-planning and formative evaluation is necessary.
- Students benefit significantly from a well-designed syllabus and presentation outlines. Structured note taking, using tools such as interactive study guides, and the use of visuals and graphics as part of the syllabus and presentation outlines contribute to student understanding of the content. However, these visuals must be tailored to the characteristics of the medium and to the characteristics of the students.
- Instructors must be properly trained both in the use of equipment and in those techniques proven effective in the DL environment. Students get more from the programmes when the instructor seems comfortable with the technology, maintains eye contact with the camera, repeats questions, and possesses a sense of humour.

2.4.4 How important is interaction?

Many distant students require support and guidance to make the most of their DL experiences (Wills 2001). This support typically takes the form of some combination of student-instructor and student-student interaction. Research findings on the need for interaction have produced some important guidelines for instructors organising programmes for DL students:

- Students value timely feedback regarding programme assignments, exams, and projects (Egan *et al.* 1991:40).
- Students benefit significantly from their involvement in small learning groups. These groups provide support and encouragement along with extra feedback on programme assignments. Most importantly, the groups foster the feeling that if help is needed it is readily available (Egan *et al.* 1991:46).
- Students are more motivated if they are in frequent contact with the instructor. More structured contact may be utilised as a motivational tool (Coldeway, MacRury & Spencer 1980:45).
- Utilisation of on-site facilitators who develop a personal rapport with students and who are familiar with equipment and other programme materials increases student satisfaction with programmes (Burge & Howard 1990:6).

2.4.5 Cost vs. benefits

Research has shown that the costs of offering DL programmes tend to be higher than those of traditional classes, although this depends too a large extent on what technologies are incorporated in the DL programme. As mentioned before (*cf. 2.1.5*) there are many benefits for using DL. In deciding whether the costs outweigh the benefits, the question which that institutions must answer is whether it is part of their mission as educators to offer

programmes to those who might not be reached without DL. The primary benefit for educational institutions offering DL may be the increased number of non-traditional students they are able to attract and serve. Research also suggests that, as programmes become more efficient, programme costs should decrease (Ludlow 1994:3).

In this chapter the researcher investigated several aspects of DL as the aim of this study is to develop a DL programme. The following chapter will focus on another requirement for the proposed programme, namely OBE.

LINKING OUTCOMES-BASED EDUCATION WITH COMPUTER LITERACY

3.1 DEFINITION OF OUTCOMES-BASED EDUCATION

Killen (2001:2) gives a simple definition of outcomes-based education (OBE) by stating that OBE is an approach to planning, delivering and evaluating instruction that requires instructors and students to focus their attention and efforts on the desired end results of education, particularly when those end results are expressed in terms of student learning.

Malan (1997:10) elaborates on Killen's definition by stating that "education – the process of teaching and learning – is outcomes-based when it accepts as its premise that the definition of outcomes should form the basis of all educational activity, including the description of qualifications, the development of curricula, the assessment of students, the development of educational structures and institutions and even the planning of finances, buildings and other resource".

Spady's view (1994a:1) is that OBE means clearly focusing and organising everything in an educational system around what is essential for all students to be able to do successfully at the end of their learning experiences. This means starting with a clear picture of what is important for students to be able to do, then organising the curriculum, instruction and assessment to make sure this learning ultimately happens.

The Department of Education (1997b:16–18) agrees with Spady (1994a:81–101), in distinguishing three different types of OBE. The following different models are noted:

- Traditional OBE is similar to the old "objectives" approach. It focuses on clearly defined outcomes, but these are narrow (rather than holistic) and are often not linked to the student's ability to use this learning in work or life. Outcomes are often drawn from the content of an existing syllabus and there is no clear picture of how the long-term outcomes of learning relate to each other or society.
- In transitional OBE the focus is higher order outcomes in response to the question: "What is most essential for the students to know, be able to do and to be like in order to be successful once they've graduated?" It focuses on the qualities students will need to operate competently in society. The syllabus provides some of the content but the educator designs activities that assist students in achieving outcomes beyond the narrow objectives of the syllabus. There is a shift towards integrating teaching across subject boundaries.
- Transformational OBE arises from a sense that the existing education system and syllabus impede the development of a new society and do not meet the needs of students. It is a system transformation approach in which curriculum instruction, assessment and accreditation are directly based on and designed around a future focused exit-outcome framework.

3.2 KEY ELEMENTS OF OBE

An analysis of the underlying principles of OBE reveals the following:

- All decisions are driven by the vision of what the student should be able to do and not merely know (Killen 1998:2).
- OBE relies on the technique of mastery learning, based on the assumption that all students can learn and succeed and that failure is not an option (Van der Horst & McDonald 1997:11). The general aim of mastery learning is to ensure that students are granted opportunities to be successful at most tasks, by providing an appropriate learning environment, materials and back-up guidance.

- Spady and Marshall (1991:61) further state that OBE is built upon the principle that success breeds success and that schools control the conditions that determine whether or not students succeed.
- Mamary (1991:25) indicates that in an OBE system it is expected of students to collaborate in learning rather than to compete with one another.

The following table lists some of the differences between OBE and traditional education (Department of Education 1997c:10; Spady 1994a:6-8):

TRADITIONAL	OBE
Students are passive students	Students are active students
Student do mostly rote-learning	Students are required to do critical thinking, reasoning and reflection.
The syllabus is content-based and broken down into subjects.	Knowledge is integrated across subjects and learning is relevant and connected to real-life situations.
Learning is based on a textbook or worksheets.	Learning is student-centred. The instructor is more of a facilitator guiding students to use a number of different resources.
The instructor is responsible for learning and the motivation of students depend on the personality of the instructor.	Students take responsibility for their learning. Students are motivated by constant feedback and affirmation.
The educational system consists of a curriculum structure that are not focused on clearly defined outcomes, but often treated as ends in themselves.	Everything, i.e. curricula, instructional strategies, assessments and performance standards are developed and implemented to facilitate key outcomes.
A time scheduled based on the calendar control student learning and success.	Time is used as an alterable resource, depending on the needs of instructors and students. It is taken into consideration that some students learn some parts of a curriculum sooner, while others accomplish those parts later.
The system rewards students for how well they do assigned work at the time it is initially covered in class – those who are fast emerge with the best grades – those who are slower never gets the opportunity to truly catch up.	The focus is on increasing students' learning and ultimate performance abilities to the highest possible level before they leave school, i.e. takes a macro view of student learning and achievement.

Fig. 3.1

In trying to obtain an answer to the question "Why should OBE be considered as an educational system?" the researcher found a number of advantages of OBE listed in literature.

The Department of Institutional Development of Vista University (1997:1) lists the following as rationale for OBE:

- create life-long students;
- remove boundaries between education and training;
- establish credible standards;
- make education accessible to all and
- establish a flexible education system.

Van der Horst and McDonald (1997:14) see the following to be advantages of OBE:

- In OBE instructors are forced to plan and prepare with a clear instructional purpose in mind because the learning outcomes guide the instructor's content selection and strategic planning.
- Students know exactly what is expected of them and they can measure their own achievement. Because students feel in control of their learning, they are more motivated to succeed.
- Schools can accurately monitor the student's progress in terms of specific learning attainments.

McGhan in Van der Horst and McDonald (1997:15) states that the advantages of OBE include the following:

- Permanent failure is eliminated, i.e. students who have not achieved the required standard will be granted further opportunities to do so.

- Rote learning is reduced, whilst understanding of content is more important than merely being able to reproduce knowledge.
- Absorption of miscellaneous, discrete facts is eliminated whilst understanding in context is required.
- The student's ability to appreciate and deal with realistic situations like those that they will encounter after school is increased since the emphasis is on knowledge, skills and values.

Although OBE most definitely has advantages, Van der Horst and McDonald (1997:16) remind us that OBE can not be regarded as a magical cure for all the educational ills of the present and past. The effectiveness of OBE does not mainly depend on the underlying principles of the approach, but rather on the instructor's abilities to implement such an approach since it requires hard work, careful planning and sensitivity to the learning process. It is imperative that instructors should be properly trained and supported in the application of OBE.

3.3 OUTCOMES IN OBE

According to Killen (2001:2), outcomes can be defined as what you can do and what you understand, the contextually demonstrated end-products of the learning process. Outcomes are the results of the learning process, i.e. knowledge, skills, attitudes and values, within a particular context so that knowledge is applied, skills develop into competencies and attitude and values harmonise with those of the workplace. An outcome is only an outcome if it can be demonstrated and measured.

Spady (1994a:49) asserts that outcomes are the learning results that are desired from students that lead to culminating demonstrations. The word "culminating" is used because the results and their demonstrations occur at the end of a significant learning experience. Outcomes are thus not simply the things students believe, feel, remember, know or understand, but rather that

what they can actually do with what they know and understand. Isaacman (1996:8) agrees by stating "an outcome is anything which you can show that you know and can do".

OBE in the South African context is discussed in detail in sub-section 3.5. At this stage it suffices to explain the three types of outcomes that are found in the South African OBE education system. The outcomes as listed by the Department of Education (1997a:7–10) are:

- *Critical cross-field outcomes*

  Critical cross-field outcomes are general outcomes and apply to all learning areas. SAQA (*cf. 3.5.1*) selected seven critical cross-field outcomes which should serve as guidelines for all other outcomes defined for South African students. The seven critical cross-field outcomes are:

  - Students should be able to identify and solve problems by using critical and creative thinking skills.
  - Students should be able to work effectively with others as a member of a team, group, organisation or community.
  - Students should be able to manage themselves and their activities responsibly and effectively.
  - Students should be able to collect, analyse, organise and critically evaluate information.
  - Students should be able to communicate effectively using visual, mathematical and/or language skills in the modes of oral and/or written presentation.
  - Students should be able to use science and technology effectively and critically, showing responsibility towards the environment and the health of others.

- Students should be able to demonstrate an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation.

- *Specific outcomes*

  In the South African context there are eight learning areas in which teaching take place *(cf. 3.5.1)*. Specific outcomes are outcomes which are the general skills, abilities and values which a student will be expected to demonstrate in a specific learning area. As this study is concerned with CL, the specific learning outcomes for the learning area Technology are listed here (Department of Education 2002):

  - The student should be able to demonstrate an understanding of the inter-relationships between technology, society and the environment.
  - The student should be able to apply technological processes and skills ethically and responsibly, using relevant knowledge concepts.
  - The student should be able to access, process and use information in a variety of contexts.

These outcomes will be achieved when students develop and use:

- knowledge of how technology, society and the environment interact with one another;
- technological processes to develop solutions to people's needs and wants;
- knowledge and understanding of concepts used in processing, structures, systems, control and
- skills to access, process and use information.

- *Lesson outcomes*

  Lesson outcomes refer to the specific knowledge, attitudes and understanding which should be displayed in a particular context. The

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- knowledge and understanding of concepts used in processing, structures, systems, control and
- skills to access, process and use information.

- *Lesson outcomes*

  Lesson outcomes refer to the specific knowledge, attitudes and understanding which should be displayed in a particular context. The

lesson outcomes function at the level of classroom instruction, i.e. an instructor will need to write lesson outcomes for a specific lesson at a particular level (*cf. 2.3.1)*. For an inexperienced instructor, this is possibly one of the major challenges in mastering OBE. Van der Horst and McDonald (1997:38) suggest that the following table of action words linked to Bloom's levels of complexity, can be used to assist in writing specific outcomes:

Levels	Action words
1. Knowledge Recall, e.g. remembering previous learned information	Define, list, match, memorise, name, observe, outline, recall, recognise, state, give, provide
2. Comprehension Understand, e.g. grasping the meaning	Describe, support, explain, give examples, identify, paraphrase, report, summarise, tell
3. Application Generalise, e.g. using learning in new situations	Apply, illustrate, manipulate, organise, solve, sequence, show, use
4. Analyse Break down, e.g. discover, break down an idea into component parts so that it may be more easily understood	Analyse, characterise, classify, categorise, compare, contrast, distinguish, differentiate, examine
5. Synthesis Compose, e.g. putting together to form a whole	Combine, construct, develop, invent, produce, revise, compose, design, formulate, plan, propose
6. Evaluation Judge, e.g. judge the value for a given purpose	Appraise, argue, assess, compare, consider, criticise, decide, evaluate, justify, judge, prioritise, rank, recommend, summarise, support, value

Fig. 3.2

Example

A lesson outcome for level 3. Application, could be:

"The student should be able to illustrate the use of bold, italics and other formatting techniques"

3.4 ASSESSMENT IN OBE

In this sub-section the researcher investigates different ways of applying assessment in OBE.

3.4.1 Assessment-related concepts

To be able to describe and fully understand OBE assessment, it is necessary to ensure that the reader has a clear view of the meaning of each of the following terms:

- *Norm-based assessment*

  Norm-based assessment compares the student's performance with the performance of other students, e.g. when the instructor sets a test, it is expected that the average of the class should be around 50%, which is usually the norm. Everyone is measured against this norm (Free State Department of Education 1997:4). Students whose marks are lower than the norm are categorised as "*below-average or weak*" and students whose marks are higher than the norm are classified as "*above-average or clever*". Malan (1997:27) asserts that another way of using norm-based assessment, is that requirements are set which specify that a certain percentage of the students in a class have to pass or fail at the end of each school year. This leads to the unacceptable situation where marks are adjusted to comply with this norm and that students who would have passed, fail and vice versa.

- *Criterion-based assessment*

  When students are assessed against a set of external criteria, the assessment is known as criterion-based (Malan 1997:29). The norm which has to be attained is not a predetermined mark, but the demonstration of a particular ability or competence. According to Van der Westhuizen, Van Wyk, Collett, Jacobs and Debeila (2002:140), criterion-based assessment has the following principles:

  - assessment criteria are clearly defined at the beginning of an activity;
  - competencies are acquired through interaction with the mediator;
  - levels of proficiency are expressed on a continuum and
  - a student's achievements can be judged without comparing it with that of another student.

- *Performance-based assessment*

  Killen (1998:23) describes performance-based assessment as a type of assessment where students are required to demonstrate that they have achieved specific outcomes by performing a task or producing a product. Performance-based assessment can be seen as a form of criterion-based assessment and according to Malan (1997:30) takes place when a student's performance is directly and systematically observed. With performance-based assessment students are engaged in activities that require them to demonstrate specific skills or develop specified products. The demonstrations can take place in a controlled environment such as a laboratory or classroom or in real-life environment where the complexities faced by students are much higher. It can also be applied to evaluate completed products, e.g. models or assignments.

- *Formative assessment*

  Formative assessment is defined by Van der Horst and McDonald (1997:168) as assessment that aims to help students to improve their performance, maximise their learning and reflect on and improve their own

learning. Archer and Rossouw (1999:109) explains that formative assessment builds up a system of feedback which forms and shapes the appropriate learning experience to the optimal benefit of students.

- *Diagnostic assessment*

  Diagnostic assessment takes place before teaching starts and aims to present the instructor with information that enables him/her to plan a teaching strategy (Van der Horst & McDonald 1997:171). An example of informal diagnostic assessment is to ask questions at the beginning of a lesson. The information gathered in this way then helps the instructor to know what the students' entry levels are. More structured methods of diagnostic assessment, e.g. pre-tests could also be used.

- *Summative assessment*

  According to Archer and Rossouw (1999:111), summative assessment is intermittent and usually applied as a final judgement at the end of a learning unit. Van der Horst and McDonald (1997:168) define it as a summary of the student's performance. All forms of assessment are added together and this sum is then used to provide an overview of student progress and/or barriers to learning and assist in meaningful interpretation of strengths and needs.

3.4.2 Defining OBE assessment

The Department of Education in South Africa (1998:2) defines OBE assessment as the process of identifying, gathering and interpreting information about a student's learning. The central purpose of assessment is to provide information on student achievement and progress and set the direction for ongoing teaching and learning. The Free State Department of Education (1997:5) elaborates on this point by stating that the process involves the following four steps:

- generating and collecting evidence of achievements during the course of activities;
- measuring this evidence against the set criteria;
- recording the findings on an appropriate form and
- using this information to assist the student's development on the path towards success.

In the Curriculum 2005 orientation programme (Department of Education 1997c:9), OBE assessment is described as:

- an integral part of the learning experience;
- being on-going throughout the learning experience (therefore it is being seen as continuous assessment);
- testing knowledge, skills and attitudes and
- should help the student to succeed.

According to Spady (1994b:20), the keyword in OBE assessment is demonstration, i.e. students are expected to demonstrate their knowledge, ability, competence or proficiency and it is up to assessors to judge the quality of such demonstrations. On the basis of their judgements, assessors will then decide whether students' performance during the demonstration was sufficient for them to be awarded the necessary credits or qualifications. Malan (1997:31) asserts that to ensure fair and equitable judgements, assessors in OBE will have to identify, formulate and make known the criteria which they intend using during the assessment process. This means that criteria should be spelt out simply, clearly and understandably and should be known to all the candidates and assessors before assessment takes place. From this reasoning it becomes clear that assessment in OBE is criterion-based – this not only impacts on how assessment results are interpreted, but also on how assessment tasks are constructed.

Killen (1998:20) views assessment of student learning as an essential element of OBE because students should be able to demonstrate their achievement of predetermined outcomes. It is therefore imperative to provide students with opportunities to demonstrate their achievements and it is necessary to have valid, reliable and fair ways of judging these demonstrations. It is further stated that, although instructors are accustomed to assessing students, OBE assessment requires special techniques. It must be kept in mind that the idea that "some students can learn well and others cannot" is not part of the philosophy of OBE. Therefore, assessment should be used to show students what they have learned and what they still need to learn. Assessment should always contribute to the goal of improving students' learning, therefore assessment tasks must provide opportunities for students to demonstrate what they have learned and to help them identify what it is that they still need to learn.

3.4.3 OBE assessment strategies

In this section the researcher looks at different methods and techniques of implementing OBE assessment.

- *Different methods of OBE assessment*
  At a workshop on OBE assessment by the Free State Department of Education (2000:9) the following were listed as possible methods of OBE assessment:

  - Self assessment describes the type of assessment where students have to make judgements about whether or not they have achieved specific outcomes and if they have not they need to make decisions to continue their learning (Killen 1998:24). Even young children are able to make judgements about their own learning provided they understand the criteria by which their learning, should be evaluated. He adds that there is a limit to how much responsibility students can be given for

their own assessment and instructors still need to make regular checks on their students' progress.

- Peer assessment is an extension of self assessment and involves students at approximately the same stage of learning making judgements and providing feedback on each other's performance (Killen 1998:24). There are many practical difficulties with peer assessment and it is suggested that both self assessment and peer assessment should be thought of as supplementary methods of assessment and not be the prime method of assessment.
- Group assessment is an extension of peer assessment and is the situation where a student is judged by a group of other students. The Curriculum 2005 document (Department of Education 1997a:10) states that group work plays an important role in OBE and encourages instructors to take advantage of this teaching strategy.
- Observation-based assessment is seen as an invaluable assessment and instructional tool by Van der Horst and McDonald (1997:190). Through observation, an instructor can assess the student's schoolwork, as well as spot clues to possible causes of the student's behaviour or lack of understanding.
- Instructors can use interviews or oral questioning to try and assert whether a student has accomplished certain competencies. The interview may be structured in the form of specific questions or an unstructured dialogue with an individual or a group of students.
- Although tests and examinations are seen as part of a more traditional education system, they still have an important role to play as OBE assessment methods. As Van der Horst and McDonald (1997:167) remark: "Learning may be more than merely knowing the right answers, but the right answers are important as well. While schooling is about learning to think and solve problems, it is also about knowledge". Woolfolk (1995:56) adds to this: "students must have something to think about – facts, ideas, concepts, principles, theories, explanations, arguments, images, opinions. Well-designed traditional

tests can evaluate student's knowledge effectively". At the workshop attended by Free State educators (Free State Department of Education 2000:8) they were advised to use tests/examinations to reach meaningful assessment, but were cautioned that final assessment should not be concentrated in only one final examination.

- *Techniques of assessments*

  The following are some examples of techniques that can be used in OBE assessment:

  - Practical assignments, e.g. scientific experiments, building models, drawing a map of the community or creating some document on a computer.
  - Projects which can either be done alone or as part of a group where a number of students work on a task together. A project might require planning, research, discussion and presentation.
  - Written assignments, e.g. essays. A written assignment involves descriptions, analysis, explanations and summaries.
  - Role-play where it is required of students to temporarily take on the role of a specific figure, e.g. in the role of a receptionist working with clients.
  - Demonstrations, where students have to practically show that they have accomplished an outcome, e.g. riding a bicycle.

3.5 OBE IN THE SOUTH AFRICAN CONTEXT

With the political transition in South Africa in 1994, the new government decided to change the educational system in South Africa. The following sub-section gives an overview of these changes.

3.5.1 SAQA, NQF and Curriculum 2005

International trends in lifelong learning, multi-skilling and global competitiveness indicated the need for rethinking education and training systems in South Africa (Isaacman 1996:7). A process of consultation with employers, providers of education and training, representatives from the then Department of Labour, the African National Congress (ANC) and the Centre for Education Policy Development (CEPD) started in 1989. On 4 October 1995 the SAQA Act (SAQA Act 58/1995) was passed. The SAQA board consists of 29 members that were appointed by the ministers of Education and Labour. The members were selected from different sectors such as the trade union movement, education and training providers, non-governmental organisations, business and industry. SAQA has proposed that South Africa take a transformational approach to OBE (*cf. 3.1)* and identified seven critical cross-field outcomes which should direct teaching and learning in all of the phases of education (*cf. 3.3)*.

One of the main functions of SAQA is to set up and maintain a National Qualifications Framework (NQF) for South Africa. According to Malan (1997:5), the NQF is conceived as a scaffolding which represents the learning pathways, locations of learning and qualification levels which will enable students to become part of a society of lifelong students. The following structure of the NQF was proposed in the document:

NQF LEVEL	BAND	TYPES OF QUALIFICATIONS AND CERTIFICATES	LOCATIONS OF LEARNING FOR UNITS AND QUALIFICATIONS
8	Higher Education and Training Band	Doctorates & Further research degrees	Tertiary/Research/ Professional Institutions
7		Higher degrees & Professional qualifications	Tertiary/Research/ Professional Institutions
6		First degrees & Higher diplomas	Universities/Technikons/ Colleges/Private Institutions/ Professional Institutions
5		Diplomas & Occupational certificates	Universities/Technikons/ Colleges/Private Institutions/ Professional Institutions/Workplace.
4	Further Education and Training Certificate		
3	Further Education and Training Band	Schools/Colleges/Trade certificates ; Mix of units from all	Formal high schools Technical/Community/ Police/Nursing/Private Colleges RDP & labour market schemes/ Industry training boards/ Union/ Workplace.
2		Schools/Colleges/Trade certificates; Mix of units from all	
1	General Education and Training Certificate		
	General Education and Training Band	Senior Phase / ABET level 4 (10 years)	Formal schools Occupational/ Work-based training/ RDP/ Labour market schemes/ Upliftment programmes/ Community programmes NGOs/ Churches/ Night schools ABET programmes/ Private providers/ Industry training boards/ Union/ Workplace, etc.
		Intermediate Phase / ABET level 3 (8 years)	
		Foundation Phase / ABET level 2 (6 years)	
		Foundation Phase / ABET level 1 (3 years)	
		1 Year Reception	

Fig. 3.3

As depicted in *Fig. 3.3* the NQF is structured in bands, levels and phases (Isaacman 1996:7)

There are three different bands of learning in South Africa:

- The Higher Education and Training (HET) band deals with all learning related to national diplomas, degrees and post-graduate learning.
- The Further Education and Training (FET) band deals with all post-compulsory, pre-tertiary learning and integrates academic, technical and commercial learning.
- The General Education and Training (GET) band includes pre-school to Grade 9. These are the ten years of compulsory education for all.

There are eight levels for qualifications with each higher level building on the knowledge and skills acquired from previous levels of learning. Qualifications are obtained after completing each level. Levels are divided into phases which show the learning needs of students at different stages of development.

Following the pathway of transformation, a new school curriculum for the GET band, called Curriculum 2005 was developed according to the principles of transformational OBE and implemented in South African schools at the beginning of 1998. The curriculum is divided into eight learning areas, i.e. Language, Literacy Communication; Arts and Culture; Mathematical Literacy, Mathematics and Mathematical Sciences; Life Orientation; Economic and Management Sciences; Technology; Human and Social Sciences; Natural Sciences.

Curriculum 2005 was set to be implemented in phases with the first students obtaining GET certificates at the end of 2002 and FET to be implemented in 2003. However, due to a number of problems with the curriculum, the implementation strategy had to be revised. A revised Curriculum Statement for Grades R - 9 was published in April 2002 (Department of Education 2002) and the implementation of OBE in the FET band was prolonged until 2004.

3.5.2 OBE in higher education

In the HET band the move towards an OBE educational system in South Africa was implemented in 2000. Higher education institutions were requested to register programmes and qualifications by June 2000. The process that had to be followed was summarised at a curriculum workshop called "Meeting the SAQA/NQF requirements for interim registration of qualifications" and consisted of the following steps:

- registration of qualifications on the NQF through SAQA;
- accreditation of learning programmes through the Higher Education Quality Committee (HEQC) and
- approval of new learning programmes for funding purposes by the Department of Education.

The aim of making registration of programmes and qualifications compulsory, is to ensure that only SAQA-accredited qualifications form part of the new educational system. All programmes and qualifications had to be submitted in OBE format according to specific guidelines outlined by the SAQA Act. Some of these guidelines are listed in *Fig. 3.4*.

1. Name of the Institution
2. Title of qualification
3. A statement of the purpose of the qualification
4. Assumptions of learning already in place before the programme leading to the qualification is commenced
5. Exit level outcomes and the associated assessment criteria
6. Total credits required
7. Integrated assessment appropriately incorporated to ensure that the purpose of the qualification is achieved

Fig. 3.4

The following description clarifies some of the concepts referred to in *Fig. 3.4* (SAQA act 1995).

- A qualification is a planned combination of learning outcomes which has a defined purpose or purposes, and which is intended to provide qualifying students with applied competence and a basis for further learning.
- A learning programme is the sequential activities, associated with curriculum implementation, leading to the achievement of a particular qualification or part qualification. Programmes may lead to a number of different certified exit levels, each of which corresponds to a particular qualification, e.g. a programme in Law could lead to students exiting with BPROC, BURIS, LLB, LLM or LLD. Different programmes may also lead to the same qualifications, provided that these programmes meet the exit level outcomes and associated assessment criteria specified for the qualification, e.g. a programme in Philosophy, another in Social Science and Development Studies could both lead students exiting with a BA qualification. Learning programmes are made up of modules which are units of learning.
- Exit level outcomes requires a statement about the specific learning ends (outcomes) which the student should achieve upon completion of the programme leading to a qualification. In other words it should indicate the end product of a specific learning process. The outcomes that are specified should be demonstrably assessable. The critical cross-field outcomes identified by SAQA (*cf. 3.3)* should, as in the GET band, form the basis of determining the exit level outcomes for a programme or qualification in HET.
- Assessment criteria refers to what will be tested or measured and should be derived directly from the outcomes. This is the evidence that the student has achieved the outcomes and can be awarded the qualification.
- The total credits required for a programme or qualification is calculated by taking into account the regulation of SAQA that 1 credit point equals ten notional hours of learning. Notional hours of learning means the learning

time that it would take an average student to meet the outcomes defined, and includes concepts such as contact time, time spent in library and individual learning. By SAQA estimates, a study year equals 1200 notional hours, i.e. 120 credits. A three-year first degree would usually consist of 360 credits.

- Integrated assessment strategies refer to the ways in which students will be tested or their abilities measured to determine whether they have met the assessment criteria. However, SAQA not only want a list of assessment strategies, instead one needs to show that these assessment strategies are integrated so as to ensure that the purpose of the qualification as a whole has been achieved and that a range of formative and summative assessment methods have been used across all the modules that make up the learning programme leading to the qualification.

Higher Education Institutions not only had to register programmes and qualifications with SAQA, but also had to submit detailed module catalogues which contained information about each of the modules that form part of the programmes. The table in *Fig 3.5* lists the information requested for each module:

1.	Module Code
2.	Title
3.	NQF Level
4.	Credits
5.	Pre-requisite modules
6.	Concurrent modules
7.	Notional hours
8.	Practical / Lab component
9.	Method of Assessment
10.	Specific outcomes
11.	Brief description of content
12.	Critical outcomes supported by the module
13.	Field / sub-field

Fig. 3.5

It should be noted that in the South African OBE context, the envisaged result of this study should rather be called a *module* than a *programme*. However the researcher decided to keep using the term *programme* as it can also be followed for non-credited purposes.

3.6 COMPUTER LITERACY

This sub-sections aims to describe the concept of CL and determine the content to be included in a CL programme.

3.6.1 Definition of computer literacy

In 1976 John Nevison coined the term CL and unwittingly sparked a long, complex debate when he wrote: "Because of the widespread use of elementary computing skill, there should be an appropriate term of this skill. It should suggest an acquaintance with the rudiments of computer programming, much as the term literacy connotes a familiarity with the fundamentals of reading and writing, and it should have a precise definition that all can agree on. It is reasonable to suggest that a person who has written a computer program should be called literate in computing. This is an extremely elementary definition. Literacy is not fluency" (Nevison 1976:401).

In studying related literature, the researcher found that the *precise definition* that Nevison called for has yet to emerge from the voluminous debate on the topic. Literature reveals that the range of the debate runs from Nevison's original idea - CL as programming ability - to the idea that quickly followed on its heels - the notion that programming ability is *passe* and what matters is the ability to choose and run applications.

The Webster's II New College Dictionary (1999) defines CL as "the ability to use a computer and its software to accomplish practical tasks".

The General Education Committee of UMass Dartmouth (1996) gives the following definition: “CL includes an understanding of computer hardware, computer software and applications, computer interfaces and social and ethical issues such as computer security, viruses and privacy”.

Eisenberg and Johnson (1999) go even further in stating that a meaningful, unified CL curriculum must be more than a "laundry list" of isolated skills, such as knowing the parts of the computer; writing drafts and final products with a word processor and searching for information using a CD-ROM database. While these specific skills are certainly important for students to learn, the "laundry list" approach does not provide an adequate model for students to transfer and apply skills from one situation to another. These curricula address the "how" of computer use, but rarely the "when" or "why." Students may learn isolated skills and tools, but they will still lack an understanding of how the various skills fit together to solve problems and complete tasks. Students need to be able to use computers flexibly, creatively and purposefully. All students should be able to recognise what they need to accomplish, determine whether a computer will help them to do so, and then be able to use the computer as part of the process of accomplishing their task.

Although a number of other definitions of CL are to be found in literature resources, the one outstanding fact that emerges from most publications is that there is no specific standard for CL - as computer technology changes, so does the requirements for being computer literate. Kim and Keith (1994) assert that there is no globally accepted definition of CL, and the scope and orientation of the training required to achieve literacy has not been resolved. Burgess, Davidson and Ginter (1987:37) state that since it was first introduced in the 1960's, the definition of CL has dramatically changed. In the beginning, a computer literate person was one who could program using a language such as FORTRAN, BASIC, or COBOL. However, rapid changes in computer technology, including the development of microcomputers and software packages, have substantially altered the concept of CL. Harvey (1990) actually proposed that the term CL should not be used at all as there are no

universally valuable computer skills, or universally important facts about computers that every person should know and that there are too many different computer-related skills to teach all of them to every student. The view of Harvey is underlined by Ross (2001) who tries to explain CL to prospective students by stating that "because computers and their applications are so diverse and changing so rapidly, no one is completely computer literate - CL usually refers to basic skills of use to students in any field, as opposed to those needed only by computer professionals".

Although there is apparently no consensus on the exact definition of CL, the statement of Harvey that "... every person needs skills to cope with the computer-centred society" (1990) is even more applicable today than it was in 1990.

In the following sub-section the researcher investigates the aspects that should form the basis of a CL programme.

3.6.2 Proposed syllabus for a computer literacy programme

In August 2000 the Computer Society of South Africa sent letters to all Universities in South Africa with the following introductory paragraph: "The Computer Society of South Africa has long been aware of the problem with uneven levels of end user-training in South Africa. It has therefore introduced the International Computer Driving License (ICDL). More than 750 000 people in Europe have an ICDL or are registered to obtain one. The ICDL is also the required entry level for many programmes in the new UNESCO curriculum for IT education at tertiary level." (Computer Society of South Africa 2000:1).

By introducing the ICDL a standard was set for CL training. The syllabus of the ICDL consists of seven modules. An overview of each of the module's content is given below:

- Module 1: Basic concepts of information technology (IT), requires the student to know about the basic physical make-up of a personal computer and understand some of the basic concepts of IT such as data storage and memory, the context for computer-based software applications in society, and the uses of information networks within computing. This is the only one of the seven modules that is tested by writing a theory examination paper.
- Module 2: Using the computer and managing files, requires the student to demonstrate knowledge and competence in using the basic functions of a personal computer and its operating system. The student shall be able to operate effectively within the desktop environment, manage and organise files and directories/folders and know how to copy, move and delete files.
- Module 3: Word processing, requires the student to demonstrate the ability to use a word processing application on a personal computer. (S)he shall understand and be able to accomplish basic operations associated with creating, formatting and finishing a word processing document ready for distribution. The student shall demonstrate competence in using some of the more advanced features associated with word processing applications such as creating standard tables, using pictures and images within a document, importing objects and using mail merge tools.
- Module 4: Spreadsheet, requires the student to understand the basic concepts of spreadsheets and to demonstrate the ability to use a spreadsheet application on a personal computer. (S)he shall understand and be able to accomplish basic operations associated with developing, formatting and using a spreadsheet. The student shall be able to accomplish standard mathematical and logical operations using basic formulas and functions and demonstrate competence in using some of the more advanced features of a spreadsheet application such as importing objects and creating graphs and charts.
- Module 5: Database, requires the student to understand the basic concepts of databases and demonstrate the ability to use a database on a personal computer. The student should not only be able to design and

plan a simple database, but also retrieve information from an existing database by using query, select and sort tools. The student shall also be able to create and modify reports.

- Module 6: Presentations, requires the student to demonstrate competence in using presentation tools on a personal computer. The student shall be able to accomplish basic tasks such as creating, formatting and preparing presentations for distribution and display.
- Module 7: Information and communication, requires the student to accomplish basic Web search tasks using a Web browser application and available search engine tools and secondly to demonstrate the ability to use electronic mail software to send and receive messages.

Another example of a CL standard is the IC3 certification programme. Certiport Incoporate (2002) introduced this programme in February 2002 in the USA. It was designed for individuals who are qualified as instructors or trainers of basic computing and Internet literacy skills and was developed in response to a certification gap identified through extensive statewide academic programmes administered by Certiport. The certification programme comprises of three modules, i.e. Computing fundamentals, Key applications and Living online.

The syllabi of the different modules include the following:

- Module 1: Computing fundamentals, requires students to be able to identify different types of computers, explain how computers work (process information) and how individual computers fit into larger systems. Students must be able to describe the function of computer hardware components and common problems associated with individual components, identify issues relating to computer performance and how it is affected by different components of the computer, identify the factors that go into a decision on how to purchase a computer or select a computer for work, school, or home. Students should further be able to identify how software works and how software and hardware work together to perform computing tasks,

identify different types of software, the tasks for which each type of software is suited. Students should also be able to identify what an operating system is and how it works, be able to manipulate and control the Windows desktop, files and disks and be able to change system settings and install software.

- Module 2: Key applications, requires students to be able to start and exit a Windows application, utilise sources of online help, identify common on-screen elements of Windows applications, change application settings, and manage files within an application. Students should be able to perform common editing (cut, copy, paste, spell check, etc.), formatting (fonts, margins, tabs, etc.) and common printing functions. Using a word processor, students should be able to format text and documents including the ability to use automatic formatting tools and add tables and graphics to documents. Requirements for spreadsheet functions are to be able to modify worksheet data and structure, sort data, manipulate data using formulas and functions and be able to add pictures and charts to a worksheet.
- Module 3: Living online, requires students to identify network fundamentals, the benefits and risks of network computing and the relationship between computer networks, other communications networks (like the telephone network) and the Internet. Students should be able to identify how electronic mail works and know how to use e-mail applications applying netiquette. Students should be able to identify how computers are used in different areas of work, school, and home and identify how to use the Internet safely and legally.

In assessing the above-mentioned two standards, it could be deducted that a CL programme should include the following:

- A theory section of which the content should serve to lead the student to understand the basic principles of computer hardware and software.
- A practical section covering the basic principles of using a word processing application.
- A practical section covering the basic principles of using a spreadsheet application.
- A practical section covering the basic principles of using an operating system.
- A practical section covering the basic principles of using the Internet and e-mail applications.

Although the ICDL also includes database and presentation packages, students could obtain certification after completing any four of the seven modules.

3.7 CONCLUSION

The aim of this study is to develop a CL *programme* - in terms of the South African OBE referred to as a *module* (*cf. 3.5.2).* The module must be able to form part of any programme where students are required to know and be able to apply basic computer skills. Furthermore, it is envisaged that this module would also be able to serve as an exit level in itself where students could obtain a certificate qualification after completion. In selecting the content of this module, the researcher should be guided by the standard for CL set by the Computer Society of South Africa, i.e. the ICDL standard. (*cf. 3.6.2).* Furthermore, the module has to be developed according to the OBE principles as applied in the South African context and be registered at SAQA *(cf. 3.5.1).*

CHAPTER FOUR

RESEARCH METHODOLOGY, DATA COLLECTION AND ANALYSIS

4.1 INTRODUCTION

As mentioned in Chapter One, the primary aim of this study was to establish the factors that should be taken into consideration in developing an outcomes-based computer literacy programme in distance learning mode and to develop such a programme through which effective teaching and learning can take place.

This research further aimed to:

- establish the role of DL in education by researching the different methodologies that can be used in presenting DL programmes;
- determine the impact of OBE on a CL DL programme by researching the principles of OBE and linking that to the requirements for a CL programme;
- investigate the most appropriate way to go about developing an outcomes-based CL programme in DL mode and
- establish how an outcomes-based CL programme in DL mode can be implemented to enable more people to have access to computer training and support the goal of life-long learning.

A study of literature in Chapter Two revealed that DL is set to play an increasingly important part in future education systems and that there are various techniques of implementing DL programmes. The study further indicates instructional design guidelines that could be followed in designing a DL programme.

A study of OBE principles and the concept of CL in Chapter Three shed light on what content an OBE CL programme should cover.

Chapter Four involves the implementation of action research as a component of qualitative research, to obtain data to develop and implement an OBE CL programme in DL mode for South African students.

4.2 RESEARCH METHODS IMPLEMENTED IN DATA COLLECTION

This research utilises the qualitative method of research for, according to Patton (1990:14), it allows the study of selected issues in depth and in detail, producing detailed information about a smaller number of people and cases. Using qualitative research, the researcher can examine people's words and actions in narrative and descriptive ways - more closely representing the situation as experienced by the participants (Maykut & Morehouse 1995:2).

4.2.1 The Qualitative research method

Hummelvoll and da Silva (1998:465), as well as McMillan and Schumacher (1993:372-373), state that qualitative researchers accumulate data by interacting with selected individuals in their settings and by acquiring documents relevant to the study.

Morse (1994:45) indicates that, unlike quantitative research, which investigates a priori hypotheses developed from the researcher's own biases, qualitative research examines what people are doing and how they interpret what is occurring. One way of doing this, is by observing how people relate to each other and to the circumstances under discussion.

Qualitative research also places emphasis on comprehension by paying attention to the words used by people and the intention of such research is to discover patterns emerging from thoughtful analysis of the research topic.

Contextual findings and not extensive generalisations are the discoveries made through qualitative research (Maykut & Morehouse 1995:17 – 21).

In this study, instructors and students are the respondents to personal and focus group interviews. The population and sampling are discussed in sub-section 4.4.

A specific component of qualitative research - action research - is used to improve practice rather than to produce knowledge (Elliot 1992:49). The fundamental aim of action research is to integrate instruction and instructor development, curriculum development and evaluation, research and philosophical reflection into a unified conception of a reflective education practice (Elliot 1992:54). Charles (1995:220) asserts that this kind of research is frequently done by instructors in graduate studies programmes. As the focus of this study is to develop an efficient CL programme for graduate students, it is deemed that action research is the best methodology of research to apply in this specific case.

4.2.2 Action research

McNiff (1992:1) notes that action research represents a progressive movement in educational research. It is seen as an alternative to the more traditional approaches to educational research and serves to bridge the gap between theory and practice of education. Charles (1995:220) states that action research is conducted by educational practitioners to resolve matters of concern in their particular setting, with no intention that their findings will be applicable elsewhere.

According to Schmuck (1997:29),action research is:

- practical, as insights from data lead to practical improvements in the classroom;

- participative, as action researchers are co-workers that collect data with and for people focused on a real problem;
- empowering, as all participants can affect and contribute equally to the inquiry;
- tentative, as inquiries do not result in action researchers coming up with right or wrong answers but rather with tentative solutions based on the multiple and diverse views of participants and
- critical, as participants not only search together for practical improvements in their educational situation, but they also act as self-critical change agents.

McKernan (1996:15-28) provides a detailed list of different models of action research that were suggested by educationalists. The list includes models of Lewin (1947), Taba & Noel (1962), Lippet and Radke (1946), Elliot (1978), Ebbut (1983) and a number of other specialists. The most important characteristic that emerges from all of these models, is that action research is executed in a series of spiralling decisions, taken on the basis of repeated cycles of analysis, reconnaissance, problem conceptualising, planning, implementation and evaluation.

The researcher decided to follow the phases as given by Schmuck (1997:50) and Sagor (1992:23). These phases are initiation, detection and judgement (*cf.1.4.2).* Schmuck (1997:31) further distinguishes between two models of action research, i.e. proactive and responsive. These models differ primarily in when the data is collected and analysed during the cycle of events. In proactive action research, action precedes data collection and analysis. The instructor acts and then studies the effects of the actions. In responsive action research, however, data is collected and analysed before action is taken, i.e. the instructor diagnoses the situation before acting. As the aim of this study is to develop a new programme and data has to be gathered before the programme can be developed, the researcher decided to follow the steps of responsive action research. It was further decided to combine step 4 "Try a

new practice" and step 5 "Check others' reaction" as the programme will be evaluated during implementation.

The steps followed in this study thus are:

- Step 1: Collect data to diagnose the situation
- Step 2: Analyse the data for themes and ideas for action.
- Step 3: Distribute the data to others, i.e. develop the new programme.
- Step 4: Try a new practice, i.e. implement the programme and monitor the implementation of the programme.
- Collect data to diagnose the situation. The sequence has circled back to step 1; however, in this second data collection, the general methods previously used will be supplemented with specific questions about the particular issues worked on, i.e. on specific aspects that was incorporated into the programme. The essence here is to determine how students are reacting to the new programme.

The process is summarised on the following page in the diagram given in *Fig. 4.1.* Note that:

- steps 1 – 3 are classified as the initiation phase;
- step 4 is classified as the detection phase and
- step 5 is classified as the judgement phase.

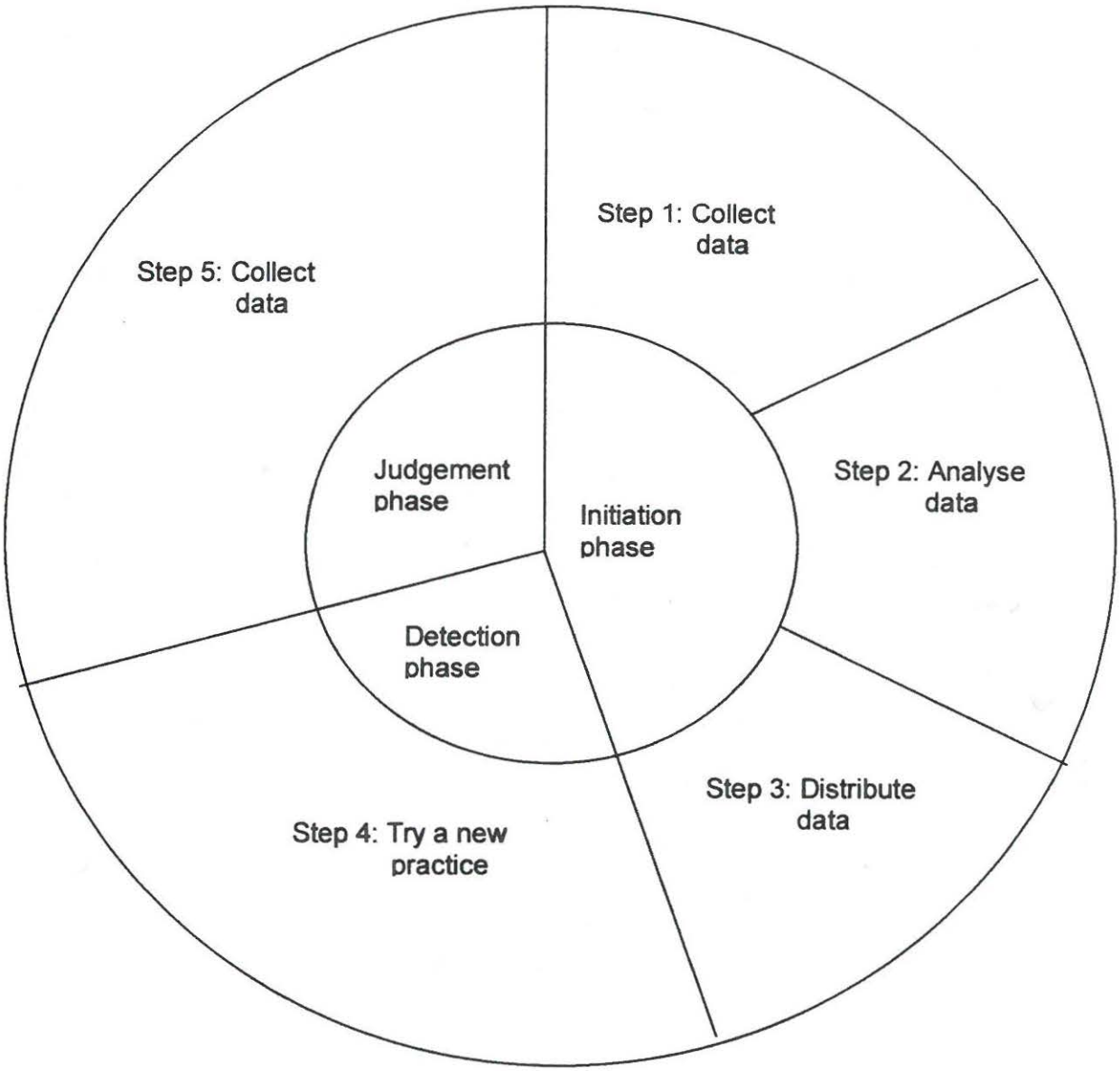

Fig. 4.1

4.3 CHARACTERISTICS OF A RESEARCH INSTRUMENT

An essential attribute of research instruments is the existence of reliability and validity, the latter being the most important characteristic (Fraenkel & Wallen 1993:138).

4.3.1 Validity

Gerdes and Conn (2001:186) indicate that validity refers to the trustworthiness of data. LeCompte (2000:146) states that data are valid to the extent that they depict or deal directly with the topic under consideration and McMillan and Schumacher (1993:404) assert that validity in qualitative research addresses the questions: "*Do researchers actually observe what they think they observe; do researchers actually hear the meaning that they think they hear?* " This factor is underlined by Morse (1994:49) when he proposes that a qualitative researcher should continuously ask him/herself the question: *"Do I, the researcher, really understand and describe what I am studying in the same way that the people who live it, do? Did I really get it right?"* The validity of qualitative designs is thus the degree to which the interpretations and concepts have mutual meanings between the participants and the researcher.

The following strategies, as proposed by McMillan and Schumacher (1993:405-406) and Gerdes and Conn (2001:186) were applied in this study to enhance validity:

- Prolonged and persistent field work was done by conducting in-depth interviews with participants in their natural setting to enable them to reflect the reality of their experiences. The researcher travelled to the USA to observe the way that DL programmes are presented in two different Community Colleges. The researcher further attended several workshops presented by the USA participants and enrolled for an on-line programme conducted by one of the participants.

- Data was recorded mechanically as the researcher used a tape recorder to record the interviews – thus enabling accurate and complete reporting.
- Verbatim accounts of conversations, transcripts and direct quotes from documents are highly valued as data. The researcher presents in this study extensive direct quotations from the data to illustrate participants' views.
- To establish referential adequacy, the researcher utilised an extensive field notebook and log to document methodological decisions and to note personal thoughts or reflections that might have occurred concerning the data.
- During the interviews, the researcher allowed the participants opportunities to clarify their comments, checking for understanding, as if asking, "Did I get this right when you said...?" or "What I think I heard you say was .... "

4.3.2 Reliability

Charles (1995:103) states that the key concept in reliability is the consistency of data. Researchers should therefore attempt to check multiple sources of qualitative data to reassure themselves that the information is consistent. In addition they should think carefully about the procedures used to obtain the data and about the trustworthiness of their key informants.

In this study the researcher ensured the trustworthiness of the key informants, by visiting the actual institutions where they operate as instructors, interviewing them in their natural working environment and observing the facilities they use in conducting their classes.

4.4 POPULATION AND SAMPLING

Qualitative research design can be thought of as a rough sketch to be filled in by the researcher as the study proceeds (Frankel & Devers 2000:155). After a preliminary question has been formulated and resources identified and

secured, the design can be likened to an abstract drawing. It has taken shape without particular individuals, groups, organisations, or sites (i.e. the social and physical settings where "subjects" or "cases" are located) in mind. Further specification of the research design requires the researcher to understand and consider the unique characteristics of specific research subjects and the settings in which they are located. In essence, the researcher must make the design more concrete by developing a sampling frame (i.e. criteria for selecting sites and/or subjects) capable of answering the research question(s), identifying specific sites and/or subjects, and securing their participation in the study.

Given the goals and logic of qualitative research, purposive sampling is often employed (Frankel & Devers 2000:264). Purposive sampling strategies are designed to enhance understandings of selected individuals or groups' experience(s) or for developing theories and concepts. Researchers seek to accomplish this goal by selecting "information rich" cases, that is individuals, groups, organisations, or behaviours that provide the greatest insight into the research question.

McMillan and Schumacher (1993:397) asserts that purposive sampling strategies differ from probability (or random) sampling strategies and that purposive sampling is specifically done to increase the utility of information obtained from small samples. A number of sampling strategies can be applied, e.g. site selection, comprehensive sampling, maximum variation sampling, network sampling and sampling by case.

In this study the researcher used the purposive sampling strategies of site selection and theory-based sampling. According to Mason (1996:93), "theory-based sampling means selecting groups or categories to study on the basis of their relevance to your research questions, your theoretical position, and most importantly the explanation or account which you are developing."

The researcher was fortunate to be involved in a USAID project through which four professors from the USA presented a workshop on DL to VISTA staff

members. These professors are all experts in the fields of DL and/or CL and presented an ideal opportunity to determine how CL is conducted in DL mode in the USA. They were identified as the key informants in this study. As Mckernan (1996:131) states, " key informants are chosen because they have special knowledge to give purposeful and insightful accounts and comments that are often denied the researcher through randomised designs"

Furthermore, the researcher pre-empted that information gathered from instructors in the USA would not be fully applicable to South Africa's particular situation with its large number of students from a disadvantaged background. It was therefore decided to interview a number of South African instructors who have been lecturing face-to-face CL classes to South African students with the intent to link the information gathered from the international participants to the local situation. The sites that were selected are the two tertiary institutions where the instructors form the USA are based as well as the contact campuses of Vista University where instructors have been presenting face-to-face CL classes for the past seven years.

With the two major DL institutions in South Africa, University of South Africa (UNISA) and Technikon South Africa (TSA) already conducting CL programmes, it was decided to review available documentation to determine how their CL programmes are structured.

As the researcher is a lecturer at Vista University, the Vista University Distance Learning Campus (VUDEC) was selected to research the implementation of the new programme. The programme was scheduled to be implemented in the year 2000 and data collection to take place during the 2000 and 2001 academic years. The final, revised programme was scheduled to be implemented in 2002.

4.5 DATA COLLECTION AND ANALASYS

According to Schmuck (1997:56) "every action-research project should include its own unique mix of questionnaires, interviews, observations and documents". As previously explained (*cf.4.2.1.1)*, this study is done following the steps of responsive action research. As action research is always cyclic, it was decided to perform the study in two cycles of data collection and analysis. The way data was collected and analysed in each of the steps are explained in the following sub-sections:

4.5.1 Cycle 1, Step 1: Collect data to diagnose the situation

In this step initial data was gathered through the use of interviews as interviews are in essence vocal questionnaires, but other than the questionnaire, the interview involves direct interaction between individuals, and this interaction has definite advantages (McMillan & Schumacher 1993:250). Non-verbal, as well as verbal behaviour can be noted when facing the respondent and the researcher can use this opportunity to motivate and probe the respondent.

The researcher followed the guidelines set out by Charles (1995:107) that interviews should be managed through the use of an interview guide that contains questions sequenced in the order they are to be put to respondents. The researcher chose to use semi-structured and open-ended questions, permitting the interviewer to ask questions and if necessary, follow up relevant answers to obtain cleared responses.

The interviews were audio-taped to ensure validity.

In designing the questions for the interviews, the researcher found the advice of Morse (1994:46) helpful in stating that six questions are the heart of any interview: *who, what, when, where, why and how.*

4.5.1.1 Interviews with selected DL experts

The intention of these interviews were to get the expert opinion of experienced DL instructors. The credibility of the instructors was established by interviewing them at the tertiary institutions where they have been lecturing for the past number of years in the USA. The reason for selecting them is that, apart from being DL lecturers, they have extensive experience in presenting DL training workshops in other countries, i.e. Poland, China, South Africa and Rwanda.

The questions listed if *Fig. 4.2* were used as an interview guide:

1.	Tell me about your professional career, and your involvement in distance learning over the past few years.
2.	What is you opinion about using text books as part of a DL programme?
3.	What type of assessment do you think works best in DL programmes. Why do you think so?
4.	What would you consider to be the best way of communicating with your DL students?
5.	Do you think that there should be any pre-requisites regarding a student's level of CL if students enrol for DL programmes – specially programmes that uses computer technology?
6.	What type of media have you used in presented your DL programmes? Which one in your opinion is the best option for DL programmes?
7.	In your view, what would you say are the advantages and disadvantages of using media, other than printed material, in DL?
8.	Do you think that the number of DL students per class should be limited and what, in your opinion, would the ideal number per class be?
9.	What factors, would you think, contribute to students dropping out of DL programmes?
10.	From you experience in training DL instructors in different countries, is there any specific advice that you would like to share that will improve DL programmes in South Africa?

Fig. 4.2

The following are information on the background of the interviewees:

- Professor Marilyn Pugh is the director of the Centre for Academic and Resource Development at Prince George's Community College (PGCC), Washington DC. She has been involved in international curriculum and DL projects in China in 1993, Poland in 1995 and South Africa in 1999. Prof. Pugh teaches Economics DL classes.
- Professor Richard Siciliano lectures English and is the co-ordinator of institutional technology at Charles Community College. He is the director of the Maryland Interactive Distance Learning Network Training Project and specialises in video conferencing technologies.
- Professor Mary Helen Spear lectures Psychology at PGCC and is the faculty co-ordinator of PGCC's DL programmes. She has extensive background in presenting international DL training in Denmark, Poland, Norway, the Philippines, South Africa and Rwanda.

The interviews presented the following information:

- *Textbooks*

  With regards to the use of text study material, whether it is a text book, study manual or study manual, the interviewees were unanimous in their responses that text still plays an integral part of the learning process and that all other media can only be used to enhance instruction. As Prof. Pugh puts it: "A textbook forms the basis of any programme. In addition students can have study instructor guides and alternative media to enhance the instruction". Prof. M Spear refers to the fact that good study material today plays a more important role even in face-to-face classes as there is the tendency towards active learning, where the instructor is seen to be facilitating the learning process rather than being the only active partner in it. "In the past the instructor was the sage on the stage – now (s)he is to become the guide on the side." These viewpoints correlates with conclusions from the literature study (*cf. 2.2.1)*.

- *Assessment*

  It is the view of Prof. Siciliano that the type of assessment used will depend on the way the DL programme is structured. "If it is a web-based, on-line programme communication between students and instructors is electronic and submission of assignments can be done fast and efficiently. In this case students can be expected to submit more assignments per semester than in the case where students have to mail their assignments through use of ordinary postal services and wait for the instructor to mail the results back." Prof. M Spear adds to this way of thinking by saying: "In the case of a web-based programme, students can for instance be expected to take part in an on-line discussion or complete an on-line test, whereas in a correspondence class students mainly submit essay-type assignments." Prof. Pugh summarises by saying: "I feel a student can be assessed fairly if he/she has submitted two major assignments, one or two smaller ones (like for instance completing a multiple choice test sheet) and then do a final exam at the end of the programme."

- *Contact with students*

  The interviewees all felt that efficient contact between the instructor and students is an important factor that contributes to effective DL. Prof. M Spear is of the view that "using e-mail is the most efficient way of communicating with students because of the fast turn-around time between the sender's message and the response". She shares the view of Prof. Pugh that "although e-mail is very effective, it can take up a great deal of an instructor's time if there is a large number of students in a class". In the case of on-line programmes, this problem could be addressed by setting up a site where frequently asked questions are addressed. At such a site, students will then also be able to answer one another's questions. Prof. Siciliano proposes telephonic communication in cases where students do not have access to e-mail. "An instructor can inform students that he/she will be available to answer phone calls during a certain time in the day. A voice mailbox system, where students can leave messages for the instructor, can be set up at a fairly low cost. Other

telecommunications technology like faxes can also be used, but it is always wise to have a system in place to verify whether a sent message actual reached the person it was intended for." All the interviewees agreed that instructors should at certain times be available for face-to-face meeting with DL students, should the students require it.

- *Prerequisites with respect to technical knowledge*

  Although it is not specifically stated as a pre-requisite, Prof. M Spear feels that "it is assumed that if a student registers for an on-line programme, that (s)he has access to a computer connected to the Internet and that the student is computer literate enough to be able to learn how to work in the software classroom environment". Prof. Siciliano agrees that it is definitely not expected of the tertiary institution to provide a DL student with Internet access. Prof. Pugh's opinion is that "as on-line programmes become more widely used, there is a growing need for students to be introduced to the new software environment and the institution should develop a programme that students could take to acquaint themselves with software classroom."

- *Using instructional media*

  All the interviewees have experience in presenting DL programmes using audio tapes, video tapes, web-access, CD-ROMs, interactive videoconferencing and text-only correspondence. Each professor described his/her own list of advantages and disadvantages for using each of these different kinds of media. However, the one idea that was agreed by all, could be summarised in the words of Prof Siciliano: " The best media to choose for your programme, is the one that is most accessible and affordable to students. For instance there is no use in designing an on-line programme when most of the students do not have Internet access." This fact is underlined by literature findings (*cf. 2.2.6)*.

- *Advantages and disadvantages of using instructional media*

  Prof. Pugh have clear thoughts about the advantages of using instructional media in DL programmes: " We have a visual oriented population – they

can't read anymore – they want to see pictures or motion. By using instructional media they are more active in the actual learning process." Prof. M Spear feels that one of the specific advantages of on-line programmes is that students are mentally engaged in a different way than simply have to read through a textbook. Prof. Siciliano, an expert on interactive video-conferencing, favours this mode of presenting DL classes as it "simulates a face-to-face class with the added benefit that students in desolated places can enjoy the benefit of attending a lecture given by an expert which is miles away from them". A disadvantage that emanated from the interviews is that modern technology is expensive and not always available and accessible to all students. Furthermore, there is a concern that if the technology is too advanced, students might see it as a stumbling block rather than a means of aiding them to master the programme content. This fact also became clear from the literature study (*cf. 2.2.6)*.

- *Number of students per DL class*

  On the issue of the proposed number of students in a DL class, the interviewees all indicated that this would depend on the type of DL programme that is presented. In the case of on-line classes the number should preferably not be more than 25. In Prof. M Spear's experience "the large number of e-mails received from students become almost impossible to handle when there are too many students in the class – even with 25 students it is difficult to respond to each student's requests within 24 hours". Prof. Siciliano remarks "that the number of students attending a videoconferencing class should be determined by how many students can be accommodated by the facilities available, i.e. the room(s) in which the video conferencing equipment is installed". Prof. Pugh agrees with the previous remarks and adds the remark that in her experience "the maximum number of students allowed per instructor in a traditional correspondence programme should be 100".

- *Factors that contribute to DL students dropping out*

  All the interviewees were of the opinion that in their experience more students drop out of DL classes than from face-to-face classes. Prof. M Spear thinks that the reason for this is the fact that DL programmes require more self-discipline from students as they have to work on their own. "This is where the use of different media can play an important role as it stimulates students to participate in other ways than merely reading text manuals – thus keeping them interested". Prof. Pugh adds the thought that most DL students study part-time and they have to find a way to cope with their workload as well as their studies. "This is why DL material should be well-structured to guide the student in the most effective way to cope with the content". In the experience of Prof. Siciliano "some students drop out of DL programmes because of the fact that they cannot cope with using the advanced technology required, e.g. some student that enrol for an on-line programme would stop participating in the programme if they feel uncomfortable operating within the virtual classroom".

- *Specific advise regarding South African students*

  Speaking from her international experience in training DL lecturers, Prof. M Spear feels that "the most important aspect to keep in mind with South African students, is to determine what the real need of the students are and where the right point is to pick up from their prior knowledge". Prof. Pugh's viewpoint is that "in developing a DL programme the instructor has to keep in mind what the students need to learn, what they have available and what the institution has available. These factors differ from one country to another and the instructor should be aware of these facts to be able to develop a meaningful programme". Prof. Siciliano mentions that "although introducing video- conferencing as a way of delivering DL programmes is most desirable, the high costs involved in installing the facilities might be a factor that a developing country like SA needs to take into consideration". He proposes to start out with the media that is available and then gradually move on to using more advanced

instructional technologies. All of these viewpoints are underlined by the literature study (*cf. 2.2.4, 2.2.6).*

4.5.1.2 Interview with Computer Science DL expert

The fourth interviewee was Professor Robert Spear, lecturer in the Computer Science Department of PGCC. Prof. R Spear is the author of several textbooks in computer programming and he assists in the design, acquisition and installation of computer equipment used in DL. He was selected to be interviewed for his expert knowledge on DL and specifically his experience in presenting CL DL programmes. The intention of the interview was to find out how CL programmes are being presented in the USA in DL mode. The interview guide that contains the original questions that were put to Prof. R Spear is listed in *Fig.4.3.*

1.	Tell me about your professional career, and your involvement in distance learning over the past few years.
2.	What aspects do you feel should be covered in a CL programme?
3.	What do you think should be the difference in time spent on theory vs. practical work in a CL programme?
4.	How many hours of training/practising do you think is required for a student to reach a moderate level of computer literate?
5.	How would you propose manuals / textbooks be incorporated in a CL programme?
6.	In your opinion, what type of assessment can most effectively be used in a CL DL programme?
7.	What type of media would you propose be used in presenting a CL DL programme?
8.	Do you think it is necessary to schedule face-to-face classes with your DL CL students?
9.	Do you think that there should be any pre-requisites regarding computer access for CL DL students? What should an institution do to assists students who do not have access to computers?
10.	From you experience in training DL instructors in different countries, is there any specific advice that you would like to share that will contribute to developing a good CL DL programme for South African students?

Fig. 4.3

In the interview with Prof. R Spear the following facts came to light:

- A CL programme should preferably consist out of a practical as well as a theory part. In Prof. R Spear's view one can compare CL with the driver of a car. "The driver needs to know how to operate the car, but he/she also needs to buy a new car – thus needs a little bit more knowledge about the inside of the car. In CL we want students to be able to use the device, but they must also be able, for instance, to purchase a computer, so they have to know about memory, processors and so on. Other important topics like careers in computing and social issues like privacy and computer security are also important." With regards to the practical part of a CL programme, Prof. R Spear notes that "CL programmes have changed over the past ten years – it was changed by the entry level (or pre-knowledge) of the students. However, in my experience most programmes still focus on teaching students the basic skills of using a word processor, spreadsheet and the operating system. Internet, e-mail and graphics packages have also become part of the most recent CL programmes." This viewpoint is validated by the facts given in sub-section 3.6.

- Prof. R Spear suggests that the final ratio between theory and practical work, should preferably be a forty-sixty split – as students will spend more time mastering the practical skills.

- In Prof. R Spear's view, the number of hours required to become computer literate, will depend on the entry level of the student. "Obviously students who have had some experience working on a computer before, will take less time to master new skills. Assuming that a student has never worked on a computer before, I think that at least forty to sixty hours of practical training is required plus double that amount of time to practice."

- Like the DL experts in the first interviews, Prof. R Spear feels that printed material still plays a vital role in DL programmes. He thinks that "in a CL programme, students should use two types of printed text, i.e. a text book that covers the theory content and a lab manual which guides them through the practical part of the work. The lab manual can include step-by-

step instructions to follow as well as exercises that students can complete to practice the required skills." This relates to the definition of a self-instructional manual given in sub-section 2.3.2.

- Prof. R Spear is of the opinion that the theory part of a CL programme can be tested by multiple choice and other short-type questions. "Students should know the basics of what is going on in the computer world – it is not expected of them to be experts on all the technical aspects surrounding computers." With regard to the practical work, Prof. R Spear thinks that "it is preferable to have students sit down and do a practical exam in a lab, however, this option presents some logistical problems in the light that DL students might be scattered all over the world. As an alternative, I propose that students hand in a fairly large project that requires them to combine the use of the practical packages covered in the programme." On probing Prof. R Spear about the problem of verifying that students handed in their own work, he responded that "the assignments should be in the form of individualised projects and not exact exercises" and that "students should work on the project in stages, submitting each separate new development. The instructor can then consider the consistency in the standard of the work submitted."

- On the matter of the kind of media to be used in a CL DL programme, Prof. R Spear mentions a number of options: "Telecourses, he feels, work well – although the videos are mainly focused on lecturing the theory part of the programme. In telecourses students still need a good lab manual to guide them through the practical work. I found that students with a poor background of using computers, find it very useful when the lab-manual is supplemented by audio tapes. The audio tapes could be used to guide students doing the practical work – this is a very productive, inexpensive way of helping students. In the case of students with language problems the audio tapes are supplementing reading with hearing which has a very positive effect. "This point is validated by the content in sub-section 2.2.2. Prof. R Spear asserts that "web-based programmes work well, although one should be aware of the accessibility of the medium to your students. For a web-based, on-line programme to succeed, students need to have a

decent Internet connection, otherwise it can become very frustrating. Computer-assisted learning (CAL) CDs is another mode of instruction – one I feel can be used productively in developing countries, like South Africa. Televised video clips, audio sound and text material could be combined on a CD and access is much faster than reading the same material over the Internet. If CAL CDs are used, students should be guided in loading and operating the trainer software.

- On scheduling face-to-face meetings with DL students, Prof. R Spear feels that it is preferable, but not always possible. He therefore proposes that face-to-face meetings should always be made optional and not be compulsory.

- Prof. R Spear feels very strongly about the fact that students who enrol for a CL DL programme should have access to a computer as well as the software that will be taught during the programme. "Why would a student who does not have a computer want to enrol for a CL programme? In my opinion the institution is not obliged to provide DL students with access to computers – although some institutions might have open computer labs where any enrolled student can access a computer."

- Prof. R Spear's advise for developing a CL DL programme for SA students is very clear: "It is imperative that you determine the entry level of your students before you start to develop the programme. If you have a few students at a lower level than the others, you could, for instance consider a bridging programme to get them up to standard, however, if you find that most of the students are at the low level, that's the place to start your programme. In your country, as was the case in the United States, in ten years' time a CL programme will look completely different from the one you plan to develop – this is because the entry-level of your students will change over the next few years. But for now, you have to teach where your students are and you have to use media that your students have access to." This fact is underlined by literature findings (*cf. 2.3.2*).

4.5.1.3 Interviews with South African computer literacy instructors

The researcher pre-empted that it might not be possible to implement exactly the same strategies as used in the USA because of the disadvantaged background of many of the South African students. It was therefore decided to interview five instructors with experience in conducting face-to-face CL classes to South African students. The interviewees are all instructors at Vista University's contact campuses where a CL programme has been running for the past seven years. All the interviewees had more than 4 years of lecturing experience.

The interview guide that contains the original questions that were put to the respondents is listed in *Fig.4.4.*

1. Tell me about your professional career, and your involvement in lecturing CL classes to South African disadvantages students.
2. How would you describe the average student with regards to background and previous experience working on a computer?
3. What, in your opinion, should students be able to do to be called computer literate?
4. How much time do you think a student should spend working on a computer to be able to master the basic principles of a word processor?
5. Do you think it is necessary for students to learn some theoretical aspects of computers?
6. How do you think should students be assessed?
7. Do you think that student will benefit by using instructional media like audio tapes, video tapes or CBT CDs?
8. Do you think the average student will be able to teach him/herself with the help of a manual and other supplementary media?
9. Would you say that it will be possible to introduce an efficient CL programme in DL mode?

Fig. 4.4

The following summarises the responses of the five instructors:

- The instructors agree that most students of Vista University are from a disadvantaged background and at the time of enrolling for the CL programme, have little or no previous experience of working on a computer.
- In asking to describe the term "computer literacy", most instructors feel that the concept is vague and could include a wide variety of skills. The most likely aspects to cover would be "the basic principles of a word processor, spreadsheet, file management by the operating system and Internet access".
- The instructors feel that a complete novice student would need between forty and sixty hours of training on a computer to be able to master the basic CL skills.
- All of the instructors deem it necessary CL students should be taught the practical skills as well as some non-technical theoretical concepts about computers. The reason given is because they feel that it is important for any computer end-user to know some of the basic principles of how a computer functions.
- All of the instructors strongly feel that students should be assessed by doing a practical examination as well as writing a theory examination. On the question of handing in assignments for a term mark, most instructors feel that "assignments are necessary to provide students with an opportunity to practice their skills". However, two instructors, are of the opinion that "some students do not hand in their own work, but rather get other students to complete the assignments on their behalf".
- The instructors are excited about the idea of students using supplementary media like audio tapes, video tapes or CAL CDs for the purpose of revision and practising skills at their own pace and in their own time. The general feeling is that the media should definitely be used "in addition to the lecturing and should not be seen as a substitute for face-to-face lecturing".

- On probing the instructors whether they think that students will be able to teach themselves computer skills using a manual and some form of instructional media without attending lectures, all of them answered "no". The reasons given are "that most students have no background of using computers and that they even find it difficult to learn the skills when the instructor is explaining and showing them what to do."

- On the question whether instructors think it would be possible to introduce a CL programme in DL mode, one answered "no" – the reason being the disadvantaged background of the students. The others answered "yes, but on condition that students must have computer access at home, students must have had some prior experience working on a computer or students should attend some form of face-to-face class to assist them in mastering the basic practical skills."

- It is the opinion of the interviewees that, in order to implement an efficient CL DL programme "students should receive a detailed study manual with step-by-step instructions on using the software packages." It is furthermore noted that "the study manual be supplemented by some form of instructional media which students have access to and that students should preferably attend a number of face-to-face classes in order to master the basic computer skills."

4.5.1.4 Collecting data by reviewing documents

UNISA and TSA are two of the leading DL institutions in SA. To determine how CL programmes are conducted at these institutions, the researcher used the data collection method of reviewing documents. According to McKernan (1996:148) documents are a rich source of evidence for the research practitioner and that one of the advantages of using documents is that information is condensed and easy to use. The following information was obtained from the calendars and the respective web-sites of the two institutions:

- UNISA follows the ICDL syllabus (*cf. 3.6.2.)*. It is expected of their students to do the examinations at any ICDL approved training site country-wide. Students can either attend the training classes presented at these sites or if they feel comfortable teaching themselves, simply do the examinations. The ICDL programme involves six modules of practical work and one module of theory (*cf. 3.6.2.)*. Students receive approved ICDL printed study material, but no supplementary instructional media are used.

- The CL programme at TSA was developed by one of the instructors. The programme consists of a practical as well as a theory module. Students receive text manuals and an optional computer-based training CD ROM. The theory module's examination is a written exam taken by students at the various examination centres of TSA. With regards to the practical work, it is compulsory for students to attend at least 40 hours of practical lecturing at any of the approved training sites country-wide. The training can either be done by an instructor in a face-to-face environment or students are trained by working through a CAL training CD ROM. A tutor is present at the training sites to assist students. Students have to do a practical examination at one of the training sites.

4.5.1.5 Collecting data by observation

According to McKernan (1996:59) observation is not only a fundamental activity associated with action research but is a requisite tool for scientific enquiry. To assemble as much information as possible before starting to develop the envisaged CL DL programme the researcher collected data by doing the following:

- The researcher visited two community colleges in the US to explore the way DL programmes are presented. Gareth Community College is located in rural, western Maryland and has a commitment to economic development of an underdeveloped and poor area of the state. To provide labour force development, the college has highly sophisticated DL technology. It is using compressed video integrated with computer

technology to teach Microsoft Office, interactive CD, fully multimedia, programmes for teaching a variety of computer programmes and it downlinks from satellite programmes for education in such areas as agricultural management. PGCC, the founding member of The College of the Air, has been a leader in DL programmes since the early 1980's. Serving a majority African-American population, PGCC is trying to improve its students' upward mobility by empowering them with the skills needed in today's job market. As is the case with Gareth Community College, PGCC is using a variety of media to present their DL programmes, i.e. interactive videoconferencing, WWW, telecourses and many of the other media mentioned in sub-section 2.2.

- The researcher enrolled for a web-based Internet Literacy programme that was presented by an instructor from PGCC. Although enrolled as a student, the researcher focused on learning more about the methodology that was used by the instructor in presenting the programme.
- The researcher attended a three-day workshop presented to PGCC's members on the methodology of interactive videoconferencing. During this workshop the researcher experienced the use of live interactive videoconferencing facilities.

At this stage the activities of Cycle 1, Step 1 is concluded. To summarise, the activities included conducting a number of interviews *(cf. 4.5.1.1 – 4.5.1.2)*, reviewing documentation *(cf. 4.5.1.3)* and observations *(4.5.1.4)*. The following step is analysing the data.

4.5.2 Cycle 1, Step 2: Analyse the data for themes and ideas for action

The general process for analysis of data is referred to as "constant comparison" (Erlandson, Harris, Skipper & Allen 1993:30). The analytical process involves an interactive, creative, and intuitive examination of the data, all in the search for patterns, themes, or emerging insights, each unfolding from the research process and grounded in the data.

To verify that the analytical process is legitimate and rigorous, collected data are disassembled, then reassembled to find uniqueness in pattern or principle of process. Data are subsequently coded so that they can be traced back to the original interview, document or observation for purposes of a conformability audit to verify the process and research method. The data is analysed and synthesised through a developmental process, continually evolving and emerging through constant comparison of newly acquired data with previously acquired materials. In this study the data obtained from the interviews were grouped according to the interviewees. The results were then analysed and cross-referenced and the following emerging themes identified:

- There exists a number of different modes in which DL programmes can be presented, using modern technologies like Internet connectivity, video conferencing and others (*cf. 2.2; 4.5.1.1; 4.5.1.2).*
- Despite the availability of modern technology, printed text still forms an integral part of most DL programmes (*cf. 2.2.1; 4.5.1.1; 4.5.1.2*).
- In selecting media to present a DL programme, the instructor should always consider the accessibility of the required technology to students (*cf. 2.2.6; 4.5.1.1; 4.5.1.2*).
- CL is a concept that can take on many meanings, but teaching students the basic functions of a word processor, spreadsheet, operating system and knowledge of basic computer-related theoretical terminology is perceived to be the bases of most CL programmes (*cf. 3.6.2; 4.5.1.2; 4.5.1.3*).
- A CL programme should preferably consist of a practical as well as a theory component. A student's final mark should be compiled from a mark for a practical examination as well as a mark for a theory examination (*cf. 3.6.2; 4.5.1.2; 4.5.1.3*).
- Students from a disadvantaged background that have no prior computer-related experience will probably find it difficult to teach themselves the

basic CL concepts and would need some initial face-to-face instruction (*cf. 4.5.1.2; 4.5.1.3*).

4.5.3 Cycle 1, Step 3: Distribute the data to others, i.e. design and develop the new programme.

In designing and developing the programme the researcher followed the guidelines of instructional design as set out in sub-section 2.4.

4.5.3.1 Design the programme

The following instructional plan as proposed by OTEN (*cf. 2.3.1)* was used in designing the programme:

- *Programme name*
  End-User-Computing (EUC5002)

- *Learning outcomes*
  One of the themes derived in sub-section 4.5.2 is that a CL programme should consist of a theory as well as practical component. Furthermore, the specific outcomes for the Technology learning area is listed in sub-section 3.3. Taking the aforementioned into consideration, the researcher derived the following learning outcomes (LO) for the envisaged programme:

  - LO1: Students should be able to describe and explain the use of basic computer terminology.
  - LO2: Students should be able to use the basic principles of MSWord to create, edit, save and print text documents.
  - LO3: Students should be able to use the basic functions of the Windows95 operating system to access programme packages and manage files.

- LO4: Students should be able to access a specific web-site and search for information on the Internet using Microsoft Explorer as well as send and receive e-mail messages using Pegasus Mail.
- LO5: Students should be able to use the basic principles of Excel to create a spreadsheet which contains values, text, formulas, functions and graphs.

As the content is broken down into units of learning, more specific lesson outcomes will be listed at the beginning of each lesson.

- *Content outline*

From the responses of the Vista contact instructors (*cf. 4.5.1.3)*, it became clear that they were of the opinion that most Vista students have had no or very little experience working on computers before they enrolled for CL programmes. In the light of this fact and keeping in mind the remarks of Prof. B Spear about the entry level of students (*cf. 4.5.1.2)*, the content of this programme is selected in a way to accommodate such inexperienced students.

Content outline for LO1 (Basic theory principles):

- Classification of computers
- Components of an information system
- Computer hardware
- Application and system software
- Productivity software
- Graphics software for professionals
- Software for home, personal and educational use
- Software for communications
- Software and legal issues
- Input devices
- Output devices
- Magnetic disks
- Optical disks

- Magnetic tapes
- Latest development in storage units

Content outline for LO2 (MSWord):

- Start MSWord
- Identify the different parts of the MSWord screen
- Create a new document & enter text
- Edit text by using the backspace, delete insert keys
- Move the cursor to different positions on the screen
- Save a new document
- Create a new blank document
- Switch between different open documents
- Close a document
- Exit MSWord
- Open a saved document
- Edit a document using various selection techniques to cut, copy and paste
- Undo/Redo
- Editing text
- Format text by changing font styles and sizes
- Format text by justifying it
- Print a document
- Change page view
- Change line spacing
- Insert page numbers to documents
- Change page margins
- Insert headers, footers and footnotes
- Use the spell checker
- Use the thesaurus
- Use the find and replace feature
- Use advanced printing options
- Create & edit tables
- Insert graphics in a document

- Create a data source file
- Create a main document file
- Perform mail merge

Content outline for LO3 (Windows 95):

- Start Windows95
- Identify the different parts of the Windows95 screen
- Shut down Windows95
- Activate program applications in Windows95
- Use the facilities of Windows Explorer
- Open and use Windows95 accessories

Content outline for LO4 (Internet and e-mail):

- Explain the relationship between the World Wide Web and the Internet
- Describe the uses of the Internet.
- Effectively search for information on the Internet using Internet explorer
- Send and read electronic mail using Pegasus Mail

Content outline for LO5 (Excel):

- Explain what a spreadsheet is
- Start Excel
- Identify the parts of the Excel screen
- Explain and use cell addresses
- Navigate around a spreadsheet
- Enter numbers / text / formulas
- Save a workbook
- Close a workbook
- Start a new workbook
- Exit Excel
- Open an existing file
- Work with more than one workbook at a time

- Insert / delete rows and columns
- Hide and unhide columns
- Change column widths
- Change row heights
- Use different formatting techniques
- Print a workbook
- Use formulas in Excel
- Use functions in Excel
- Move and copy data in a workbook
- Sort data in a workbook into either ascending or descending order
- Create different types of charts in Excel

- *Media*

  Another important theme that emerged in sub-section 4.5.2 is that printed material should form the basis of any DL programme. As VISTA students receive self-contained study manuals for most of their DL programmes, it is decided to develop a complete manual for this programme. Because Prof. B Spear suggested the use of a lab manual, it is decided to develop the manual according to the guidelines for self-instructional study material (*cf. 2.3.2).* To supplement instruction, a set of audio tapes will be developed to guide students through the practical sessions. The reasons for selecting audio tapes as instructional media are that audio tapes

  - are the type of media that is most accessible to South African students from a poor background;
  - are relatively inexpensive and simple to create and
  - are seen as having a number of educational advantages (*cf. 2.2)*

  Furthermore, video tapes which deal with the theoretical aspects of the programme will be placed in the libraries.

The researcher could not consider any of the other media option listed in sub-section 2.2. as they are either not available at VISTA or are too expensive for students.

- *Teaching strategies*

  The programme will be presented over the course of one academic year, with the year starting in February and ending in October. Students will receive the manual, audio tapes as well as an introductory letter in February. This letter will welcome students to the programme and explain to them how to use the audio tapes with the study manual to guide them through the practical sessions. The letter will further give an outline of the syllabus and a study programme. Students will be expected to hand in two practical assignments as well as a theory assignment and write a final examination in October. Video tapes explaining the theoretical aspects of the programme will be made available in the libraries. Students will be able to take out the videos and use it as supplemental instruction. As students' assignments are marked and returned to them, they will receive more letters with comments on assignments and further information about the programme.

- *Assessment strategies*

  A number of assessment strategies will be used according to guidelines set out in sub-sections 2.3.1 and 3.4.2. The main focus will be to assess whether students can perform activities as this is the essence of OBE assessment (*cf. 3.4.2).* Firstly the manual will contain practical activities that students have to complete using the computer and the application packages. Students can use these activities as self-assessment to determine whether they have progressed well enough to proceed to the next section. Students will be requested to hand in a practical assignment on MSWord in June, an Excel assignment in July and a theory assignment in August. These assignments will be used as continuous assessment and will count 30% of the final mark. These assignments can be classified as formative assessment (*cf. 3.4.1).* Students will write a final examination

during the first week of October which will mainly consist of questions on the theory part of the programme – this will constitute the other 70% of the final mark. The theory exam will mainly consist of multiple choice and other short-type questions as proposed by Prof. B Spear (*cf. 4.5.1.2).* The final examination at the end of the programme is a form of summative assessment (*cf. 4.5.1.2).*

- *Other issues*
  As this programme is envisaged to run within the OBE system of South Africa, a module catalogue was set up according to the requirements of SAQA (*cf. 3.5.2).*

4.5.3.2 Develop the programme

In this phase, the researcher compiled the study manual, recorded the audio tapes and set up the first letter for students.

In compiling the manual, the researcher paid specific attention to the following guidelines *(cf. 2.3.2):*

- Basic principles were applied to ensure good page design, e.g. the researcher avoided writing too much text on one page, used unjustified right-hand margins as it is easier to read, avoided too many different font types and used graphics to serve a specific purpose.
- An easily readable font and font size (Arial 12pts) were used.
- Special attention was given to the use of grammar as, for most VISTA students, English is not their first language. Sentences were kept short and either written in conversational English or structured in a step-by-step manner to guide students through practical sessions.
- The material was divided into different sections – each further divided into lessons.

As previously mentioned, the researcher chose to develop a self-contained, self-instructional study manual, structured in such a way that students can do most of their learning from the materials alone. The active learning approach was used by combining content with activities.
The following guidelines were followed in designing the activities:

- The activities were developed to match the lesson outcomes. They were carefully selected to help students achieve the outcomes and appear in order of increasing difficulty.
- Activities were selected to be realistic and manageable for students to complete.
- Activities are not grouped at the end of a section, but are interspersed with content.

It should be noted that the researcher did not write the content of the theory section of this programme, but paid copyright to use text from an existing textbook.

In recording the audio tapes, the researcher used a simple home recording device. The aim of the tapes is to guide students through the practical work. The content was thus developed to supplement the text in the manual with audio instructions. Students are instructed to stop the tape and perform certain activities before continuing with each new section. Special attention was given to talking in a friendly tone, making students feel comfortable working with the technology.

As previously mentioned, the first letter that was set up to be sent to students contained instructions of how to use the study material, an outline of the programme syllabus as well as a study workscheme indicating the assignments and due dates of assignments.

The video tapes covering theory concepts, were the tapes being used by PGCC for their CL programme. These tapes were kindly donated to VISTA by PGCC.

4.5.4 Cycle 1, Step 4: Try a new practice, i.e. implement and monitor the implementation of the programme.

This step in the research marks the beginning of the implementation and evaluation phases of the instructional design process (*cf. Fig. 2.1)*. It could be classified as formative evaluation (*cf. 2.3.3.4).*

One of the methods used to collect data during this phase of the research process, was by keeping a journal - also called a diary. McKernan (1996:84) asserts that a curriculum can be understood in a more personal and humane way by keeping a journal. According to Mcniff (1992:79), a journal acts as a record of events and also a record of the researcher's thinking about the events. In this study the researcher chose to keep a log-type journal. As described by McKernan (1996:85) a log, as opposed to a personal diary, is a list of short notes recording events as it happen and not necessarily on a day-to-day basis. The events are summarised in the following sub-section.

Due to some administrative problems at the despatch department, students received their study material in March instead of February. At the time this did not pose a major problem because there was still enough time for students to work through the syllabus. By mid-March the phone calls started coming in and the researcher was inundated with requests from students who wanted to know where they can get access to computers. It was explained to them that it was assumed that they would only register for the programme if they already have access to a computer, but it became clear that most of the two hundred students that enrolled for the programme, did not have access to computers. The original plan of students working at home and handing in practical assignments would not be possible. The researcher realised that the only way to make the programme effective, was for students to attend a compulsory face-to-face practical workshop. It was decided to have students write a

practical exam at the end of the workshop and replace the marks of the practical assignments with this mark. The researcher organised a venue at a central position where the students could be housed for a week whilst attending the practical workshops. Letters were sent out to the students informing them about the new arrangements and students were allowed to choose any one of four different timeslots to attend a workshop. As many of the enrolled students were teachers, the workshops were scheduled to take place during the June/July school break. Because of the slow postal system many students received their letters informing them about the verified arrangements only weeks before they had to attend the workshops. This lead to the unfortunate situation that a large number of students could not attend the workshops and the drop-out rate for the first year being higher than expected.

After changing the implementation plan for teaching the practical side of the programme to the students, the remainder of the year proceeded as scheduled. Students handed in a theory assignment and wrote a final examination in October.

The video tapes donated by PGCC were used by campus instructors in face-to-face classes shortly before the EUC DL programme was implemented. These instructors found that students had difficulty in understanding what the instructor was saying, mainly because of the difference in accent between South African and USA English. As this fact came to light before the video tapes were distributed to the DL libraries the researcher decided not to duplicate and distribute the videos.

4.5.5 Cycle 2, Step 1 Collect data to diagnose the situation - determine how students are reacting to the new programme.

This phase of the research process could be classified as summative evaluation (*cf. 2.3.3.4*). In this step the researcher conducted focus group interviews with students on the last day of attending the practical workshops. Ten interviewees were randomly selected from each of the five practical

groups – resulting in a total of fifty students taking part in the interviews. Focus group interviews not only rely on a question-and-answer format of interview but on the interaction within the group (Mertens 1998:174). This reliance on interaction between participants is designed to elicit more of the participants' points of view than would be evidenced in more researcher-dominated interviewing. It is the view of McMillan and Schumacher (1993:453) that a focus group interview is a strategy for obtaining a better understanding of a problem, concern, new product, programme or idea by interviewing a purposefully sampled group of people. The fact that group members are stimulated by the perceptions and ideas of each other, increases the quality and richness of data through a more efficient strategy than one-on-one interviewing.

The questions used as basis for the interviews were set up along the guidelines for evaluation given by Wills (2001) and Thorpe (1993:7) *(cf. 2.3.3.3)*:

1. Do you feel that you have benefited from taking this programme?
2. Do you have access to a computer at home or work?
3. Did you use the audio tape that you received with the manual?
4. If you did use the audio tape, do you feel that it helped you in teaching yourself the practical aspects of the computer?
5. How would you describe the quality and effectiveness of the manual?
6. What is your feeling about the practical workshop that you attended?
7. Would you feel comfortable to encourage a friend to enrol for the EUC5002 module?

Fig. 4.5

The following aspired from the focus group interviews:

- Although no exact statistics are available, it seems from students' feedback that more than half of the VISTA students enrolled for the DL CL programme did not have access to computers at home or work.

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Fig. 4.5

The following aspired from the focus group interviews:

- Although no exact statistics are available, it seems from students' feedback that more than half of the VISTA students enrolled for the DL CL programme did not have access to computers at home or work.

- Students who did have access to computers at home or work, indicated that they did use the audio tapes as supplementary instruction to the manual. They felt that using the tapes definitely assisted them in mastering the required practical skills and were of the opinion that it would have been much more difficult to start working on a computer if they had not used the audio tapes.
- All of the groups felt that the study manual was good and gave sufficient guidance and support in doing the practical work and that the theory was clearly laid out.
- All students who attended the practical workshops felt that, although it was a great financial burden to them, it was worth while and that they have learnt more than they would have been able to do on their own. They also concluded that using the manual and audio tapes prior to attending the workshop prepared them in such a way that they were able to master the required practical skills faster than students who did not have access to a computer before attending the workshop. The groups were united in their request that, if possible, the workshops should be held closer to where they live.
- All the groups agreed that the programme is definitely worth taking and that they would encourage other students to enrol for the programme.

Although evaluation is not synonymous with assessment (*cf. 2.3.3.1),* Wills (2001) asserts that student achievement, looking at the rate of participation of students and the marks obtained could be indicators used for evaluation (*cf. 2.3.3.3).* Research in this step was thus concluded by analysing the end-of-year statistics of the first year of implementation: 205 students enrolled, 101 attended the practical workshop, 156 wrote the final exam and 100 passed. This constitutes a drop-out rate of 25% and a pass rate of 64%. Although the drop-out rate was higher than for contact students, the pass rate was quite in line with the general pass-rate of Vista students.

4.5.6 Cycle 2, Step 2: Analyse the data for themes and ideas for action.

From the data collected in cycle 2, step 1, the following became clear:

- It can not be assumed that students that enrol for this programme have access to computers at home and/or work. It might be considered to make it a pre-requisite to enrol for the programme, but as the aim is to enable as many students as possible to become computer literate, this decision was ruled out. It was thus decided to have students attend a one-week (40 hours) compulsory practical workshop and do a practical examination at the end of the week. The mark of this practical examination will constitute the mark for their practical work. As many of the students in the focus group interviews requested that the workshops be held closer to their homes, it was decided to have practical workshops at all six contact campuses of VISTA, rather than arranging the workshops in one central part of the country.
- The audio tapes were accepted well and students seemed to find it helpful in teaching them the practical aspects of the programme. It was decided that, even if students were going to attend a practical workshop that the audio tapes could still be useful - either to prepare them for the workshop or as revision and practising after the workshop.
- The video tapes could not be used effectively because students found it difficult to understand the USA English accent. The tapes were thus not distributed to the libraries.
- Students seemed to feel satisfied with the manual and therefore it will mainly stay the same, except for some minor spelling, language and formatting errors that will be changed before it is re-printed for the following year.

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4.5.7 Cycle 2, Step 3: Distribute the data to others, i.e. revise the programme.

The programme was revised in the following manner:

- The manual was edited to correct spelling, language and formatting errors.
- The first letter that was drafted to be sent to students informed them about the fact that they had to attend a compulsory practical workshop. The venues and dates of the workshops were given and they had to send a reply to indicate where and when they will be attending. This enabled the researcher to organise workshops in an orderly way, preparing materials and informing the instructors at the campuses of the number of students to be expected.
- The work schedule was changed in the sense that students had to attend a practical workshop during the June/July school break and hand in a theory assignment during the first week of August. These two marks, together with the final examination mark written in October would be combined to form the final mark. As many students do not have access to computers, it was not required of them to hand in any practical assignments during the year.

4.5.8 Cycle 2, Step 4: Try a new practice, i.e. implement the revised programme and monitor the implementation thereof.

During the second year the revised structure of the programme was implemented. The researcher did not encounter any serious problems. There were a very small number of students that still complained about having to travel too far to attend the practical workshops, but in general students seemed to be more satisfied with the arrangements.

4.5.9 Cycle 3, Step 1: Collect data to diagnose the situation - determine how students are reacting to the new programme.

Data collection in this phase was done by conducting focus group interviews. The same interview guide was used as outlined in *Fig. 4.5.*

- The researcher was quite pleased with the results of the interviews. Students were overwhelmingly positive about the programme. "We definitely benefited from it and will recommend other students to enrol next year".
- Positive feedback was given about the manual. "The language use is clear and straight forward – it helped us to understand what to do"
- Students were satisfied with the wider choice of venues where they could attend the practical workshops. In general students felt that the workshops were well conducted and that they learnt enough to be able to keep on working on computers after the workshop. "The workshop was excellent – we have learnt a lot." One of the groups felt that "too much work have been done in a week". This is understandable taking into consideration that students have never worked on computers before they arrived at the workshop. However, the pass-rate of 76% for the practical examination done at the end of the workshops, is an indication that most of the students were able to cope with the required content.
- Most students felt that the audio tapes are effective in helping them either to prepare for the practical workshop or do revision after the workshop. "The audio tape assists us to understand what to do at the computer when we read the manual."

The researcher concluded this phase of data collection by looking at the end-of-year statistics for the second year of implementation: 395 students enrolled, 375 attended the practical workshops, 305 took the final exam and 194 passed, which constitutes a drop-out rate of 23% and a final pass rate of 64%.

4.6 CONCLUSION

In this chapter, the researcher gave a detailed layout of the methodology used and steps taken to collect and analyse data in this research study. The result of the research process is a complete outcomes-based computer literacy programme that can be presented in distance learning mode to South African students. The following chapter contains some conclusions and recommendations and the complete programme is given in Chapter Six.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

An overview of the study has been given in sub-section 4.1, where the researcher explained the method used to fulfil the original aims set out for this study.

5.1 FINDINGS OF THE STUDY

In this sub-section the researcher presents the findings of the study by providing answers to the research questions stated in sub-section 1.2.

- *What is the role of distance learning in education?*

  A study of literature in Chapter Two revealed that DL has definite advantages (*cf. 2.1.5)* and is set to play an increasingly important part in future education systems. With the development of new technology, there are a number of innovative ways to enhance DL (*cf. 2.2)*. The study further indicated instructional design guidelines that could be followed to design DL programmes *(cf. 2.3)*. One of the phases of instructional design is evaluation and the literature study indicated a number of ways in which a DL programme can be evaluated (*cf. 2.3.3)*. These guidelines were followed in evaluating the DL programme in this study, through action research.

- *What impact does outcomes-based education have on a computer literacy programme?*

  The literature study in Chapter Three revealed the concept of outcomes (*cf. 3.3)*. It also indicated the specific way that OBE is implemented in the South African context and shed light on how a programme should be structured to form part of the South African OBE system (*cf. 3.5)*. The

chapter concluded by looking at standards set for CL programmes and indicated the content that should be covered by such a programme (*cf. 3.6)*. The programme developed through this study reflects this content and is based on OBE principles.

- *What factors should be taken into account in developing a computer literacy programme in distance learning mode?*

  As described in Chapter Four the researcher followed action research techniques to develop, evaluate and implement an OBE CL programme in DL mode for South African students (*cf. 4.2)*. The first step in the research cycle was to collect data to be able to develop the programme. The researcher conducted interviews, reviewed documentation and performed observations. The findings are summarised in sub-section 4.5.1.

- *Can an effective computer literacy programme be successfully developed and implemented for distance learning education?*

  After collecting the initial data, the research process was completed by following a number of steps, i.e. analysing, developing and evaluating the programme (*cf. 4.5.2 – 4.5.8)*. The end-result of the research is a well-developed programme that proved to be successful in training disadvantaged students the basic CL concepts in DL mode. The complete programme is given in Chapter Six.

5.2 LIMITATIONS OF THE STUDY

The study revealed a number of new, innovative technologies that can be used to present DL programmes (*cf. 2.2)*. However, in selecting the media to supplement this particular programme, the researcher was limited by the following two factors:

- Most of VISTA University's students are from a disadvantaged background and do not have access to modern technology like the Internet.
- There was no infrastructure available at the University for using videoconferencing and because of the high cost of installation this could not be considered a viable option.

The study revealed that in selecting media, the most important factor to consider, is what media students have access to (*cf. 2.2.6, 4.5.1.1, 4.5.1.2).* The researcher was thus restricted to selecting very simple media, i.e. audio tapes, that was available to most students.

5.3 CONCLUSION AND RECOMMENDATIONS

It is recommended that students who want to become computer literate and do not have the opportunity to attend face-to-face classes enrol for the programme presented in Chapter Six. The chapter is a copy of the self-contained study manual. The module catalogue that was set up and submitted to SAQA is given on the second page of the manual. The programme was approved by SAQA and is listed as module EUC5002. The manual is divided into the following five sections:

- Section A – Theory. This section was not specifically developed for the purpose of this study, but is copied from a textbook of which the researcher is a co-author (Oosthuizen, de Bruyn and Zeelie 1999:1 – 40).
- Section B – MSWord. This section covers the basic principles of Word Processing.
- Section C – Windows. This section covers the basic principles of using the Windows operating system.
- Section D – Internet. This section covers the basic principles of using the Internet and e-mail facilities.

- Section E – Excel. This section covers the basic principles of using spreadsheets.

In addition to the manual, students receive an audio tape to be used in conjunction with the manual. Students also receive letters during the course of the year providing them with a detailed work scheme indicating the due dates for assignments and the practical workshops. These letters to the students differ from one year to another and is therefore not presented as part of the study manual.

5.4 SUGGESTIONS FOR FURTHER RESEARCH

The researcher identified the following as possible opportunities for further research:

- The result of this study is an *introductory* CL programme. A similar programme could be developed at a more advanced level.
- Quantitative research techniques could be applied to statistically profile a number of aspects relating to the programme, e.g. the percentage of students who have access to computers at home, the level of prior knowledge of the students, the results of students, etc.
- Students who completed the programme could be observed to determine the long-term effects of the training on their careers.

The final product that resulted from this study is presented in Chapter Six.

AN OUTCOMES-BASED COMPUTER LITERACY PROGRAMME IN DISTANCE LEARNING MODE FOR SOUTH AFRICAN STUDENTS

TABLE OF CONTENTS

1. Section A — Theory
2. Section B — MS Word
3. Section C — Windows 95
4. Section D — Internet and E-mail
5. Section E — Excel

MODULE CATALOGUE

(As presented to and accepted by SAQA)

The following module catalogue was presented to SAQA according to the requirements (*cf. Fig. 3.8)*. The module was officially approved by SAQA.

1. **Module Code**: EUC5002
2. **Title**: End User Computing
3. **NQF Level**: 5.0
4. **Credits**: 16
5. **Pre-requisite modules**: None
6. **Concurrent modules**: None
7. **Notional hours**: 160
8. **Practical / Lab component**: 70
9. **Method of Assessment:**

   Practical, Tests and Module Examination.
   Module Mark = 1/3 Term Mark and 2/3 Exam Mark.
   Module Exam will be in June and November.
   Module Exam will comprise of one 2-hour paper.
   Practical exam will be organised before theory exam.

10. **Specific outcomes**

    At the end of this module the student will be able to use the computer to produce documents and spreadsheets using the application packages MS-Word and Excel. Students will further be able to send and receive e-mail, search information on the Internet and manage files through the Windows operating system.

11. **Brief description of content**

    Basic introduction to computer concepts.
    Word Processing, Spreadsheets, E-mail, Internet and Operating systems.

12. **Critical outcomes supported by the module**

    Using computer technology effectively and critically;
    Collecting, analysing, organising and critically evaluating information;
    Working effectively with people as a member of a team.

13. **Field / sub-field**: Computer and Information Technology

SECTION A: THEORY

Section A, Chapter 1 – 5 was re-printed in the study manual with permission of Computer Forum and was not specifically developed for this study. It is therefore not presented as part of this study.

SECTION B: MSWORD

CHAPTER B1

OUTCOMES OF THIS CHAPTER ARE TO BE ABLE TO:

- Start MSWord 97
- Identify the different parts of the Word 97 screen
- Create a new document & enter text
- Edit text by using the backspace, delete insert keys
- Move the cursor to different positions on the screen
- Save a new document
- Create a new blank document
- Switch between different open documents
- Close a document
- Exit Word

INTRODUCTION

Word processing software allows general word processing like typing letters, assignments, CVs and other types of documents. This type of software replaces the use of pen, paper and the typewriter which were traditionally used for word processing. MSWord processing software allows document creation to be easier and faster. The basic functions of word processing software are *typing , editing, formatting, saving and printing*.

- **Typing** involves the creation of a document.
- **Editing** involves correcting mistakes made on your document.
- **Formatting** involves adjusting the appearance of a document.
- **Saving** involves saving a document for later reference.
- **Printing** involves producing a paper copy of a typed document.

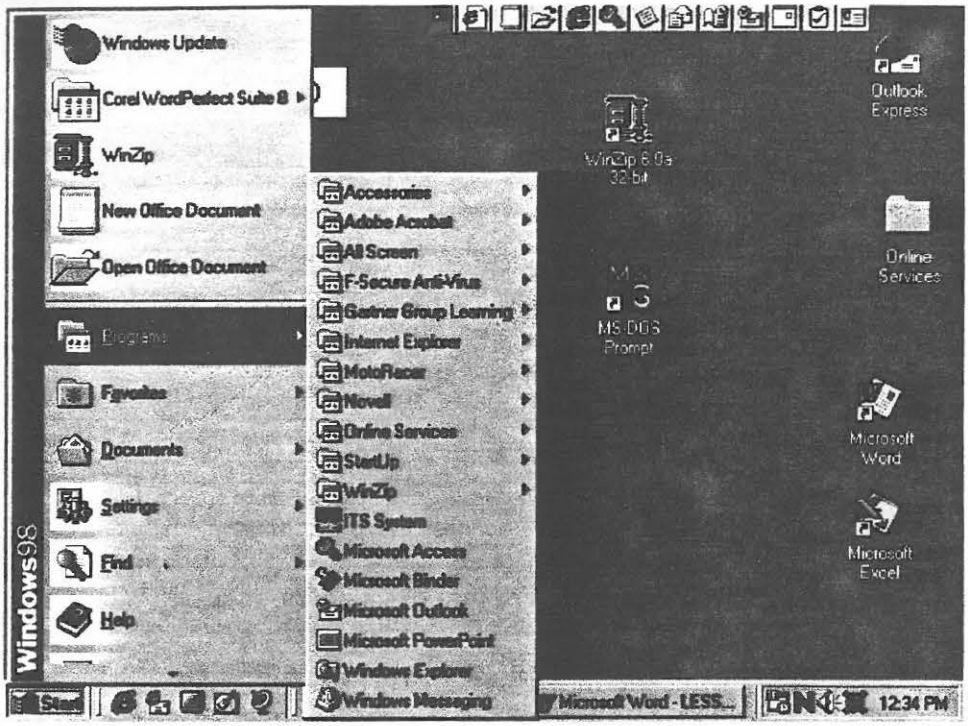
In word processing, document creation is separate from the printing process. This separation is what makes word processing software much more convenient than using a typewriter or traditional pen and paper.

See Chapter A3 for more information on the advanced features of word processors.

MSWord 97 is the word processing software we are going to learn to use in this course. Other examples of word processing software are: **Corel WordPerfect, Lotus Amipro** and **WordStar.**

STARTING MS Word

1. Click on **Start** (*at the bottom left corner of the screen*).
2. Click on **Programs.**
3. Look for the **Microsoft Office 97 icon** or **Microsoft Word icon.**



There are different ways to activate a program in Windows 95. Note that your screen may look different from the diagram shown above. If you have problems activating MSWord, consult the Windows notes. In any case you will find the following **MSWord-icon**:

MSWord will automatically open a new document and the user can start typing immediately. The insertion point, represented by a blinking cursor [|] shows the position where the next character that you type will appear.

To enter text, simply start typing.

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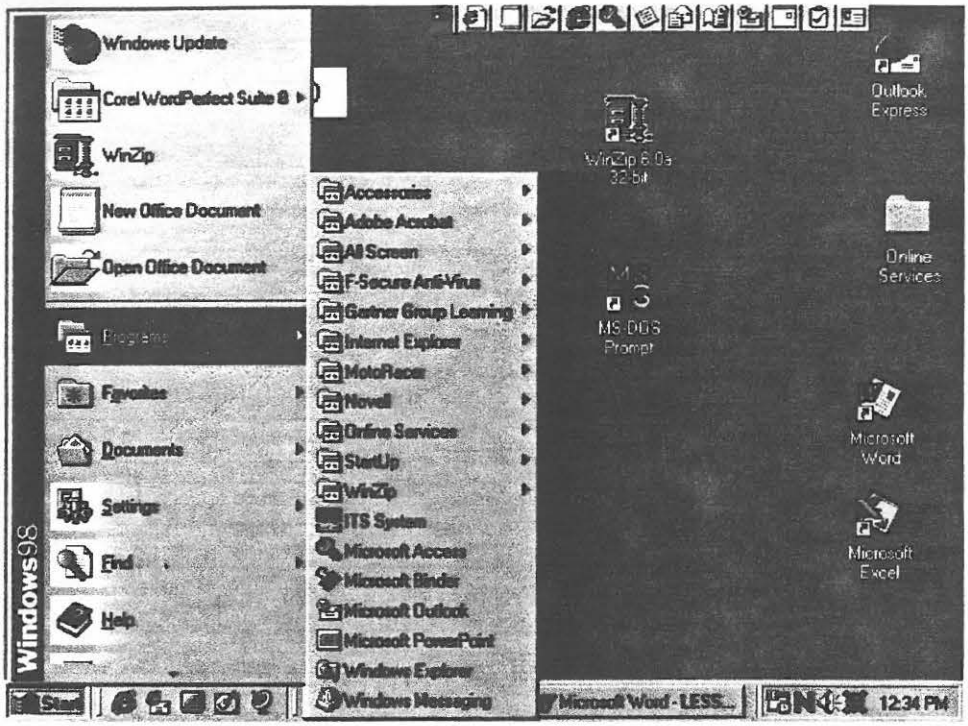

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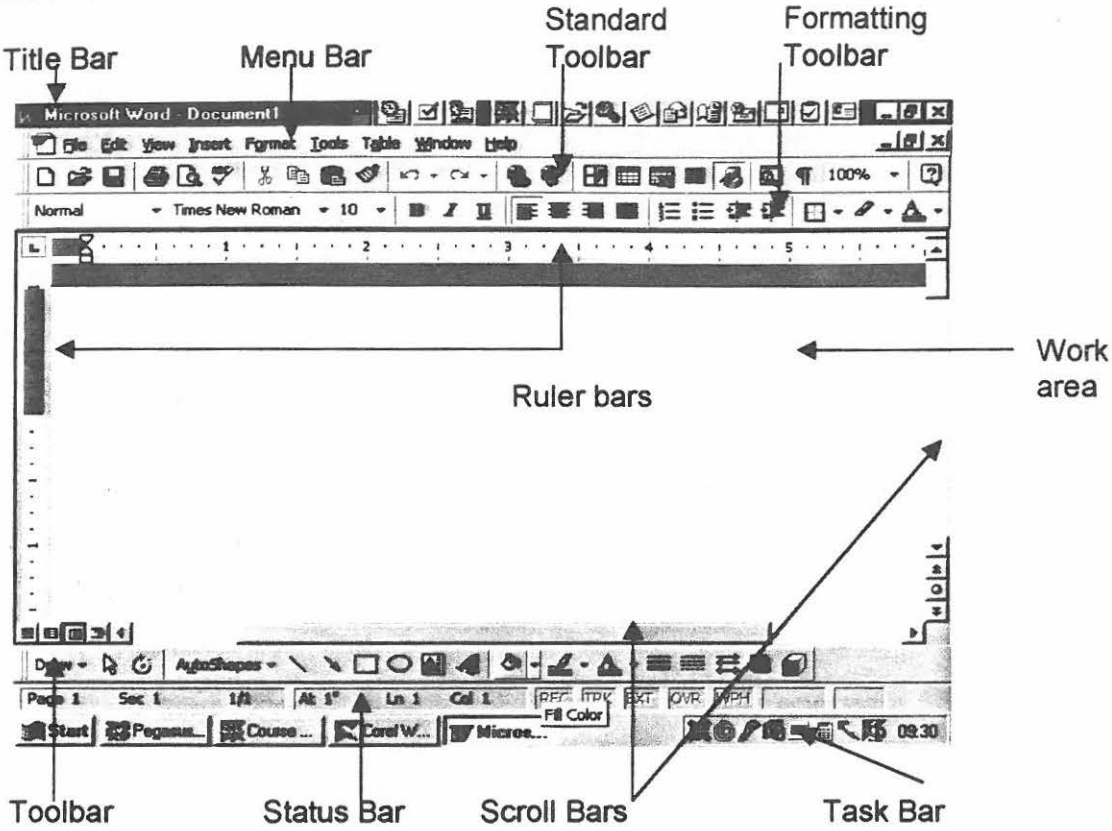
To enter text, simply start typing.

IDENTIFYING THE DIFFERENT PARTS OF THE SCREEN



The first thing that you will realize is that the MSWord screen is set up the same way as your Windows 95 program. It consists of :

- **The Title Bar** displays the name of the application and workbook you are currently working in.
- **The Menu Bar** displays the name of the various application menus available within MSWord.
- **The Standard Toolbar** is usually displayed below the Menu Bar and contains a number of **icons** that can be used to activate functions of MSWord without having to go through the menus. The user has a choice of displaying a number of different toolbars by right clicking between icons on the standard toolbar.
- **The Status Bar** is situated at the bottom of the screen. It provides information about documents, such as cursor position, page and section numbers and the total number of pages in the document.
- **The Formatting Toolbar** is usually just below the standard toolbar at the top of the screen. It contains a number of icons that can be used to format the contents of the workbook i.e. bold, italic, underline, left align, right align or centre text.
- **The Ruler Bar** is situated below the formatting toolbar and is used to set indents,

tab settings and changing margins settings.

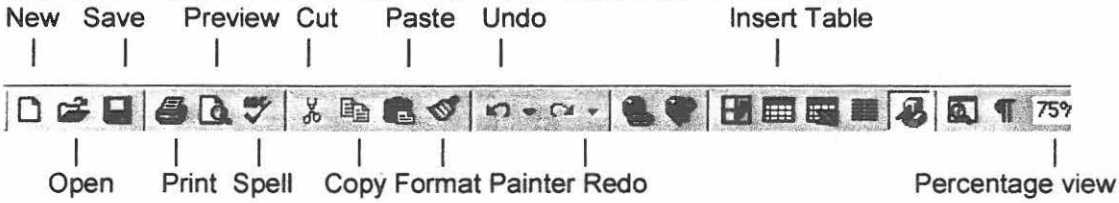
- **The Scroll Bars** appear at the right hand edge (vertical scroll bar) and at the bottom (horizontal scroll bar) of the screen. These are used to scroll through the document.

USING ON - LINE HELP

It can be quite difficult to start using MSWord 97. People without previous experience in any Windows based MSWord Processor can make use of the on-line help available in MSWord 97. This allows you to obtain help on certain topics while you are actually using MSWord 97. To activate the on-line help facility:

1. Click on the **Help menu.**
2. Click on **Microsoft Word Help.**
3. Follow the guidelines on the screen. The help facility will direct you to instructions which will help you to perform the required tasks.

IMPORTANT ICONS ON THE STANDARD TOOLBAR

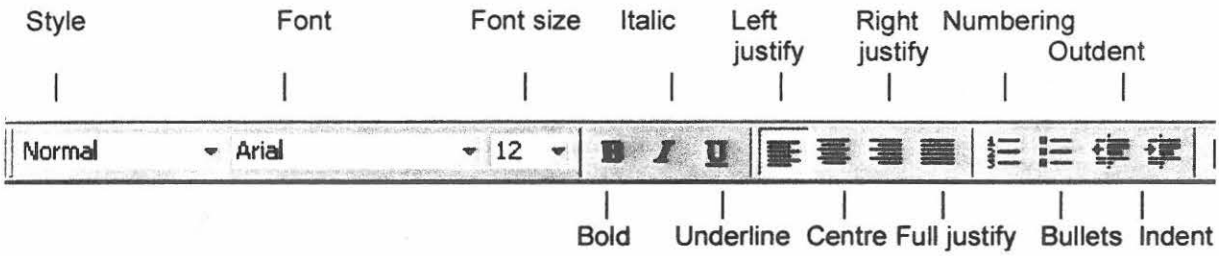


The following are the most important icons on the toolbars that will be used during this course:

- **The New icon** is used to create a new document.
- **The Open icon** is used to open an existing document that has already been saved.
- **The Save icon** is used to save a document that has been saved before.
- **The Print icon** is used to send a document to be printed on the printer.
- **The Preview icon** displays the document in a small format to enable the user to see the format in which pages are going to be printed.
- **The Spell check icon** can be used to do a spellcheck on the document.
- **The Cut icon** places highlighted content onto the Clipboard – removing them from their old position.
- **The Copy icon** places a *duplicate* of the highlighted content onto the Clipboard – the original data stays untouched.

- **The Paste icon** inserts the current contents of the Clipboard into a new position.
- **The Format Painter icon** can be used to change the format of data to the same format as that of a selected content.
- **The Undo** and **Redo icons** can be used to undo or redo previous actions.
- **The Insert table icon** allows the user to insert a small table.
- **The percentage icon** makes it possible to display the document in different sizes.

IMPORTANT ICONS ON THE FORMATTING TOOLBAR



- **The Style drop-down box** can be used to change the specific style which is used to type the text.
- **The Font drop-down box** can be used to change the font of text.
- **The Font size drop-down box** can be used to change size of the font used.
- **The Bold, Underline** and ***Italic* icons** are used respectively to switch between **boldface**, underline and *italics*.
- **The Left, Right and Centre Justification icons** are used to align text left, right or centre with reference to the left and right margins.
- **The Full Justification icon** is used to align text automatically so that the left and right margins form a straight line.
- **The Bullet** and **Numbering icons** are used to insert bullets and numbering.
- **The Outdent** and **Indent icons** are used to either move a whole paragraph to the left or to the right.
- **The Bullet** and **Numbering icons** are used to insert bullets and numbering.

ENTERING TEXT

When you open MSWord, a blank new document is immediately made available for use. It is possible, though, to open a new document at any time.

WHERE TO START TYPING?

The insertion point, represented by a blinking cursor [|] shows you the position where the character you type will appear. To enter text simply start typing. When entering text, the following rules apply:

- The **alphabetic keys'** row start with the letters QWERTY.
- **Capital letters** are obtained by either switching the *Caps Lock* key on **or** by using the Shift key in conjunction with the letters A - Z (when *Caps Lock* is off).
- The **Shift key** is used to obtain special characters [! @ # $ % ^ & * ( ) _ + = -` ~] which are positioned above the number keys situated above the alphabetic keys.
- **Spaces** between text and words is obtained by using the *Space Bar* key.
- To move to the next line, MSWord uses a feature called **word-wrap**, were text automatically moves to the next line once the end of the previous line has been reached.
- The user can also proceed to the next line by pressing the **ENTER key**. Spaces between lines and paragraphs are thus obtained by using the **ENTER key**.

TO CORRECT TYPING ERRORS

When typing the user is bound to make mistakes. In MSWord, mistakes could be corrected without re-typing the whole word, paragraph or page. There are different ways of correcting mistakes:

- **By using insert mode** the user is allowed to insert text at any point in the document without typing over any other text. In normal circumstances, the insert mode is the default mode.
- **By using overwrite mode** the user will type over any text to the right of the cursor. To switch to overwrite mode, simply press the **INSERT key** OR double click on **OVR** on the status bar (at the bottom of the screen).
- **By using the delete key** one character to the right of the current cursor position will be deleted.
- **By using the backspace key** one character to the left of the cursor will be deleted.

TUTORIAL B1.1

September 19, 1998
Molehe Leteane
19224 Putswastene
Thabong

Dear Molehe

You are invited to my millennium party on 1 January 2000 at 32 Meyer Street, Reitzpark. Please phone: 057-355 5555 to confirm your attendance.

See you at my party!!

Sincerely
Mogomotsi

1. Type the letter exactly as given above.
2. Use the arrow keys on the keyboard to move to the end of the name *Mohlehe.*
3. Press the **Backspace key** to erase the name.
4. Type in the name *Nkosi.*
5. Move the cursor to the beginning of the name *Nkosi.*
6. Press the **Delete key** to erase the name *Nkosi.*
7. Type in the name *Martha.*
8. Move the cursor to the beginning of the name *Martha.*
9. Press the **Insert key.** You now move into Overwrite mode which means that the text you type, will be typed over existing text.
10. Type the name *Molefi.*

MOVING THE CURSOR TO DIFFERENT POSITIONS ON THE SCREEN

The cursor can be moved in your document to suit your different needs. One can use either the mouse or the keyboard to move the cursor or insertion point to different parts of your document. It is much faster to move the cursor using a mouse.

TO MOVE THE CURSOR USING A MOUSE

1. Move the mouse pointer to the desired position in your document.
2. Click the left mouse button.

***NOTE**: The vertical and horizontal scroll bars can also be used to move through your document with a mouse.*

TO MOVE THE CURSOR USING A KEYBOARD

Pressing different keys will move the cursor to different positions in different ways:

- Use the **left, right, up and down arrows** to move one character at a time to the left, right, top or bottom.
- Use the **Control key (Ctrl)** in conjunction with the **left and right arrow keys** to move one word at a time.
- Use the **Control key (Ctrl)** in conjunction with the **up and down arrow keys** to move one paragraph at a time.
- Use the **Home key** to move to the beginning of a line.
- Use the **End key** to move to the end of a line.
- Use the **Page Up (PgUp)** and **Page Down (PgDn) keys** to move between pages.

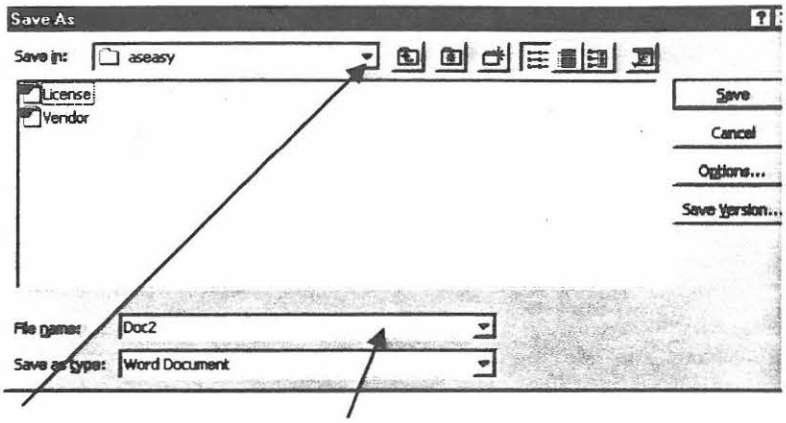
SAVING DOCUMENTS

As you type, the computer's memory (RAM) holds your work. When you exit MSWord, or if power to the computer is turned off, your computer erases your work in RAM. To store your work permanently, you must save it in a named file on your disk. Files / documents can either be saved on the computer's hard disk (C:); on the diskette in drive (A: or B:) or the disk in your network drive (H:). Get into the habit of saving your work regularly while still busy creating the document. This can help save time in case of hardware or software failure.

When saving a document for the first time, the document must be assigned a file name. You must also specify where the file should be stored i.e. in drive A:, C: or H:.

TO SAVE A DOCUMENT FOR THE FIRST TIME

1. Click on the **File menu.**
2. Click on **Save As**. A dialog box will appear, giving you the option to assign a name to the document and choose a specific directory (e.g. H:) where you wish to save it.



Click here to select the drive Click here to type in a name for the document

3. Click on the **Save in drop-down list** (see diagram above). A similar dialog box to the following appears:

4. Select where you want to save the document i.e. in the A: , C: , or H: -drive. You can also select a specific directory to save the file in.
5. Click in the **File name box** and type a name for the document.
6. Click on **Save** or press **Enter**.
7. The title bar should now display the name of your file and the directory where it is saved.

TO SAVE A FILE THAT HAS BEEN SAVED BEFORE

When saving a file that has already been saved, Word will save the latest version of the document and replace the old contents.

1. Click on the **File menu.**
2. Choose **Save**
   OR
   Click on the **Save icon.** 

NOTE: *The* ***Save As option*** *can also be used to make a copy of the document and save it under a different name. Simply follow the steps above and in step 5, assign a new name to the file.*

It is advisable to save the file that you are working with every 5 - 10 minutes. It may happen that you experience problems with your computer, the power shuts down or your network server goes down in which event you will lose all information that has not been saved.

TUTORIAL B1.2

1. Save the file that you created in Tutorial B1.1 with the name PARTY.

2. Change the name of the document to PARTY1.

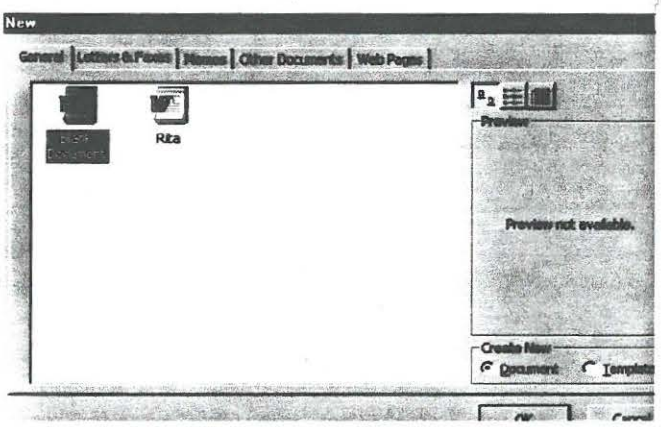
CREATING A NEW DOCUMENT

As already stated a new document is immediately made available for use when MSWord is activated. However, the user may wish to create a new document whilst already working on an existing document. (It is possible to have more than one document open at the same time.)

The format of documents is based on templates. A template is a model for a document. MSWord has different kinds of templates, but in general, most documents you'll create will be based on the **blank document template.**

TO CREATE A NEW DOCUMENT

1. Click on the **File menu.**
2. Click on **New**. The following dialog box will appear:



8. Click on **Blank Document**.
9. Click on **OK**.
   A new document will be opened.

NOTE: *A new document can also be created by simply clicking on the* ***New icon****.*

SWITCHING BETWEEN DOCUMENTS THAT ARE OPEN

It is possible to have more than one document open at the same time. Usually MSWord will only display one document on the screen.

TO SELECT ANOTHER OPEN DOCUMENT

1. Click on the **Window menu.**
2. Select the document you want to work with.

CLOSING AND EXITING

The computer may never be switched off while working in MSWord. All documents have to be closed and MSWord has to be exited.

TO CLOSE A DOCUMENT

1. Click on **File.**
2. Select **Close.**

If you close a document or exit MSWord without saving, MSWord will ask you if you wish to save the document or any changes that you have made to the document. Choose an option which is relevant to your case.

TO EXIT MSWORD

1. Click on **File.**
2. Select **Exit.**

TUTORIAL B1.3

1. Close all open documents. (Do not save the empty document.)

2. Exit MSWord.

CHAPTER B2

OUTCOMES OF THIS CHAPTER ARE TO BE ABLE TO:

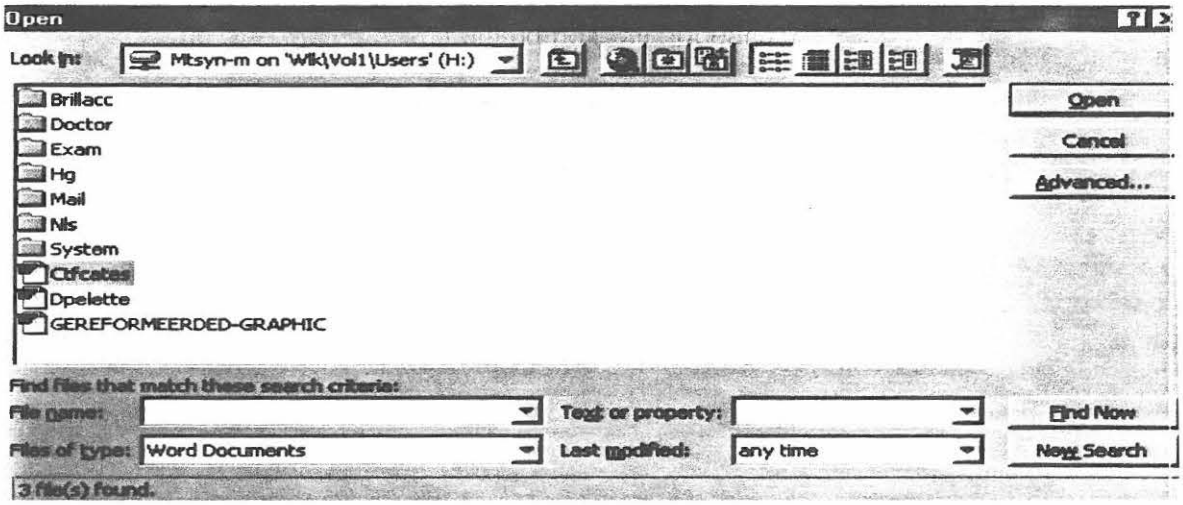
- Open a saved document
- Edit a document using
  - Various Selection Techniques
  - Cut, Copy & Paste
  - Undo/Redo
  - Editing text

OPENING A SAVED DOCUMENT

To edit or make changes to an already existing saved document, one has to first open it from a disk where it is saved. When it is opened, **MSWord** displays it on the screen. Opening or retrieving a document onto the screen does not remove it from the disk, it just places a copy of it in your computer's memory. If you already have another document opened, **MSWord** will open a new window for the new document.

TO OPEN A DOCUMENT

1. Click on **File.**
2. Select **Open**. A dialog box similar to the one below will appear.



3. If the filename is not listed on the screen, click on the **Look in drop-down list**.
4. Choose the appropriate drive and / or directory.
5. Select the file you want to open or type in the file name in the **File name box.**
6. Click on **Open**.
   The document will appear on the screen.

EDITING A DOCUMENT

To edit a document entails making changes to the document. We are going to learn how to edit a group of text simultaneously. The general procedure is:

- Open the document.
- Select the text that has to be changed / edited.
- Perform the editing.

SELECTION TECHNIQUES

To make changes to text, words or paragraphs that have already been typed, first select (or *highlight*) the text. Either the keyboard or the mouse can be used to select / highlight text.

TO SELECT USING A MOUSE

1. Click the mouse to position the cursor at the beginning of the text to be selected.
2. Hold down the **Shift key.**
3. Point the mouse at the end of the portion to be selected.
4. Click the **right mouse button**.

All text between the first mouse click and the last mouse click will now be highlighted.

There are other ways to select text using a mouse:

Select	Procedure
Characters	Drag the mouse while holding the left mouse button down. Changing directions when you drag will increase or decrease the selected area.
A word	Double click the word.
A line of text	Click in the selection bar to the left of the lines.
Multiple lines	Click and drag in the selection bar to the left of the lines.
A sentence	Hold down the Ctrl key and click anywhere in the sentence.
A paragraph	Double-click in the selection bar to the left of the paragraph. OR Triple click anywhere in the paragraph.
An entire document	Press Ctrl and click in the selection bar.
A rectangular block	Hold down the Alt key, click and drag.

TO SELECT USING A KEYBOARD

1. Move the cursor with the arrow keys to the beginning of the text to be selected.
2. Hold down the **Shift key** and move with the **arrow keys** to the left, right up or down direction to the end of the portion to be selected.

As the cursor is moved, text will be highlighted.

There are other ways to select text using a keyboard:

Select	**Procedure**
To the end of a word	Ctrl+Shift+Right arrow
To the beginning of a word	Ctrl+Shift+Left arrow
To the end of a line	Shift+End
To the beginning of a line	Shift+Home
One line up	Shift+Up arrow
One line down	Shift+Down Arrow
To the end of a paragraph	Ctrl+Shift+Down arrow
To the beginning of a line	Ctrl+Shift+Up arrow
One screen up	Shift+PgUp
One screen down	Shift+PgDn
To the end of a document	Ctrl+Shift+End
To the beginning of a document	Ctrl+Shift+Home

Once you have selected text that you want to edit, you can then make changes to it.

CUT, COPY AND PASTE

MSWord allows a user to move text that has been typed in one position to another position without having to retype it. This process is called *Cut and Paste.* It is also possible to copy text that has been typed in one position to another position in the document. This process is called *Copy and Paste.*

Once text has been cut or copied it can be pasted multiple times at different positions in the document. It can also be pasted into other documents or even to other Windows-based applications.

The difference between *cut* and *copy* is:

- Copy leaves the text block in the original position and places an exact duplicate of the text at the new position.
- Cut removes the text block from its original position and places it at a new position that the user selects.

TO COPY AND PASTE

1. Select text that you want to copy, using one of the selection techniques described.
2. Click on the **Copy icon**. 
3. Move the mouse pointer to the position where text has to be copied to.
4. Click on the **Paste icon.** 

TO CUT AND PASTE (MOVE TEXT)

1. Select text that you want to copy, using one of the selection techniques described.
2. Click on the **Cut icon**. 
3. Move the mouse pointer to the position where text has to be copied to.
4. Click on the **Paste icon.** 

UNDO / REDO

Mistakes happen! It is all too easy to perhaps delete characters you do not really want to delete or make changes and then change your mind about them. MSWord gives us a quick and easy way to correct our mistakes using the **Undo and Redo icons**.

TO UNDO THE LAST CHANGE THAT YOU HAVE MADE

1. Click the **Undo icon** on the standard toolbar. 

NOTE: *MSWord remembers up to 29 changes that you have made to your document. To view them click on* ***the drop-down list*** *of the* ***Redo / Undo icon*** *and a menu will appear showing the sequence of Redo / Undo activities you have done. Select the appropriate action to undo.*

TO REDOTHE LAST CHANGE THAT YOU HAVE MADE

If you undo something and then change your mind, you can use Redo to reverse the Undo action:

1. Click the **Redo icon** on the standard toolbar. 

TUTORIAL B2.1.

1. Open the document PARTY1 that was saved in tutorial B1.2.
2. Type the following just below Dear Molehe:

> The theme of the party is traditional wear. My cousin has a shop in Liberty Center which sells traditional clothing.
>
> Please contact her at this number: 057 - 353 2222.
> The prices range from R 100.00 to R 3000.00.

3. Move the paragraph you have just typed to directly above the sentence "See you at my party!!"
4. Copy the same paragraph at the end of your document.
5. Click on the **UNDO icon** to undo the copy action.
6. Save the document as PARTY2.

CHAPTER B3

OUTCOMES OF THIS CHAPTER ARE TO BE ABLE TO:

- Format text by changing font styles and sizes
- Format text by justifying it
- Print a document

FORMATTING

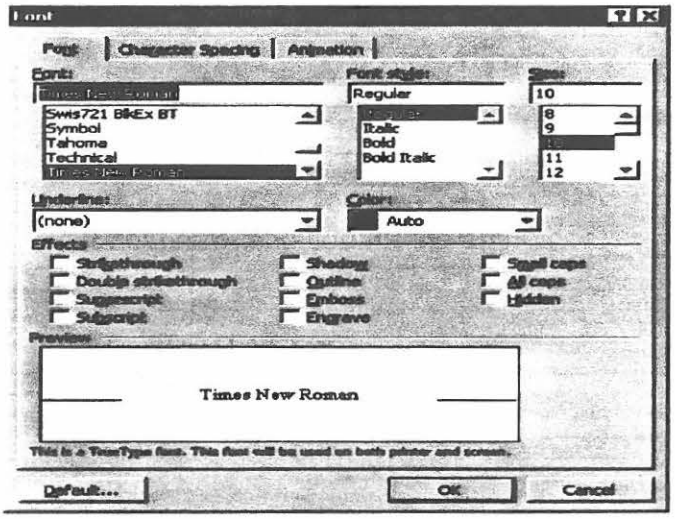
Formatting is the process of adjusting the appearance of a document. You can format an entire document, several paragraphs, one paragraph or a single word.

Formatting text includes activities like displaying text in **boldface**, *italics*, underlining words, and changing the size and fonts of text. The user can format text that has already been typed or format text as it is typed.

- To format existing text, you first select it and then select the formatting options you want.
- To format text as you type, first select the formatting option you want, then type the text and then turn the formatting options off.

TO FORMAT EXISTING TEXT USING THE FORMAT MENU

1. Select or highlight the text you want to format.
2. Click on the **Format menu.**
3. Click **Font**, and the following dialog box will appear:



In the dialog box, one will see the different formatting options available:

- different types of fonts and their respective available sizes
- different appearance styles such as **boldface,** underlining, *italics,* shadow, ~~strikeout~~ and even a ***combination*** of all
- a drop-down menu for underline featuring different styles of underlining

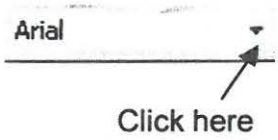
- different effects i.e. superscript ^{Superscript} (use: $x^2 + x + 1$) and subscript $_{Subscript}$ (use: H_2O)
- color options, which allow you to change the colour of your text.

Instead of working through the Format menu, the user can format text by using the formatting toolbar.

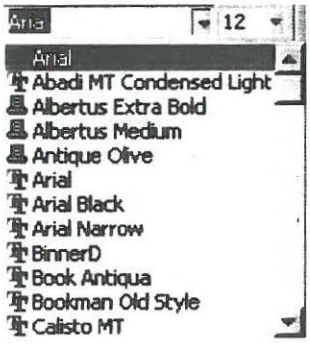
The following options are available on this toolbar:

CHANGING FONTS USING THE *FORMATTING TOOLBAR*

1. Select / highlight the text which font you wish to change.
2. Click on the **Fonts drop-down button** on the Formatting toolbar:



3. A **drop-down list** with a number of fonts appears:

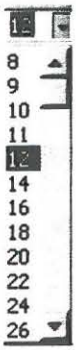


4. Click on the font you want to select.

CHANGING THE SIZE OF FONTS USING THE *FORMATTING TOOLBAR*

1. Select / highlight the text which size you wish to change.
2. Click the **Size drop-down button** on the *Formatting Toolbar.*

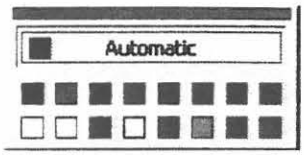
3. This will give you a **drop-down list** with a list of sizes.



4. Click on the font size you want.

CHANGING THE COLOUR OF TEXT USING THE *FORMATTING TOOLBAR*

1. Highlight the text that you wish to change.
2. Click on the **Font color drop-down icon** on the *Formatting Toolbar.* This will give you a drop down list with colours:



3. Click on the colour you want to select.

CHANGING THE APPEARANCE OF TEXT USING THE *FORMATTING TOOLBAR*

Bold *Italic* Underline

1. Select / highlight the text that you wish to change the appearance of.
2. Click on the appropriate icon according to what you wish to select i.e. **Bold,** *Italic* or Underline.

JUSTIFICATION

Justification, sometimes called alignment, is an option which allows you to specify how your text should be aligned with respect to the left and right margins. There are four justification options i.e. *Left, Centre, Right,* and *Full Justification.*

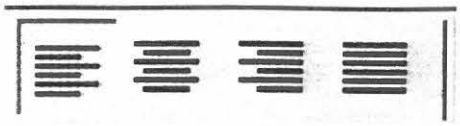
- **Left Justification**  allows text to form a straight line with the left margin, whilst the right margin is uneven.

- **Right Justification**  allows text to form a straight line with the right margin, whilst the left margin is uneven.

- **Centre Justification**  centres the text between the left and right margins, with uneven left and right margins.

- **Full Justification**  aligns text along both the left and right margins. Extra spaces are added when necessary to make the text aligned fully. This option does not affect the last line of a paragraph.

TO JUSTIFY TEXT USING THE *FORMATTING TOOLBAR*



Left Centre Right Full Justification

1. Move the cursor to a point in the paragraph / sentence where you want the justification to take place.
2. Click on the **Justification icon** desired on the *Formatting Toolbar* for the type of justification you require.

TUTORIAL B3.1

1. Open the file PARTY2 that was saved in CHAPTER B2.
2. Change the appearance of the word "Molehe" to a **Boldface**.
3. Change the appearance of the word "Mantsho" to *Italic*.
4. Underline the phrase "Liberty Center".
5. Change the phrase "Traditional wear" to any other font.
6. Right justify the date at the beginning of your document.
7. Centre the sentence "See you at my party!!"
8. Change the word "Dingi" to 20 points and the colour to green.
9. Save the file as PARTY3.

PRINTING

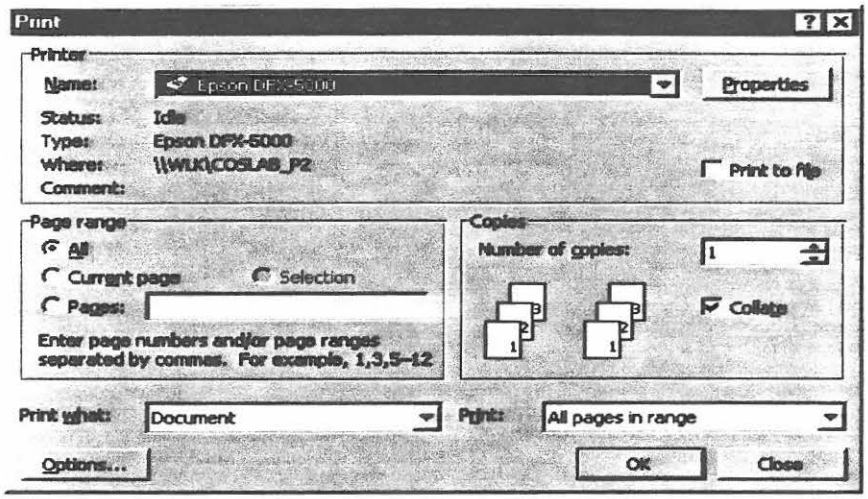
Printing involves an activity which enables a user to obtain hard copy or paper copy of the document you are busy with. In **MSWord** a document can be printed at any time though it is more efficient and convenient to print a document after you have finished writing, editing, formatting and saving it.

TO PRINT A DOCUMENT

1. Click on the **Print icon** on the Standard Tool Bar

   OR

2. Click on the **File menu** and then on **Print**. The following dialog box appears:



The dialog box features certain options including:

- **All** which will print all the pages in the document.
- **Current Page** which will print the page in which the cursor currently is.
- **Pages** which allows the user to specify which pages should be printed i.e. 10-15. The page numbers must be typed into the box provided.
- **Selection** will only print the text that is highlighted in the document.
- **Number of Copies** allows the user to specify the number of copies to be printed.

3. Select the desired option, then click on **OK**.

NOTE: *Advanced printing options are discussed in more details in CHAPTER B5.*

TUTORIAL B3.2

1. Print the document PARTY3.

2. Close the file.

3. Exit MSWord.

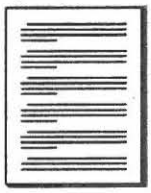
OUTCOMES OF THIS CHAPTER ARE TO BE ABLE TO:

- Change page view
- Change line spacing
- Insert page numbers to documents
- Change page margins
- Insert headers, footers and footnotes

PAGE FORMATTING

PAGE VIEW

➢ The user can change the way that pages are set up and displayed in **MSWord**. The default page layout or setup in **MSWord** is normally the **Portrait view**. This orientation displays and prints text parallel to the short side of a page.

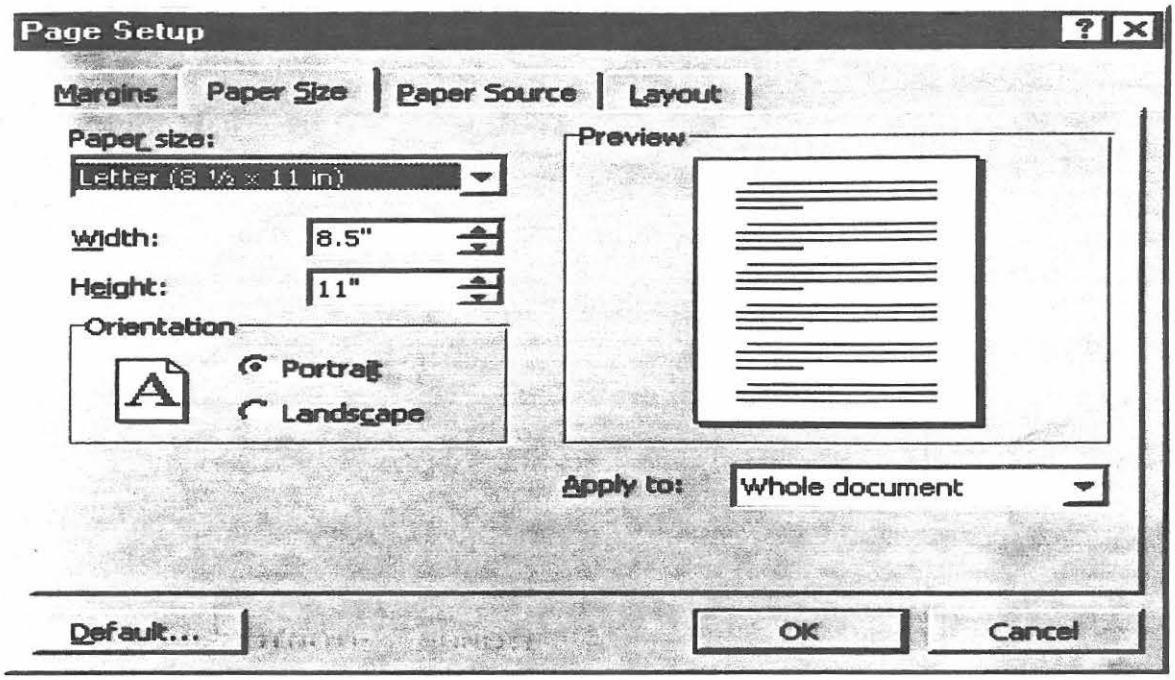


➢ Page view can also be changed to **Landscape**, depending on a need to do so. This orientation displays and prints text parallel to the long edge, making the printed page wider than long.

The user can change the paper orientation for the entire document or for a selected portion only.

TO CHANGE THE PAGE ORIENTATION

1. Click on **File menu.**
2. Click on **Page Setup.**
3. Click on **Paper Size tab**. The following dialog box will appear:



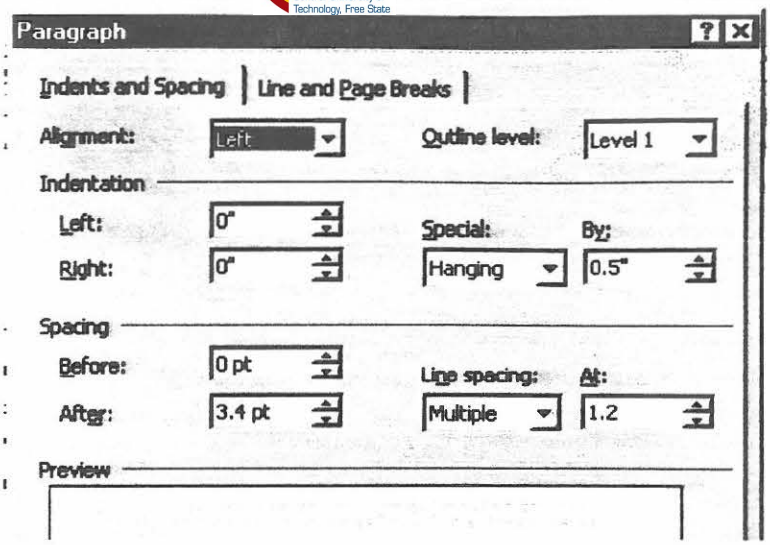
4. *Leave the Paper Size as it is.*
5. Click on **Landscape** under **Orientation** to select the new orientation.
6. Click on **OK.**

LINE SPACING

MSWord automatically sets the document to single spacing between lines. It might sometimes be preferable to double space or even triple space the document lines. The spacing can be set for the whole document or for selected text only.

TO CHANGE LINE SPACING

1. Move to the beginning of the document you want to double space or select the paragraph you want to double space.
2. Click on the **Format menu.**
3. Click on **Paragraph**. The following dialog box will appear*:*



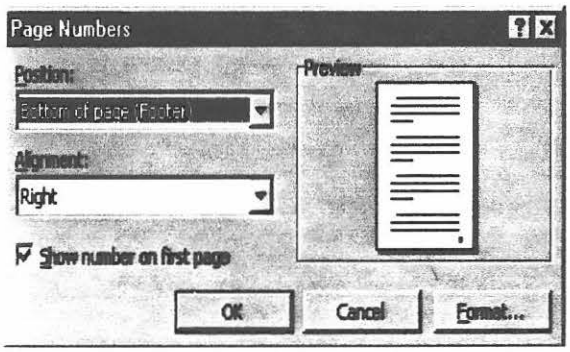
4. Click on **Indents and Spacing.**
5. Click on the **Line Spacing drop-down list** and select the desired line spacing.
6. Click **OK.**

PAGE NUMBERING

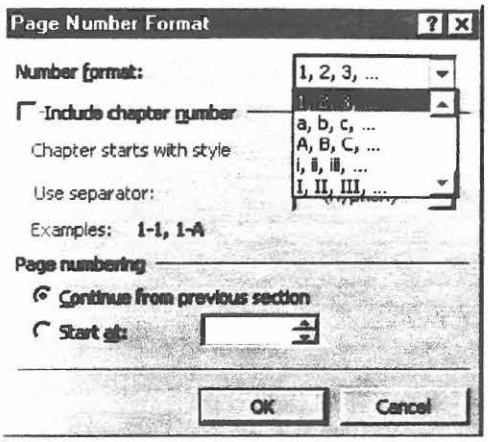
Page numbering allows a user to insert page numbers at different positions of a page. You can number your document from its very beginning or from a different position i.e. if necessary, make the second page Page 1.

TO NUMBER PAGES

1. Move the cursor to the page where you want numbering to start.
2. Click on the **Insert menu.**
3. Click on **Page Numbers**. A dialog box will appear:



4. Click on the **Position drop-down list** and select the position of the page numbers.
5. Click on the **Alignment drop-down list** and select the required alignment.
6. The format of the numbers could be specified by clicking on **Format:**



7. Select the required format under **Number format.**
8. If necessary, the starting value of the pages could be changed by specifying the correct number in the **Start at box**.
9. Click **OK.** This will return to the **Page Numbers dialog** box.
10. Click **OK.**

PAGE MARGINS

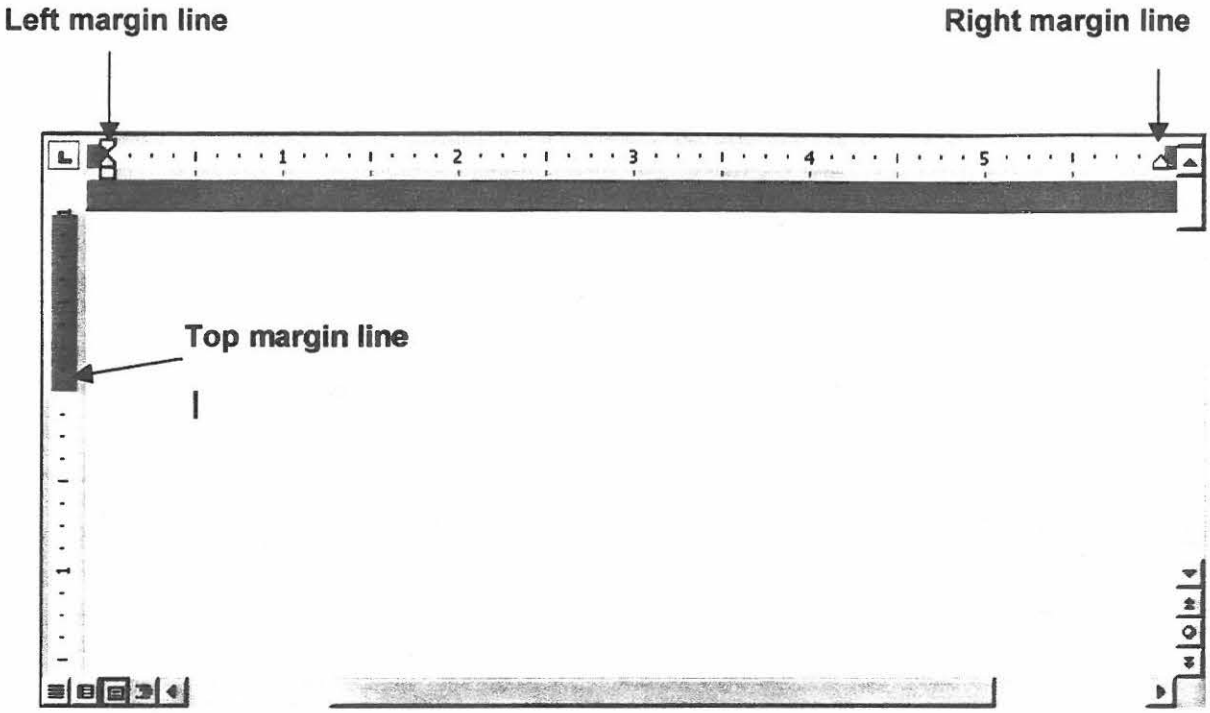
Margins are the borders on all four sides of a page, where the text is confined in. The *top, bottom, right, or left margins* can be changed. Before you make any changes to your document margins, you must remember that all changes in **MSWord** apply to either selected text or the position in the document where the cursor is situated. If you want your margins to change the entire document, you must move your cursor to the beginning of the document or page you want to format.

TO CHANGE PAGE MARGINS

1. Click on the **File menu**.
2. Click on **Page Setup.**
3. Click on **Margins.**
4. In the *Top, Bottom, Left and Right* text boxes, enter the desired margin size or click the **increment arrows** to set the desired value.
5. Click on **OK.**

CHANGING THE MARGIN SETTINGS ON THE RULER

Instead of using the menu, the user can change margins using the **Ruler.** This can only be done when working in Page Layout view (click **View menu** and then select **Page Layout**). In the *Page Layout* view, **MSWord** displays both a horizontal ruler at the top of the document page and a vertical ruler on the left edge of the document page.



TO CHANGE MARGINS USING THE RULER

1. Place the mouse pointer on the ruler at the margin line that you wish to change.
2. Move the mouse pointer around slightly, until you see it change into a double-sided arrow. ↔
3. Click on the left mouse button and drag the mouse until the desired new location for the margin is obtained. Whilst dragging you will notice a black dotted line following the double-headed arrow. This line indicates where the margin will be positioned, should you let go the mouse button at that time.
4. Release the mouse button when you have reached the desired margin setting.

NOTE: *The grey areas on the left and right sides of the Horizontal Ruler and at the top and bottom of the Vertical ruler indicate the margin settings.*

TUTORIAL B4.1

1. Open the file PARTY3 created in CHAPTER 3.
2. Change the page orientation to Landscape.
3. Change the line spacing from single to 1.5 for the whole document.
4. Insert page numbers at the bottom right of each page.
5. Insert a centre justified header which reads "PARTY!!!PARTY!!!!PARTY!!!"
6. Re-adjust the margins to make your document narrower.
7. Save the document as PARTY4.

HEADERS AND FOOTERS

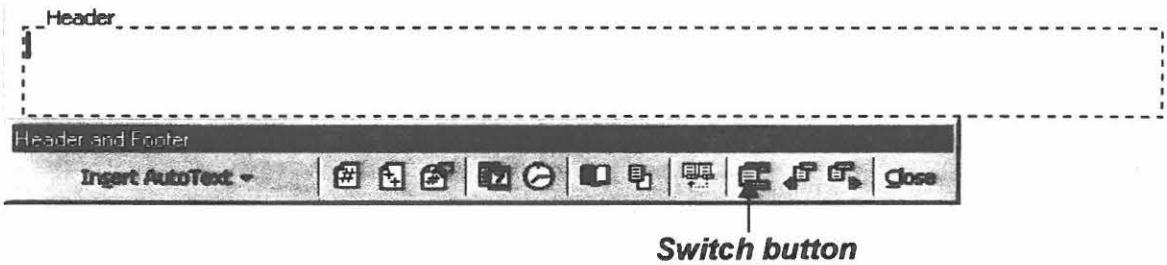
Pages of a long document can easily get separated. They can get out of order or be misplaced. Headers and Footers help to identify the pages of your document, as well as the document itself.

- A *Header* is text that is displayed and / or printed at the top of every page.
- A *Footer* is text that is displayed and / or printed at the bottom of every page.

Two common uses of headers and footers are for page numbering and to repeat the document's title on each page. (It is not necessary to have headers or footers if all you want to do is number your pages. See section 3.3 for page numbering.)

TO CREATE A HEADER OR FOOTER

1. Move the cursor to the page where you want to insert the header or footer.
2. Click on the **View menu.**
3. Click on **Header and Footer. MSWord** displays the current page's header enclosed in a non-printing dashed line. The Header and Footer toolbar appears, and regular document text is dimmed:



4. Select Header or Footer by clicking on the **Switch button** on the Header and Footer toolbar. Type the text for the header or footer.
5. Click on **Close** on the **Header and Footer toolbar**.

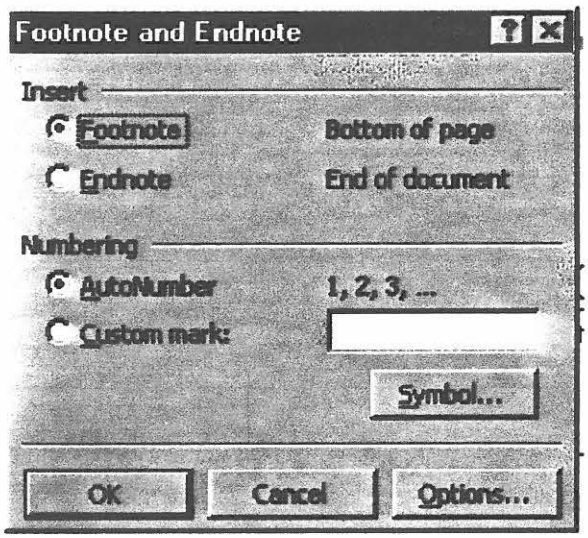
NOTE: *To discontinue an already existing header or footer, you follow the above steps and instead of typing text at step 5, delete all information from the Header or Footer.*

FOOTNOTES

- *Footnotes* provide references for text or paragraphs in a document. The process of creating footnotes involves inserting a number as a note reference and then typing the text (which refers to the number) at the bottom of the document. The footnote appears at the bottom of the page where it has been inserted. An example is[1].
- *Endnotes* are more or less the same as footnotes. Unlike footnotes which appear in a page were you have inserted them, endnotes appear right at the end of the document.

TO INSERT A FOOTNOTE / ENDNOTE

1. Place the cursor where you want to insert the footnote.
2. Click on the **Insert menu.**
3. Click on **Footnote.** A dialog box appears:



[1]Example of an ***Footnote***

4. Select **Footnote** to create a footnote
OR
Select **Endnote** to create an endnote.

An appropriate number will be inserted in your document and your cursor will move to the bottom of your page, where you can type in the reference.

5. Click on the position inside the document where you want to continue typing.

TUTORIAL B4.2

Work with the document PARTY4.

1. Insert a left justified footer which reads "The best party of the year". Change the point to 16 points.

2. Next to contact number for confirming attendance, insert a footnote which read RSVP.

3. Save the document as PARTY5.

CHAPTER B5

OUTCOMES OF THIS CHAPTER ARE TO BE ABLE TO:

- Use the spell checker
- Use the thesaurus
- Use the find and replace feature
- Use advanced printing options

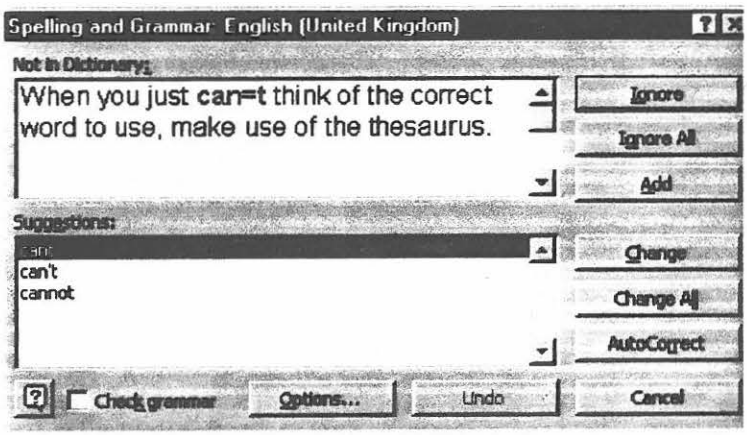
THE SPELL CHECKER

MSWord's spell checker is an indispensable tool that you can use to correct spelling errors and other typing mistakes. If you misspell a word the spell checker will offer a list of possible corrections from a dictionary file contained in Word. Words that are unknown are flagged. The user can then ignore it, correct it, or add it to the dictionary.

Spell checkers cannot detect language usage problems. They will not recognize a problem if for example, a sentence reads "*They room is cold*" in stead of "*The room is cold*". Further remember that the spell checker questions only the words that do not match a word in MSWord's dictionary.

TO SPELL CHECK A DOCUMENT

1. Move the cursor to the beginning of the document.
2. Click the **Spelling and Grammar icon** on the Standard tool bar. A dialog box similar to the following will appear:



3. Take ONE of the following actions to respond:
   - Click on the correct spelling in the **Suggestions list** and click on **Change.**
   - To correct the word manually, edit it in the **Not in Dictionary list box**, and then click on the **Change button.**

- To replace all instances of the word in the document with either the manual correction you have made or the word which you have selected from the **Suggestions box**, click the **Change All button**.
- To ignore the word, click on the **Ignore button**.
- To ignore this and all other instances of the word in the document, click the **Ignore All button**.
- To add the word to the MS-Word dictionary, click on the **Add button**.

4. When the *Spelling and Grammar* is complete, click on **OK** to return to your document.

TO SPELL CHECK A WORD OR A PART OF A DOCUMENT

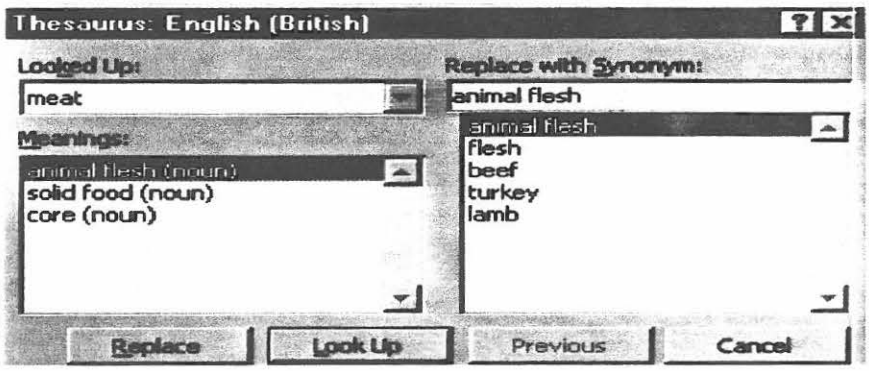
1. Select / highlight the word or part of the document that has to be spell checked.
2. Follow steps 2 – 5 as described above.

THE THESAURUS

The Thesaurus can be used when the user just can't think of the correct word to use. The Thesaurus displays a list of synonyms (words that are written differently but have similar meaning).

TO VIEW A LIST OF SYNONYMS FOR A WORD

1. Move the cursor inside the word whose synonyms you want to view.
2. Click on the **Tools menu.**
3. Click on **Language.**
4. Click on **Thesaurus**. The Thesaurus dialog box appears:



5. To replace the word in the document with a synonym, highlight the desired word in the list and select **Replace**. The word will be replaced.

TUTORIAL B5.1

1. Open the file PARTY5 which you have saved in CHAPTER 4.
2. Spell check the whole document.
3. Use the thesaurus to replace the word "shop" with "boutique".
4. Save the document as PARTY6.

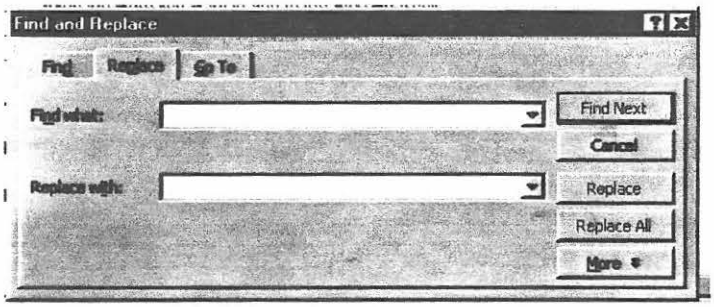
THE FIND-AND-REPLACE FEATURE

The Find-and-Replace feature of MSWord can be a real time saver.

- The *Find* option can be used to locate the exact position of a word / text. Instead of scrolling through the entire document MSWord can locate the word and move the cursor to the exact position.
- The *Replace* part of the command allows the user to replace the word or text located. This means that you can easily correct an error in several locations, or change a specific word to another word at every position it occurs.

TO FIND AND REPLACE TEXT

1. Click on the **Edit menu.**
2. Click on **Replace.** A dialog box appears:



3. Type the word you want to find in the **Find what box**.
4. Type the word you want to replace in the **Replace with box**.
5. Click on **Replace** to replace one occurrence of the word, or choose **Replace All** to immediately replace all occurrences of that word in a document.
6. Click **Cancel** when finished.

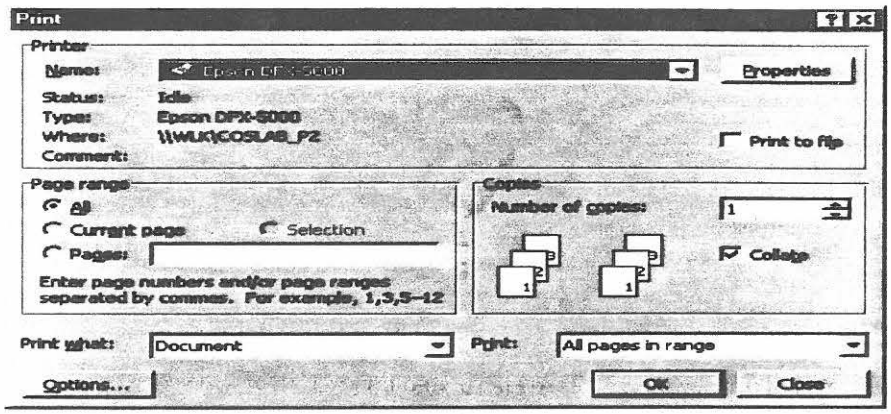
ADVANCED PRINTING OPTIONS

To print a document the user can simply click on the **Print icon** and press **Enter**.

There are, however, a number of different printing options which could be selected from:

PRINTING SELECTED PAGES ONLY

1. Click on the **Print icon** on the Standard Toolbar.
2. The Print dialog box appears and different options are available:



- To print the current page only, click on **Current Page.**
- To print selected pages, click on **Pages** under **Page Range.** The pages you will be entering should be separated by a comma, i.e.

  type **4** to print only page 4
  type **4,6,8** to print pages 4,6, and 8
  type **4-6** to print pages 4 to 6
  type **4-6,8** to print pages 4 to 6 and 8

3. Click on **OK.**

NOTE: *If you want to print selected text instead of selected pages, just select the text you want to print, click on the* ***Print button*** *and then click on* ***OK****.*

PRINTING MULTIPLE (MORE THAN ONE) COPIES

1. Click on the **Print icon** on the Standard Toolbar.
2. The Print dialog box similar to the one shown above.
3. Click in the **Number of copies box.**
4. Type the number of copies you want to be printed.
5. Click on **OK.**

TUTORIAL B5.2

Work with the document PARTY6

1. Open the file PARTY6 saved in TUTORIAL B5.1.

2. Use the Find - and - Replace feature to find all instances of the word "party" and replace them with the word "bash".

3. Use the print-option to print 3 copies of the document.

4. Save the file as PARTY7.

CHAPTER B6

OUTCOMES OF THIS CHAPTER ARE TO BE ABLE TO:

- Create & edit tables
- Insert graphics in a document

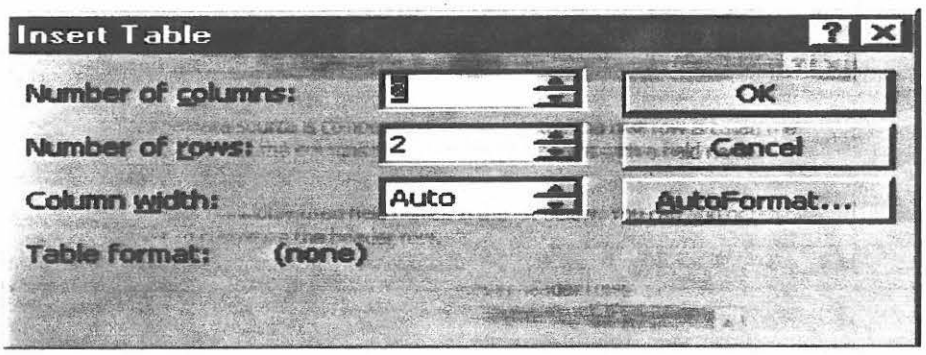
CREATING AND EDITING TABLES

A table consists of a set of rows and columns. Columns are vertical whilst rows are horizontal. The rows and columns intersect to form boxes called cells. Text are typed into the cells. In the diagram below, the set of "Cs" represents columns while the set of "Rs" represents rows. "RC" is the cell, i.e. the position where a row and a column intersect.

	C			
R	RC	R	R	R
	C			

TO CREATE A TABLE

1. Click on the **Table menu.**
2. Click on **Insert table.** A dialog box similar to the following appears:

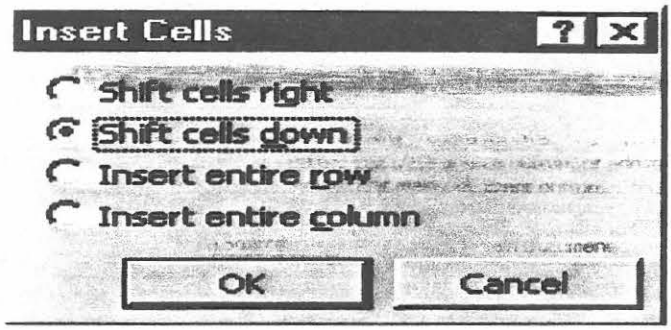


3. Click in the **Number of columns box** and type the required number of columns you want in the table.
4. Click in the **Number of rows box** and type the required number of rows you want in the table.
5. Click **OK.**

TO ADD ROWS AND / OR COLUMNS

It is possible to add extra rows and / or columns after a table has been created.

1. Select the row or column of cells next to the location in the table where you want to add / insert a new row or column.
2. Click on the **Table menu.**
3. Click on **Insert Cells.** The following dialog box appears:

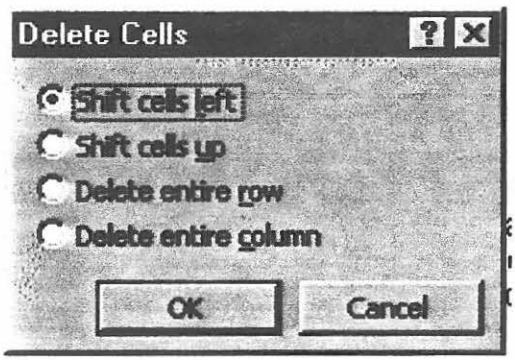


4. Click on
   - **Insert entire row** if you want to insert a row
     OR
   - **Insert entire column** if you want to insert a column.
5. Click **OK.**

TO DELETE ROWS AND / OR COLUMNS

It is possible to delete extra rows and / or columns after a table has been created.

1. Select the row or column of cells in the table where you want to delete.
2. Click on the **Table menu.**
3. Click on **Delete Cells.** The following dialog box appears:



4. Click on
   - **Delete entire row** if you want to delete a row
     OR
   - **Delete entire column** if you want to delete a column.
5. Click **OK.**

GRAPHICS

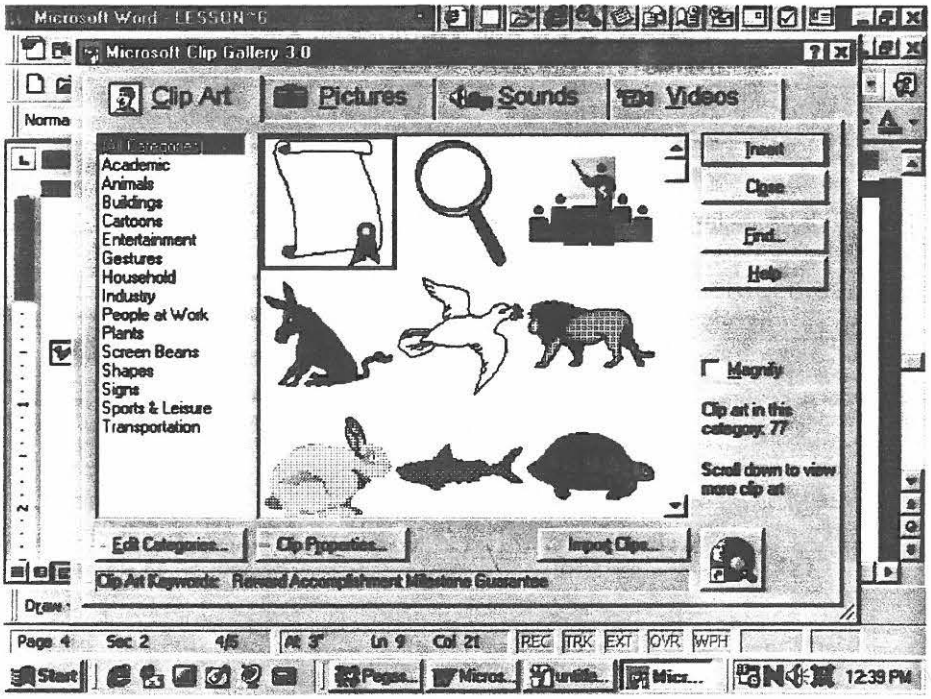
In most Word Processing software, graphics such as clip art images and drawings can be inserted into a document. The user can insert clipart (pictures) from other applications or from Word or create own drawings by using a Drawing Toolbar.

When an image is inserted, it appears in a graphics box at the insertion point (where your cursor is positioned). The user can then use the mouse to:

- change the size of the graphic
- move the graphic
- change the appearance of the image.

TO INSERT AN IMAGE

1. Position the cursor where you want the image to appear.
2. Click on the **Insert menu.**
3. Click on **Picture.**
4. Click on **Clip Art** (If a message box titled *Cannot open Previews File* appears, click the **OK button** until it disappears. Click on the **Clip Art tab** on The Microsoft Clip Gallery 3.0.)



5. Scroll through the list of graphics and their categories to find the graphic you want.
6. Click the graphic you want to insert in the document.
7. Click **OK.**

TUTORIAL B6.1

Design the following poster and save it with the name POSTER.

NOTICE

THERE WILL BE DOCTORS FROM CUBA VISITING OUR COMMUNITY. EVERYONE IS WELCOME TO ATTEND!!!

DATE	3/5/2000
TIME	18H00
VENUE	THABONG COMMUNITY HALL
ADMISSION	FREE

PLEASE COME PREPARED AS THEY WILL BE ANSWERING ANY QUESTIONS THAT YOU HAVE CONCERNING THE NEEDS OF OUR COMMUNITY.

BY ORDER

The Manager

CHAPTER B7

OUTCOMES OF THIS CHAPTER ARE TO BE ABLE TO:

- Create a data source file
- Create a main document file
- Perform mail merge

MAIL MERGE

Mail merging is a feature of MSWord used to mass produce letters, mailing labels, memos and other documents. Mail merging consists out of creating two different kinds of files and then merging them to produce one new file which contains several printed copies of the main document.

- The *main document* is the letter, memo, mailing lable or other document that has to be sent to different individuals.
- The *data source* is a database containing records with information like names and addresses of the people you want to send the letters to.
- The *merge process* produces a new file with several copies of the main document where each copy contains specific information from records in the data source.

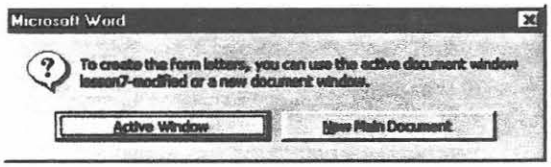
For example, to write the same letter to a number of people without typing the original letter more than once, you can create the main document (the letter) and a data source (address file). Then merge the two files to create multiple copies of the original letter. The text will be the same for each printed letter, but the names and addresses will differ.

PERFORMING MAIL MERGE BY CREATING NEW DOCUMENTS

As explained, before mail merge can take place, the user must create TWO different documents. The **Mail Merge Helper** guides the user in setting up the documents required and performing the mail merge.

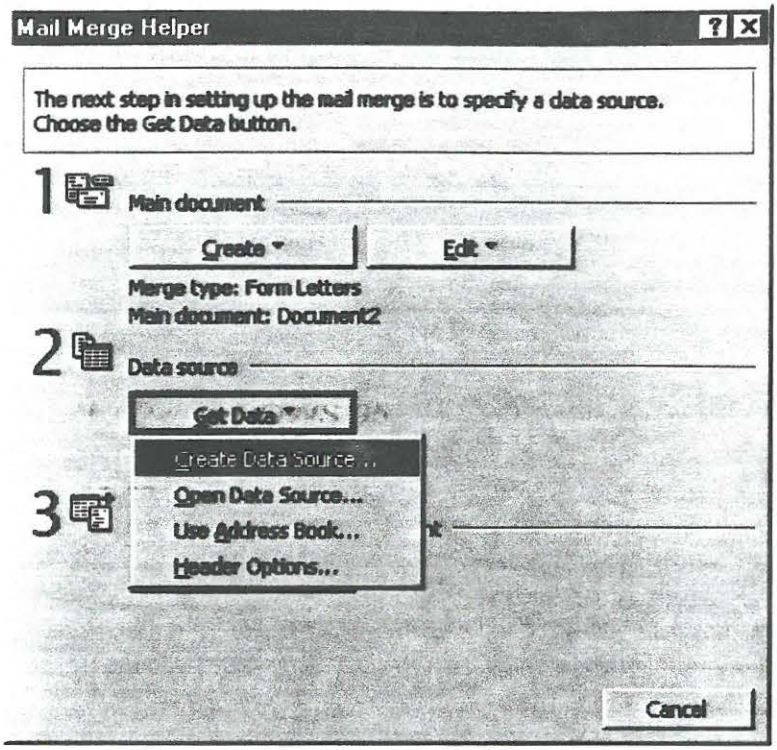
TO CREATE A MAIN DOCUMENT

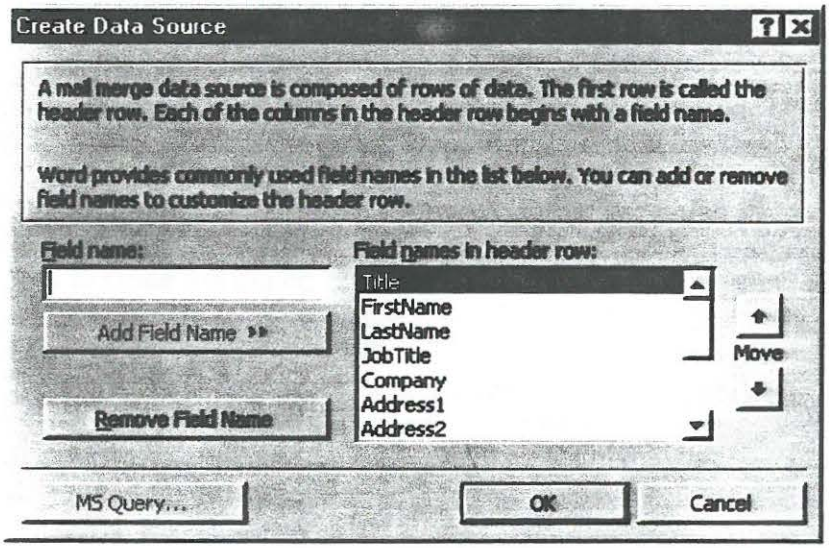
1. Click on the **Tools menu.**
2. Click on **Mail Merge.**
3. Click on **Create.**
4. Click on **Form Letters.**
5. Click on **New Main Document** to work on a new document.



TO CREATE A DATA SOURCE DOCUMENT

1. With the Mail Merge Helper dialog box still open, click on **Get Data.**
2. Select **Create Data Source** from the **drop-down list** that appears.



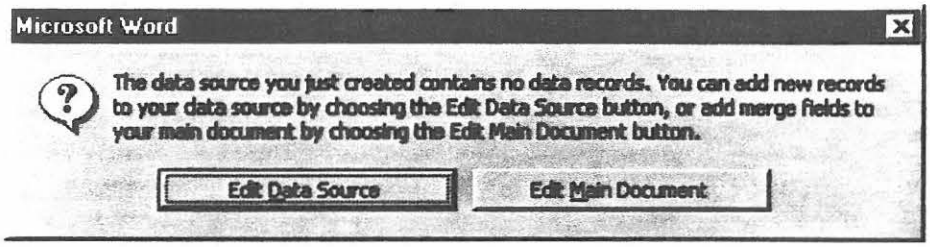


3. MSWord gives a list of fields commonly used when creating data records. The user can decide to use these fields as they are given or to remove the

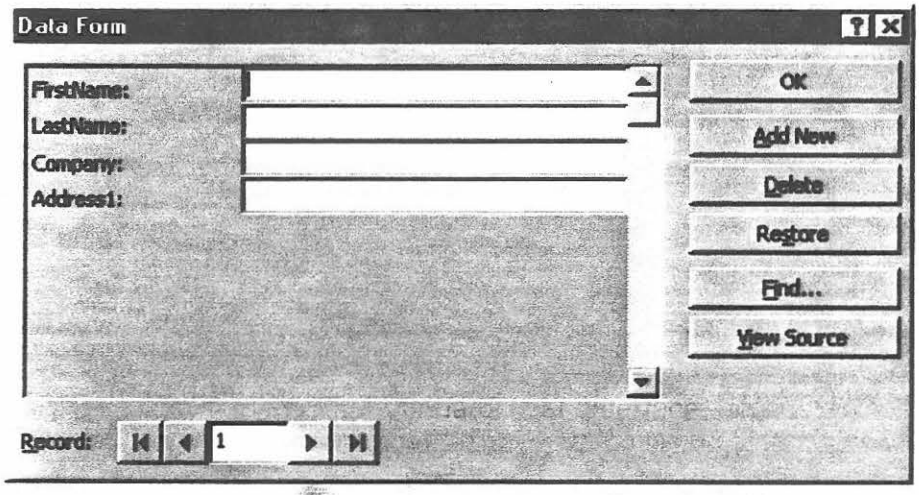
fields you don't want to include in your data.

- To remove a field, select that specific field and then click on **Remove Field Name**.
- To add a field that does not appear on the list, type the field name in the **Field Name box** and then click on the **Add Field Name button.**

4. Click **OK.**
5. Type a name for the data source in the **Save Data Source dialog box.**
6. After assigning the name, click **OK**. MSWord displays the following dialog box.



7. Click **Edit Data Source** to display the following dialog box, where you begin entering records in the data source.

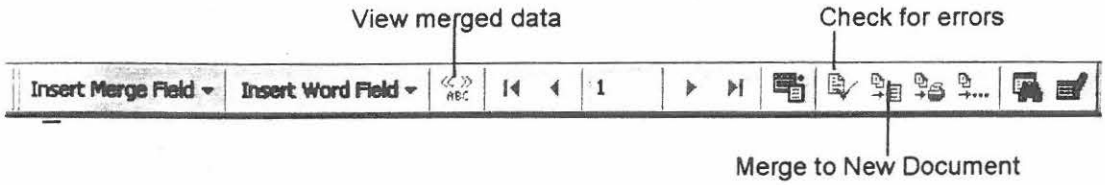


8. Type the information you want to save into the different fields.
9. Click **Add New** to add a new record.
10. Click **OK** to close the dialog box and return to creating the main document.

COMPLETING THE MAIN DOCUMENT

The **Main Document** is created after a **Data Source** has been created as the main document refers to fields in the data source file. The Main Document can be made up of text, graphics and merged codes. The text and graphics in the document will be printed exactly as given but at the position of the merged codes, data will be extracted from the data source file.

The following is the merge tool bar:

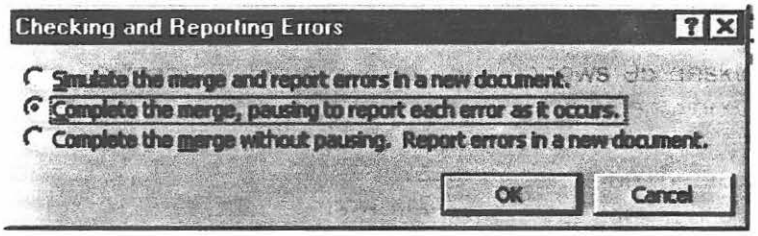


1. Type the text you want and insert the graphics into the main document.
2. To refer to a field from a data source, click on the **Insert Merge Field icon** from the **Mail Merge tool bar.**
3. Click on the field name you want to insert in the document from the drop-down list.
4. Repeat steps 9 and 10 as often as you need to place the fields where you want them to be.
5. Save the main document.

NOTE: *Once the Main document and Data source document has been created, the user can proceed with the merge.*

PERFORMING A MERGE

1. Click the **Check For Errors button** to display these options on the **Mail merge tool bar.**



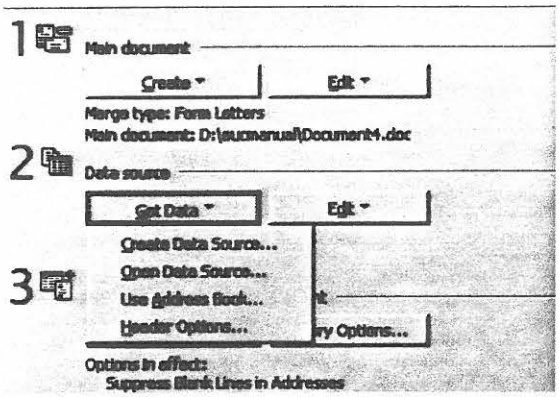
2. Click the **Merge To new Document button.** MSWord will open a new document window called *Form Letters 1* and then print all copies of the letters to that document. There will be a section break (page break) between each letter.
3. Now print the document **Form Letters 1**. Multiple copies of the original main document will be printed.
4. Use the **Save As option** to save the document **Form Letters 1** by giving it a new name.

PERFORMING MAILMERGE BY USING PREVIOUSLY CREATED DOCUMENTS

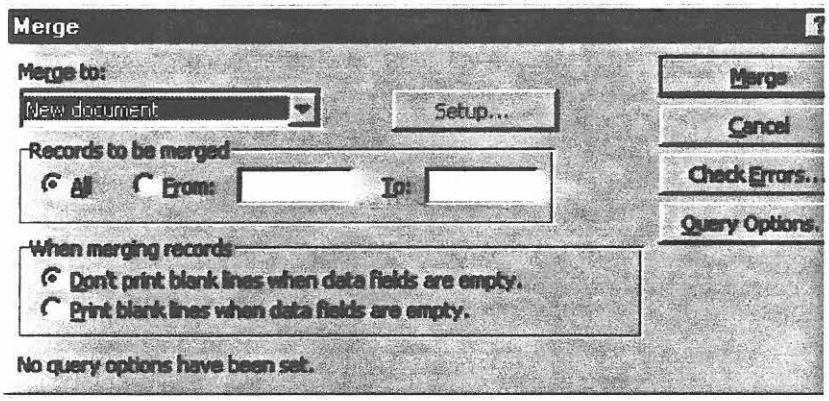
It is not always necessary to create completely new documents when performing a mail merge. The user can set up one data source document, create several different main documents and then merge data whenever required.

TO PERFORM MAIL MERGE WITH EXISTING DOCUMENTS

1. Open the **Main document.**
2. Click on the **Tools menu.**
3. Click on **Mail merge.**



4. Click on **Get Data.**
5. Click on **Open Data Source.**
6. Click on the name of the data source document.
7. Click on **Merge** in the **Mail Merge Helper .**



8. Select the options required from the dialog box (usually it will be to a new document).
9. Click on **Merge.**
10. The new file with copies of the main document will be created.
11. Print the merged file.

TUTORIAL B7.1

Perform a printed mail merge using the following two documents:

Main document

STUDENT RECORDS

Dear .....

According to our records, your account is in arrears. Please come and pay the amount due shown below before .....

Amount due: .....

Yours sincerely

{Type your name & surname here} - Principal

Data source document

Title	FirstName	Surname	StudNum	Amount due
Miss	Rose	Hakuta	98001	R 100.00
Mr	Masana	Pawula	98002	R 212.00
Mr	Walter	Leshoma	98003	R 315.00
Mr	Irvin	Riet	98004	R 419.00
Miss	Lerato	Khalema	98005	R 154.00

SECTION C: WINDOWS

CHAPTER C1

OUTCOMES OF THIS CHAPTER ARE TO BE ABLE TO:

- Start Windows 95
- Identify the different parts of the Windows 95 screen
- Shut down Windows 95
- Activate program applications in Windows 95
- Use certain facilities in Windows Explorer
- Open Windows 95 accessories

INTRODUCTION TO WINDOWS 95

WHAT IS WINDOWS 95?

Windows 95 is classified as *system software (also called an operating system). System software* are computer programs that controls the functioning of a computer. In a way it helps the user organise the work done with your PC. The most obvious part of Windows is the graphical user interface i.e. the colourful screen and the pictures called *icons*. Once you have learned how to move the mouse pointer around the screen, Windows enables you to perform most tasks by pointing at an icon and clicking a button. By clicking on the icon, the user actually tells Windows to get to work on his / her behalf. Behind the scenes, beneath the surface and just out of sight, Windows then acts as your personal executive staff, complete with the PC equivalent of file clerks, messengers, switchboard operators, administrative assistants, and a full-time maintenance crew. Best of all, you're the boss; every time you tap a key or click the mouse, the staff swing into action to carry out your requests.

WHY USE AN OPERATING SYSTEM?

Imagine how chaotic an office would be without an office manager. Well without an operation system, things inside a PC gets just as disorganised. The Windows operating system is there to act as a ruthlessly efficient office manager. Windows knows every part of your PC, inside and out, so it can send your work to the right place. (When you ask your PC to print a file, you want it to go to the printer and not the trash can, right? That's the operating system's job.) It also knows all the rules for storing and retrieving files, so you can find your work without a lot of hassle. In fact, it controls every move that takes place inside the computer.

The icons and menus in Windows make it easy for the user to ask your PC to do some work but the operating system is the actual part that performs the instructions.

WHAT IS AN ACRONYM?

An acronym is an abbreviation that is commonly used as a full word in computer language. Examples of acronyms are:

- **SCSI** (Small Computer System Interface)
- **GUI** (Graphical User Interface)
- **LAN** (Local Area Network).

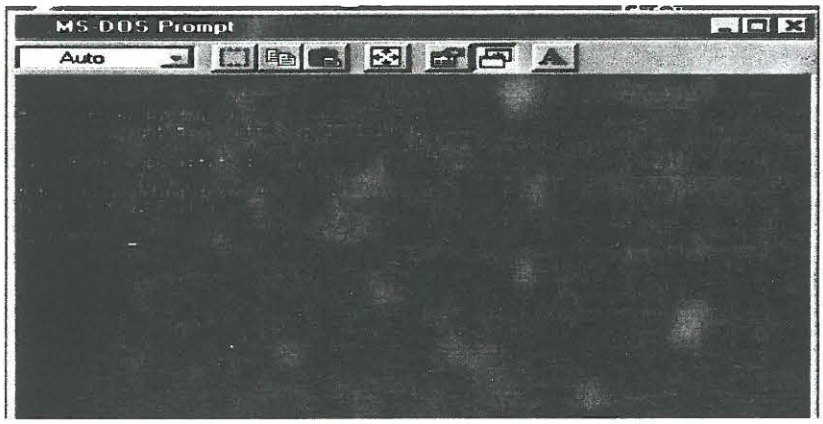
WHAT IS A GUI?

Pronounced "gooey" the acronym stands for the most obvious part of Windows namely its **G**raphical **U**ser **I**nterface.

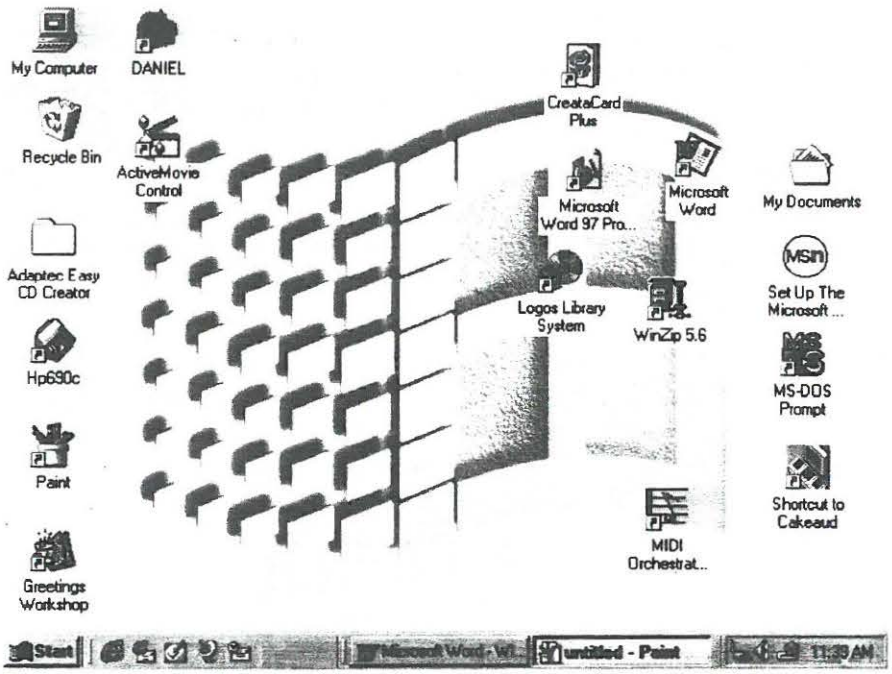
A user interface is simply the way that the user communicates with a machine. Most machines have some type of user interface i.e. a microwave oven's control knobs, the 12 buttons on the telephone, etc. We need an interface because the user has to be able to tell the machine / computer to perform certain instructions. You don't really need to know much about your computer's operating system - just what kind you have and how you can get it to do what you want it to do!

Some operating systems use a command-line interface, where you type commands at the computer's keyboard (and it beeps back at you when you type a command wrongly). Windows is much easier to use because it allows the user to tell the computer what to do by pointing at pictures on the screen. There is no need to memorise a whole manual full of commands – simply point at what you want and click the mouse button.

GUIs are powerful, but they only work on powerful computers with large RAM and disk space. Command-line interfaces, like DOS, are powerful, too, but the average computer user find them harder to use. That's why GUIs are rapidly showing up everywhere and has become the standard user interface for cable TV boxes, in cars, even on refrigerators and washing machines!



The command-line interface of DOS



(Start button) *The graphical user interface of Windows 95*

THE DESKTOP

Because there are so many ways to set up the Windows 95 desktop, the screen shown above is only one example of what you might see when working in Windows 95. It is clear to see the graphical user interface that consists of icons. The exact icons that will appear on a specific user's screen, depends on the programs that are used. There are however some standard icons that appear on most Windows 95 setup screens. Two of these icons are:

An icon which leads to more information on how the computer is set up.

An icon which leads to a list of items that has been deleted.

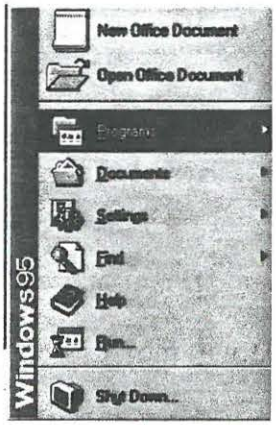
THE START BUTTON

At the bottom of the Windows 95 screen you can see the *task bar*. At the far right of the bar you can see the current time. At the far left, you can see the START button. (This is where everything in Windows 95 starts.)

When an application has been activated in Windows, the program's name will appear in the Task Bar indicated by a small icon of the program. When more than one application is active, the user can click on the icon in the task bar to switch from one application to another.

TO ACTIVATE A PROGRAM

1. Click on the **Start button**.

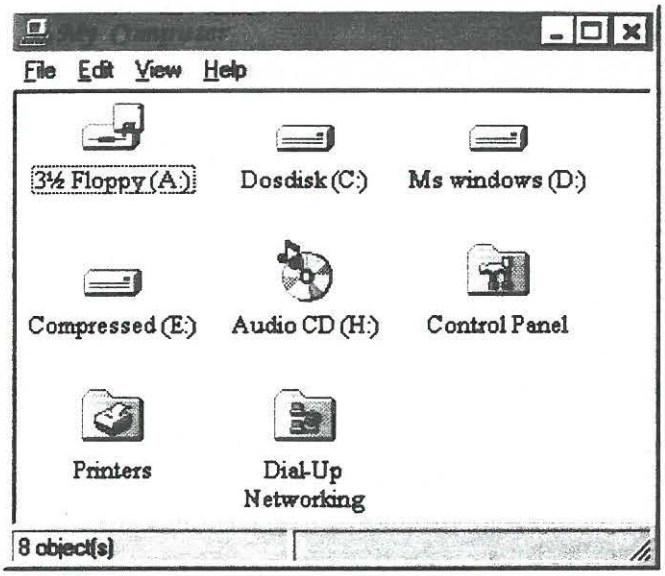


2. Move the mouse over **Programs.**

3. Click on the program that you want to activate.

MY COMPUTER ICON

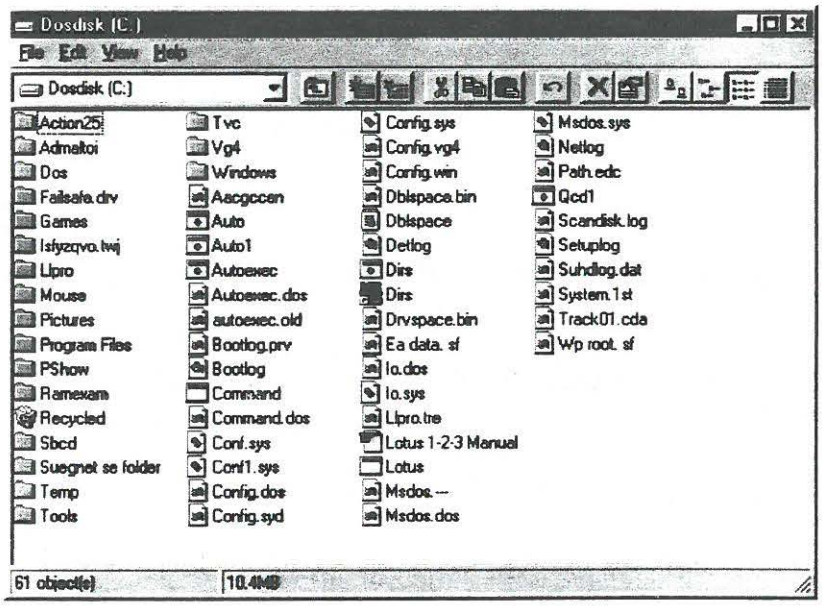
My Computer



This is My Computer the place to turn when you want to find a file, set up a printer or change your PC's settings.

Each icon leads to something in your computer setup that can be explored further. The icons indicating letters A:, C:, D:, etc. indicate disks where information can be stored.

If you click on the icon that looks like a hard disk (C:), you will get a window similar to the following:



The name of the drive (C:) is at the top of this window. This is also the name that appears at the bottom of the screen in the Task Bar. We will later look at the icons and menu commands. The list of names displayed can be either *files* or *folders*.

- Information is saved in the form of *files* on disk. Each file has a unique filename.

- The computer's disks can be divided into different sections, called *folders*. A *folder* is like a drawer that you can put (save) your files in. The folders are indicated by yellow icons.

NETWORK NEIGHBORHOOD ICON

The Network Neighborhood icon is only active when you work on a computer where Windows 95 is connected to a network. In Network Neighborhood you can connect to other computers on your network or you can chat with users connected to the same network.

INBOX ICON

This icon leads to the Microsoft Exchange program that allows you to receive faxes or electronic mail. To be able to use this program, you will have to have a modem connected to your PC.

MY BRIEFCASE ICON

If you have a laptop (portable computer) and want to work on files at home or while travelling, you can use Briefcase to help keep the various copies of the files updated. To use Briefcase, files are dragged from shared folders on the main computer to the Briefcase icon on the portable computer. When finished working on the files on the portable computer, reconnect to the main computer, and then click **Update All** in Briefcase to automatically replace the unmodified files on your main computer with the modified files in your Briefcase.

The files on your main computer are automatically revised; you do not need to move the files you worked on out of Briefcase or delete the existing copies.

MOUSE ACTIONS

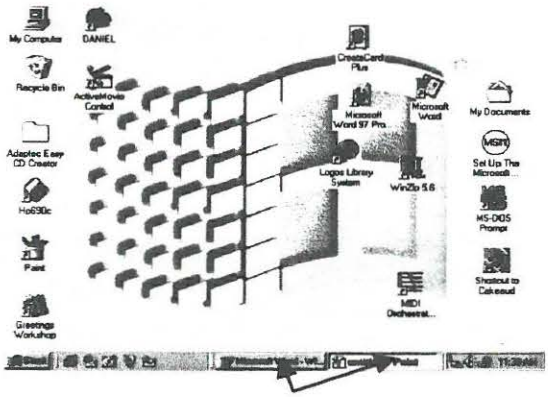
The following is a list of words that has to be understood when using windows and a mouse:

Drag	To move the mouse while holding one of the mouse buttons down. This is a very useful function and is often used in Windows applications.
Click	To click the mouse button by tapping the finger on the leftmost button on the mouse.
Right-Click	To click the rightmost button on the mouse.
Double Click	To double click you must click the left mouse button twice

	– one click following the next one immediately.
Minimise	To close a window only partially so that it can be re-opened later on. The program is still active, but is only displayed as an icon at the bottom of the screen.
Maximise	To restore a window that has been minimised to full size.

TASK BAR

The Task Bar is a graphical representation of the Task List. All programs / windows that are active, are listed in the task bar by icons.



Task bar indicating the Task list

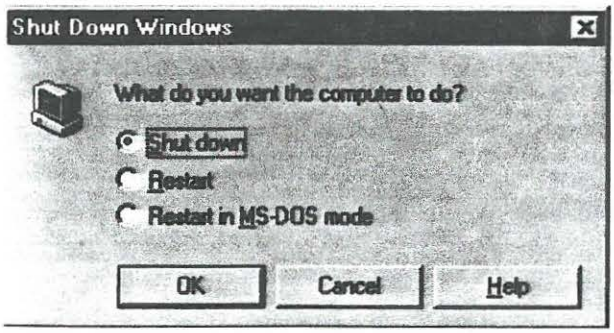
SHUTTING DOWN THE COMPUTER

WHY MUST YOU SHUT DOWN YOUR COMPUTER?

If a computer working with the Windows 95 operating system is not shut down in the appropriate way, the user can loose important settings and even data. When the computer is turned on again, it might have problems operating. *It is important NOT to switch off your computer without following the proper Shut down procedure.*

TO SHUT DOWN THE COMPUTER

1. Click on the **Start button.**
2. Click on the **Shut down button.** The following dialog box appears:



3. Ensure than the *Shut down* option is selected.
4. Click on **OK.**

WINDOWS EXPLORER

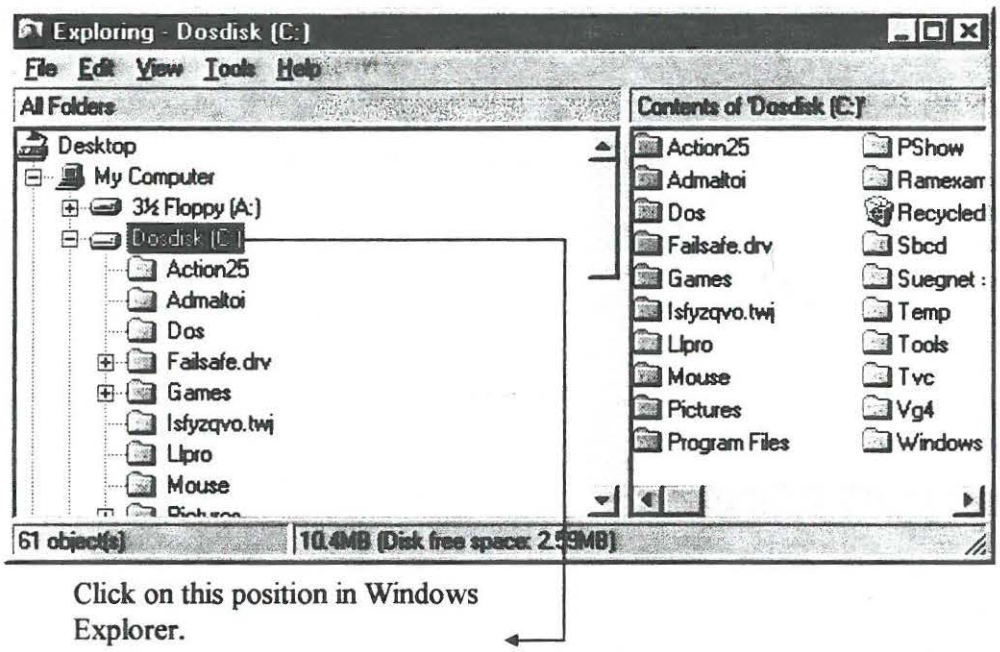
Windows explorer is the program that allows a user to manipulate the different resources of the computer. The user can create new folders, copy, move or rename files. The following sections explains how to perform some of these actions using Windows Explorer.

TO OPEN WINDOWS EXPLORER

1. Click on **Start.**
2. Move the mouse over **Programs.**
3. Click on **Windows Explorer.**

TO CREATE A NEW FOLDER IN THE C:-DRIVE

1. Click on C: on the left side of the Explorer window.



Click on this position in Windows Explorer.

2. Click in the **File menu.**
3. Click on **New.**
4. Click on **Folder.**

This will appear on the right hand side of the Windows Explorer.

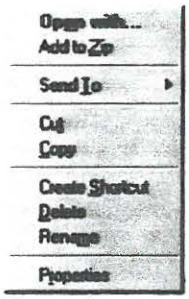
5. Type in the name of the new folder.
6. Click once on the left side of the name to go directly to that folder.

TO COPY A FILE FROM ONE FOLDER TO ANOTHER

When a file is copied from one folder to another, the user ends up with two files of exactly the same content in different folders. A copy is thus made of the original file in another folder.

Assume you want to copy a file with the name ***FILE*** from a folder with the name ***FOLDER-A*** to a folder with the name ***FOLDER-B:***

1. Select the folder ***FOLDER-A.***
2. Move the cursor to the file with the name ***FILE.***
3. Right-click on the filename ***FILE.***

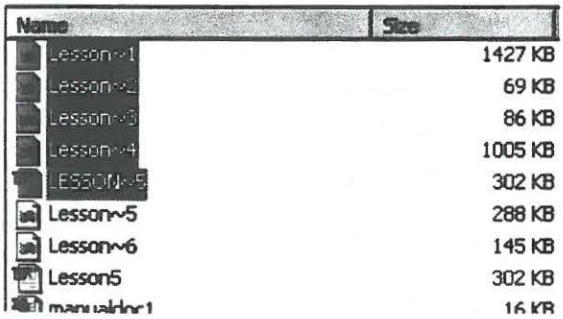


4. Click on **Copy** in the sub-menu that appeared.
5. On the left side of explorer, click on the folder ***FOLDER-B*** with the right mouse button.
6. Click on **Paste** in the sub-menu.

The file ***FILE*** has been copied from ***FOLDER-A*** to ***FOLDER-B***.

TO WORK WITH A GROUP OF FILES

It is possible to work with a group of selected files. These files may or may not be adjacent.



Example of a selection of adjacent files

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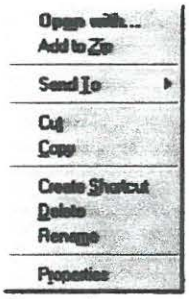
2. Move the cursor to the file with the name ***FILE.***
3. Right-click on the filename ***FILE.***



4. Click on **Copy** in the sub-menu that appeared.
5. On the left side of explorer, click on the folder ***FOLDER-B*** with the right mouse button.
6. Click on **Paste** in the sub-menu.

The file ***FILE*** has been copied from ***FOLDER-A*** to ***FOLDER-B***.

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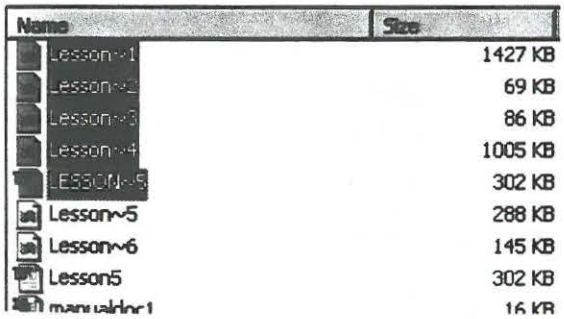
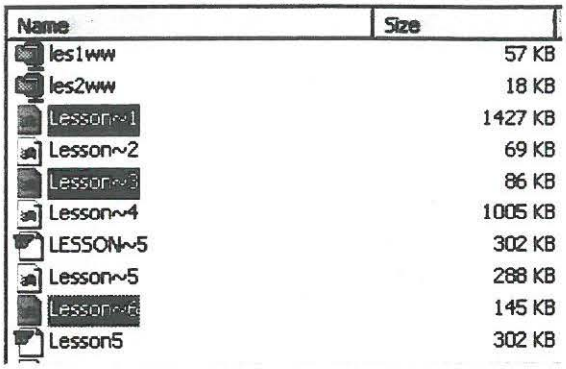


Example of a selection of adjacent files

TO SELECT A GROUP OF ADJACENT FILES

1. Click on the first file.
2. Keep the **shift-key** down and click on the last file in the group to be selected.



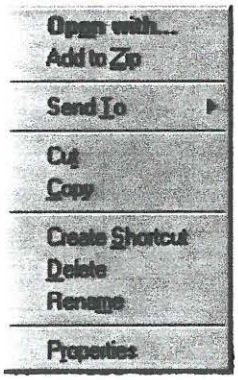
Example of a group of non-adjacent files

TO SELECT A GROUP OF NON-ADJACENT FILES

1. Click on the first file.
2. Keep the **ctrl-key** down and click on the next files to be selected.
3. Repeat step 2 until all required files have been selected.

TO COPY A GROUP OF FILES FROM ONE FOLDER TO ANOTHER

1. Select the folder ***FOLDER-A.***
2. Select the group of files to be copied by using one of the selection techniques described above.
3. Right-click inside the selection.

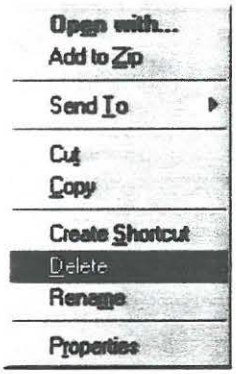


4. Click on **Copy** in the sub-menu that appeared.
5. On the left side of explorer, click on the folder ***FOLDER-B*** with the right mouse button.
6. Click on **Paste** in the sub-menu that appeared.

All selected files will be copied from ***FOLDER-A*** to ***FOLDER-B***.

TO RENAME A FILE

1. Move the cursor to the filename you want to change.
2. Right-click on it. The following sub-menu appears:



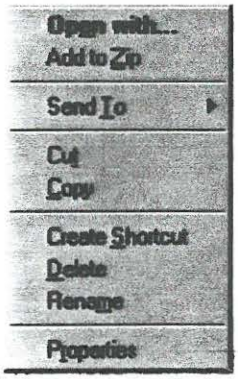
3. Click on **Rename.**
4. Use the keyboard to change the name.
5. Press enter when finished typing the new name.

TO MOVE A FILE OR GROUP OF FILES FROM ONE FOLDER TO ANOTHER

When a file is moved form one folder to another, the user ends up with only one file. The original file is taken from its original folder and literally moved to another folder.

Assume you want to move a file / files from a folder with the name ***FOLDER-A*** to a folder with the name ***FOLDER-B***.

1. Select the folder ***FOLDER-A.***
2. Select the group of files or single file to be moved by using one of the selection techniques described previously.
3. Right-click with the mouse.

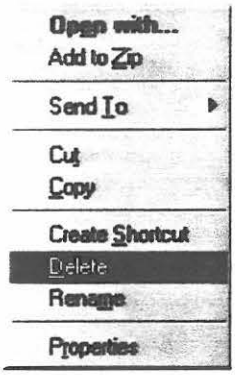


4. Click on **Cut** in the sub-menu that appeared.
5. On the left side of explorer, right-click on the folder ***FOLDER-B.***
6. Click on **Paste** in the sub-menu that appeared.

All selected files will be moved from ***FOLDER-A*** to ***FOLDER-B***.

TO RENAME A FILE

1. Move the cursor to the filename you want to change.
2. Right-click on it. The following sub-menu appears:



3. Click on **Rename.**
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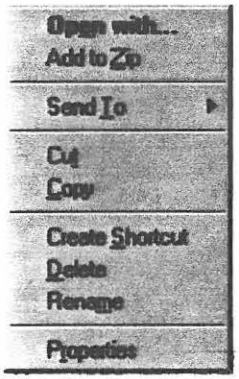
2. Select the group of files or single file to be moved by using one of the selection techniques described previously.
3. Right-click with the mouse.



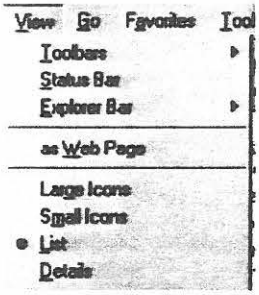
4. Click on **Cut** in the sub-menu that appeared.
5. On the left side of explorer, right-click on the folder ***FOLDER-B.***
6. Click on **Paste** in the sub-menu that appeared.

All selected files will be moved from ***FOLDER-A*** to ***FOLDER-B***.

TO VIEW FILES IN WINDOWS EXPLORER

Files could be viewed in different formats i.e. *List, Details, Icons and Small Icons.*

1. Click on **View**.
2. Click on the view required i.e. **Large Icons, Small icons, List** or **Details**

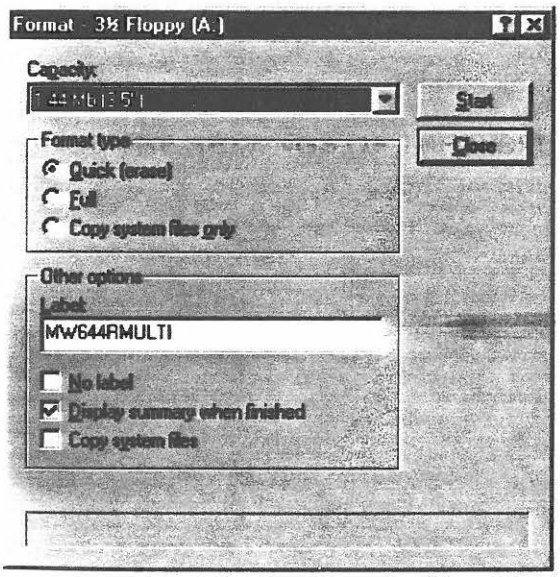


The *Details view* displays information like what kind of file it is, the date and time it was last modified or created, etc.

TO FORMAT A DISKS

Any new stiffy disk has to be formatted before it can be used. It is possible to buy pre-formatted disks but a user has the option to format a disk to either prepare it for use or erase all data that was previously saved on the disk.

1. Insert a stiffy in the stiffy drive.
2. Click on the **A:drive icon** (usually the stiffy drive is the A:-drive).
3. Click on the Drive with your right mouse button.
4. Click on **Format Disk**. The following window appears:



You can select the type of format you want for your disk. If you've finished with the selection you can click on **Start** and formatting will start.

NOTE: *NEVER FORMAT YOUR HARD DISK (C:). IT WILL ERASE ALL DATA!!*

COPY INFORMATION FROM HARD DISK TO STIFFY

1. Select the file you want to copy in Explorer.
2. Right-click with the mouse on the file you want to copy to the stiffy drive.
3. Click on **Send to** in the menu.
4. Click on **3½ Floppy.**

Data will be transferred from the hard disk to the disk in the stiffy drive.

COPY FROM STIFFY TO STIFFY

It is possible to make a complete copy of one stiffy onto another stiffy:

1. Click on the **3½ Floppy** with the left mouse button, make sure the original disk that has to be copied is in the drive.
2. Now right-click on **3½ Floppy.**
3. Click on **Copy Disk** in the menu that appears.
4. The screen shows two drives i.e. **from Drive A to Drive A.**
5. Click **Start** to start copying.
6. Follow the instructions set out on the screen.

ACTIVATING A PROGRAM

To start a program from within Explorer, look out for files labelled as **Application** file type. Double click on the name of the application and it will be activated. If the program can run in Windows, the user will stay in Windows and the program will execute. If the program requires a DOS session, Windows will ask you if you want to switch to MS-DOS session. If you press OK then windows will terminate and shut down, then DOS will start again.

TO START THE MS-DOS WINDOW

Because of the fact that DOS was such a popular operating system, many programs still operate in DOS. To start a DOS session do the following :

1. Click on the **Start button.**
2. Move over **Programs.**
3. Click on **MS-DOS Prompt.**

When you are in MS-DOS Prompt you can use the following commands :

Exit	Will exit DOS and return to Windows.
Alt + TAB	Pressing TAB while holding down Alt, allows you to switch between programs.
Alt + Enter	Pressing Alt and Enter simultaneously allows you switch between full screen mode and window mode.

Some DOS programs can only function when the computer is re-started in DOS-mode. In this case a message will appear informing the user that the computer is

busy re-starting in DOS-mode. When the program is exited, the computer re-starts in Windows-mode.

RETRIEVING DELETED FILES

When a file is deleted in Windows 95, a backup of the file is automatically placed in the Recycle Bin. The Recycle Bin keeps the deleted information until it receives an instruction to remove all data. Only then will the file finally be deleted. All files in Windows 95 must actually be deleted twice!

If a user accidentally deleted a file it can be retrieved by the following steps:

1. Right-click on the **Recycle bin.**
2. Click on **Open.**
3. The recycle bin opens and it displays all the files it contains.
4. Select the file(s) you want to undelete.
5. Click on the **File menu.**
6. Click on **Restore.**

USING ACCESSORIES

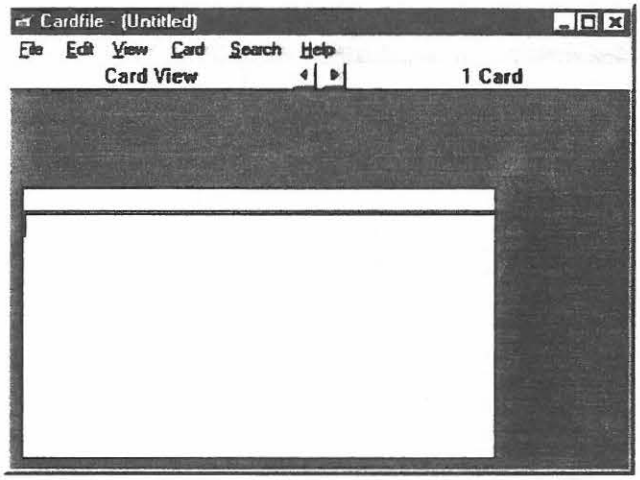
Windows 95 contains a number of accessory programs that are very useful to the computer users. These programs include:

- *Cardfile* which can be used like a personal telephone directory to store information about important persons or businesses.
- *Calendar* which is a diary program that can be used to diarise events on a day by day or month by month bases.
- *Paint* which is a graphics program that enables the user to create graphical drawings / pictures.
- *Calculator* which is an on-screen calculator that can either be used as an ordinary or a scientific calculator.

Instructions are given to open each of the accessory programs but if you would like to use any of the accessories, please consult the on-screen Help-file for further information.

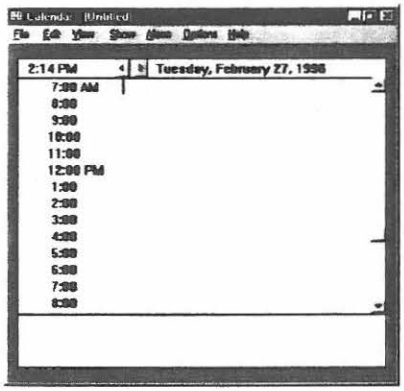
TO ACTIVATE CARD FILE

1. Click on **Start.**
2. Move over **Programs.**
3. Move over **Accessories.**
4. Click on **Card File.**



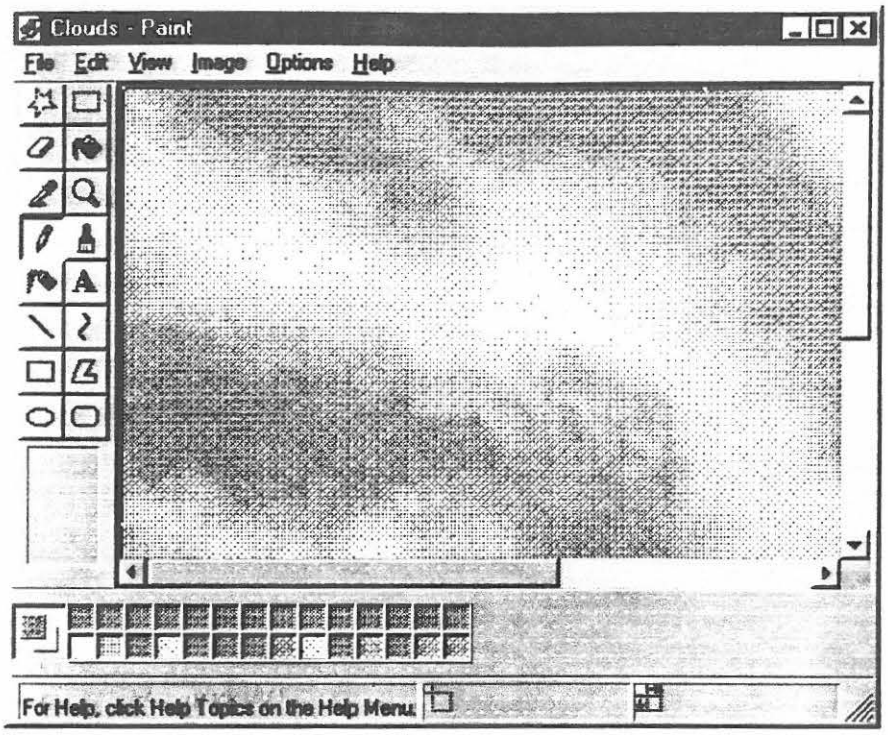
TO ACTIVATE CALENDAR

1. Click on **Start.**
2. Move over **Programs.**
3. Move over **Accessories.**
4. Click on **Calendar.**



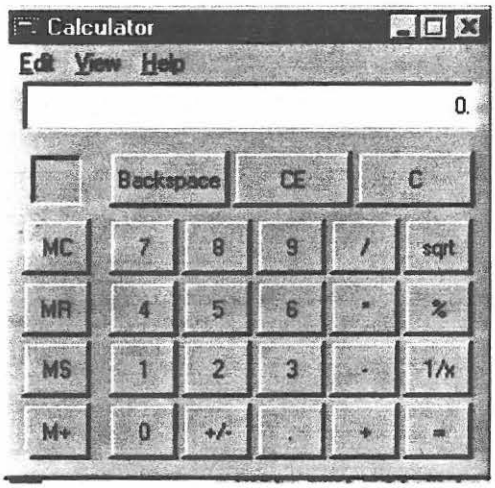
TO ACTIVATE PAINT

1. Click on **Start.**
2. Move over **Programs.**
3. Move over **Accessories.**
4. Click on **Paint.**

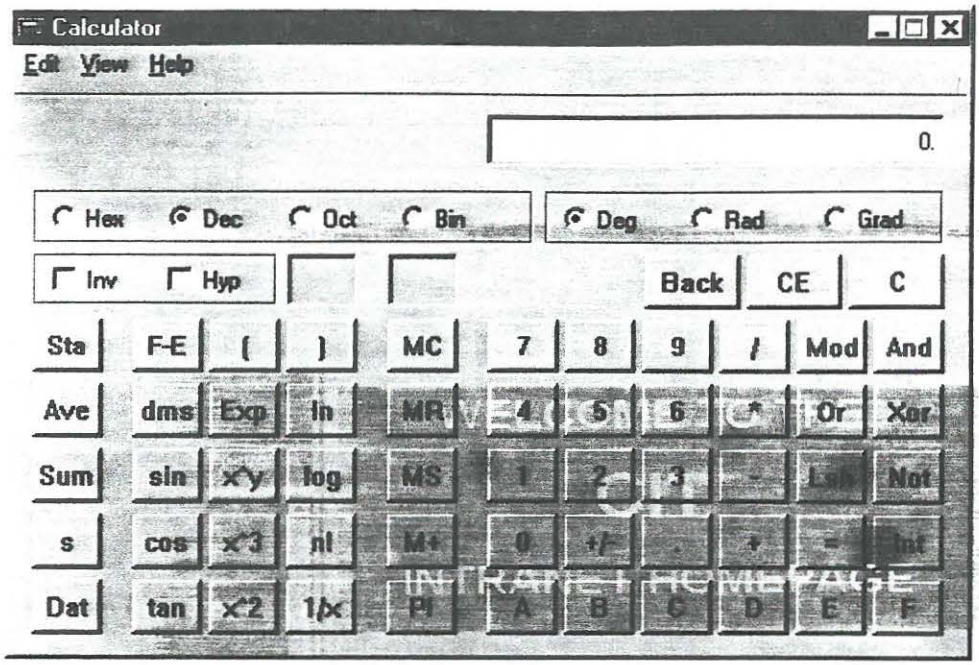


TO ACTIVATE CALCULATOR

1. Click on **Start.**
2. Move over **Programs.**
3. Move over **Accessories.**
4. Click on **Calculator.**



The Calculator in standard view



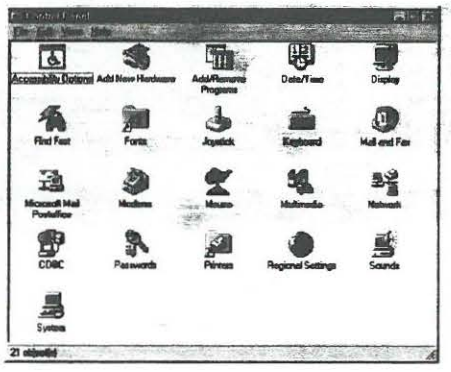
Calculator in scientific view

THE CONTROL PANEL

The Control Panel is used to change the system's settings and all other settings that control your computer. It is dangerous to play around with settings in the control panel if you are not absolutely sure what you are doing. However, one part of the control panel that most users find easy to use, is the settings of the display (screen). Feel free to experiment with the settings of the display.

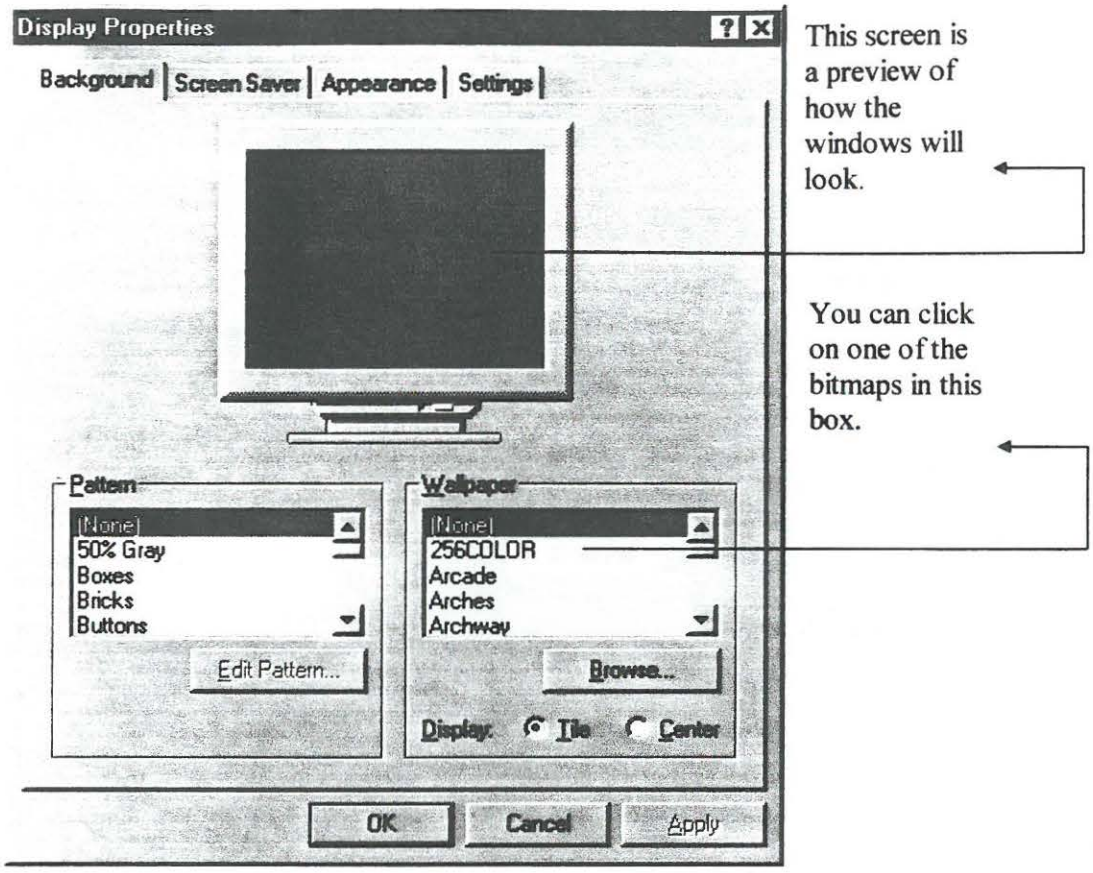
TO CHANGE THE SETTINGS OF THE DISPLAY

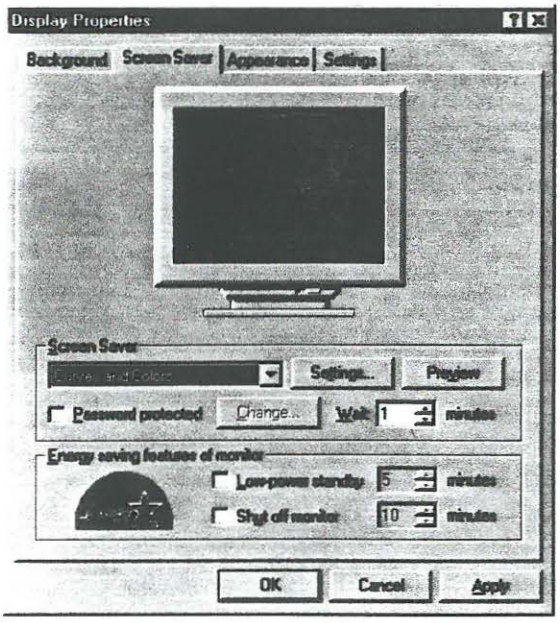
1. Click on **Start.**
2. Move over **Settings.**
3. Click on **Control Panel.**



4. Double-click on **Display.**

5. A dialog box appears which you can use to change different settings. You can change the background, with this dialogue box :

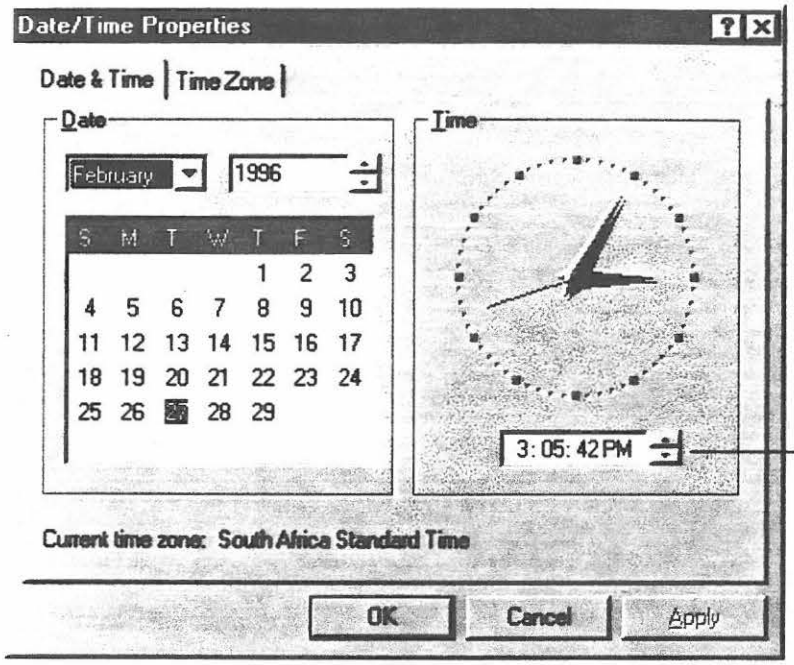




CHANGING THE DATE AND TIME

The computer has a built-in clock which should display the correct date and time. If this is not the case, the user can set the date and time:

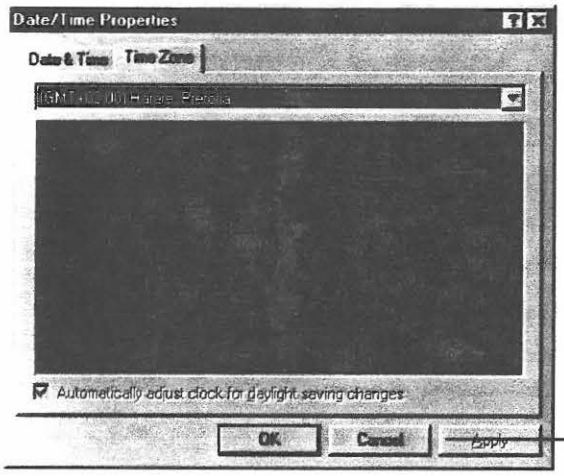
1. Double-click on the right hand corner of the screen where the time is displayed. The following dialog box appears:



Click in this box and type the correct time.

2. Click in the appropriate box and change the time and /or date as required.
3. Click on **OK.**

The computer can even be set to display the time of a different time zone:



Click in the area which your country is in.

SECTION D: INTERNET & E-MAIL

CHAPTER D1

THE OUTCOMES OF THIS CHAPTER ARE TO BE ABLE TO:

- To explain the relationship between the World Wide Web and the Internet
- To describe the uses of the Internet.
- To effectively search for information on the Internet using Netscape Navigator

INTRODUCTION TO THE INTERNET

WHAT IS THE INTERNET?

The Internet is a collection of computer networks that communicate with each other by using the same standards (protocols) of communication. The Internet connects:

- Government computers
- Computers run by hundreds of different universities and schools
- Systems owned by large corporations
- Systems belonging to non-profit organisations
- And many more ...

The Internet connects millions of people throughout the world, from Russia to Rhode Island, Austria to Australia and even to the computer lab at Vista University or your private home. If you know where you are going and how to get there, you can cruise around in cyberspace, traveling from computer to computer from one continent to another.

Did you know?

The Internet began in 1969 as a government-sponsored research network called ARPANET (Advanced Research Projects Agency Network). This network linked Department of Defense (DOD) research centers with university researchers. The network grew to include contractors and subcontractors with DOD. Many universities and colleges then joined. Libraries, other government agencies and interested businesses also joined.

HOW WILL THE INTERNET HELP YOU?

The question often asked is "But what can it do?" This question may never be answered to the full because the options are unlimited. In simplest terms, the Internet can **send information from one computer to another.**

INTERNET USES

The Internet has three basic services:

- *Telnet* that is the Internet service that allows the user to access remote computers. Through Telnet, a user can access libraries, databases and other public services all over the world.
- *File Transfer Protocol (FTP)* is the Internet service that allows a user to obtain computer programs and files i.e. files can be downloaded to a local computer through ***FTP***.
- *Electronic Mail* (is discussed later in this chapter).

WORLD WIDE WEB (WWW)

The World Wide Web is a worldwide *hypermedia system*. When you read a Web document (Web site), you will probably see underlined words. Each underlined word refers to a computer resource like a program, graphic, or document. Concealed "under" the word is the address of another Internet computer. When you select or click the word the Web software connects you to that computer. You do not have to know where exactly the resources are located – simply click and you will be connected!

Businesses have found a new venue for two-way communication with customers in the Web site. Not only do they advertise but provide much more information to customers, students and investors.

Did you know?

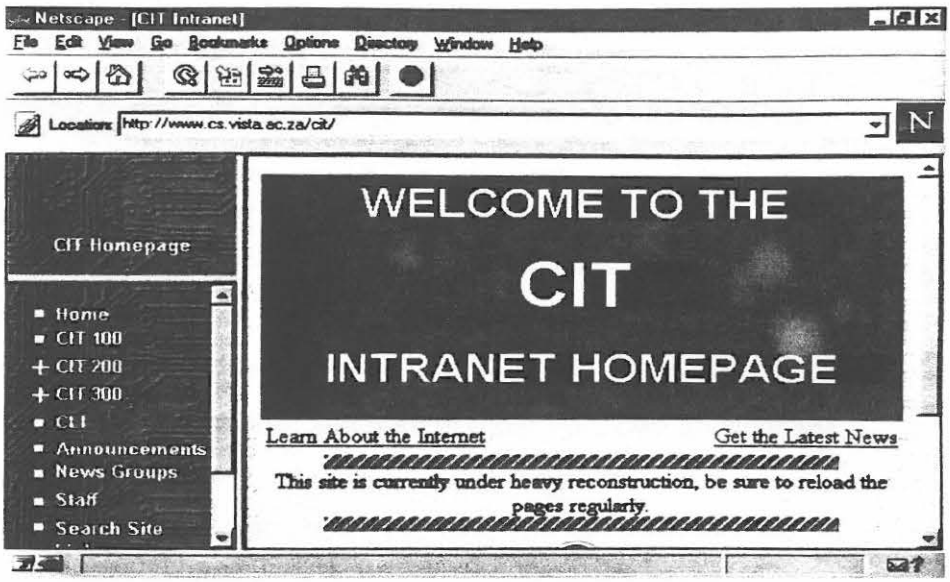
You can access the web site of ABSA, SABC, VW, other universities?
You can access a web site (which you have seen on TV, or Magazines) by typing in the internet address in the address line.

USING NETSCAPE NAVIGATOR

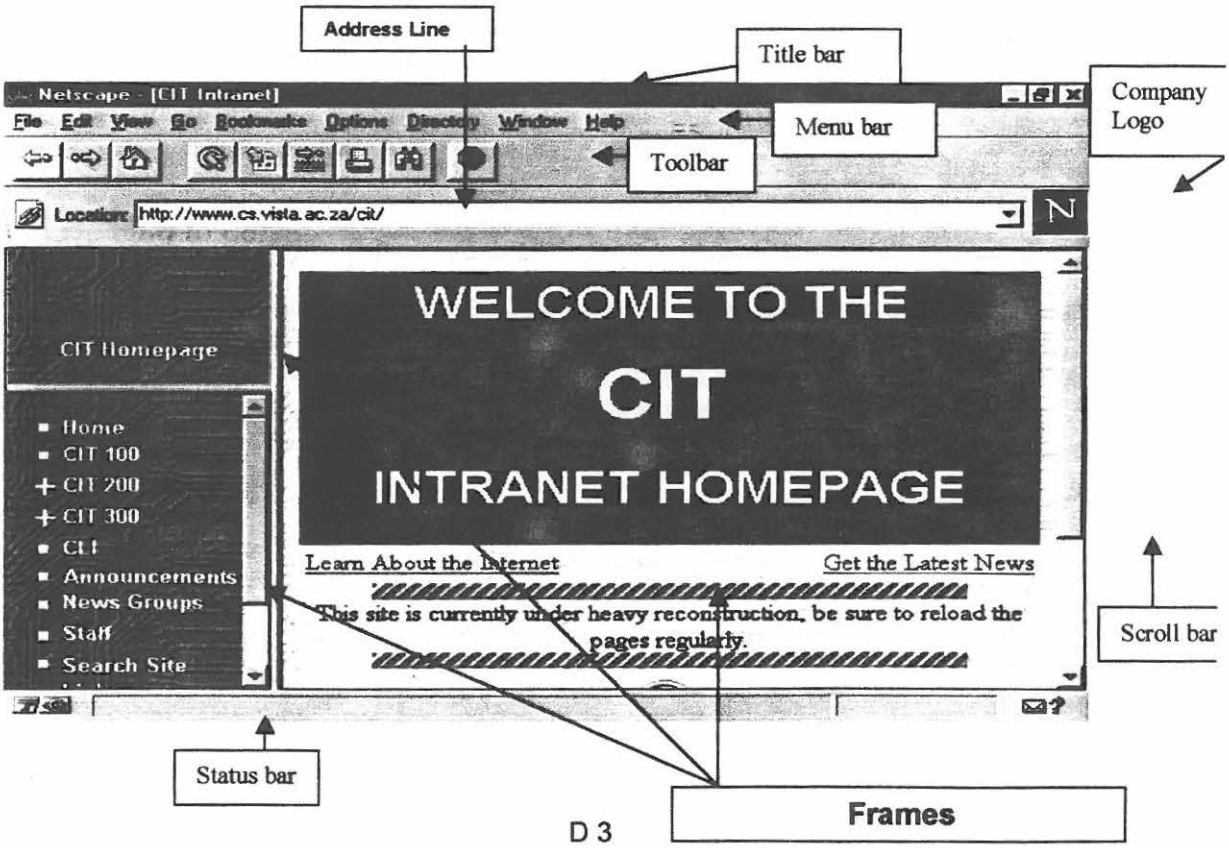
GETTING STARTED

Upon starting Netscape Navigator the first page you see is your current home page. If you work in a Vista computer lab, this page will be the CIT Department's Intranet page.

If you work at any other computer, the home page will display as set-up by the installer of your Internet connection.
The computers in the lab are all set to start with the following screen once you have activated Netscape from the Program Manager.



THE NETSCAPE WINDOW



TO VIEW WEB PAGES

There are different ways to access web pages:

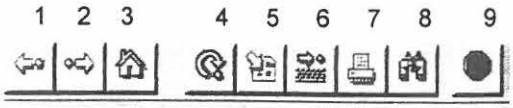
- In the current web page, click on highlighted words, pictures or menus to bring another page of related information to your screen.
- Click the **Back** or **Forward tool bar buttons** to go back (or forward) to a page you have previously seen.
- Type the web address of a web page that you want to visit in the address line.

It is important to familiarise yourself with the different screen components and terminology as outlined below:

Home Page	The document, or page, that you first see is called a *home page*.
Title Bar	It is similar to other title bars of other Windows applications.
Address Bar	The address bar shows the URL (**Universal Resource Locator**) that you are viewing.
Menu Bar	It is similar to the menu bar in other Windows application and works the same way.
Tool Bar	Shortcut buttons have been placed on a toolbar where you have to click to access them. See the next section outlining the toolbar.
Scroll Bar	It is used to scroll up and down through the page you are viewing.
Status bar	The status bar is used for several reasons. When you view a page it tells you if a piece of text is a shortcut to another page. If you use the menus the status bar give a brief description of the menu command. When a page is being transferred to your computer, the status bar will show the progress of the transfer.

TOOL BAR

The following icons are found on the tool bar.



(1) Back	Displays the previous page in the history list. A history list references a hierarchy of pages you've already viewed.
(2) Forward	Displays the next page in the history list. When you use Back or a history menu item to retrieve a page, using Forward gets the proceeding page. Forward is only available after you use Back or a history item.
(3) Home	Displays the home page designated in the General Preferences Appearance panel. The default is the Netscape home page location.
(4) Reload	Redisplays the current Netscape page, reflecting any changes made prior to the original loading. Netscape checks the network server to see if any change to the page has occurred.
(5) Images	Loads images into pages. This is useful when the Options Auto Load Images menu item is unchecked and icons have been substituted for images. By loading images, you replace the icons with the intended images.
(6) Open	Allows you to enter a URL to display the specified page in the content area.
(7) Print	Prints the content area of the current Netscape page. A dialog box lets you select printing characteristics.
(8) Find	Allows you to specify a word or phrase to locate within the current Netscape page. You can specify case sensitivity and search direction. If a match is found, the text is selected and displayed.
(9) Stop	Halts any ongoing transfer of page information.

FINDING INFORMATION

As previously explained, to locate a known web site, simply type in the address in the address line.

It is often the case that a user is simply looking for information. A search engine may be used for this purpose. Search engines create their own "table of contents" for the Internet in one of two ways.

- Some scan the Web, jumping from site to site and automatically "reading" all the pages they find.
- Others require individual authors of web pages to submit description to the search engine. These descriptions are then placed in a database that users can access and in this way find what they are looking for.

In terms of basic use, most search engines are very similar. The only noticeable difference is how the retrieved information is organised and displayed. The basic steps for use are:

- Type in one or more keywords into a form.
- A search will be done and a temporary "customized" Web page presented.
- Browse the list and select the sites that match the keyword(s) that were entered.

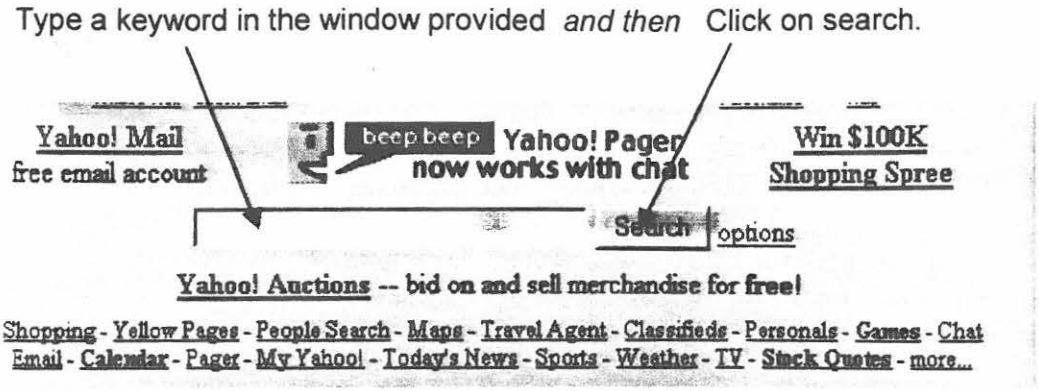
INTERNET ADDRESSES (UNIVERSAL RESOURCE LOCATION- URL)

A code to identify resources in the Internet is called the *Uniform Resource Locator.* Data is moved within a network or between networks according to established rules called *protocols*. The protocol of the World Wide Web is *HTTP* or Hyper Text Transfer Protocol. Note the following address:

TO USE THE SEARCH ENGINE YAHOO

Yahoo is one of the most popular search engines. To access this site:

1. Type address: http://www.yahoo.com in the address box. The screen on the following page appears:
2. The introductory screen of Yahoo has a number of major categories to choose from. Each category is divided into sub-categories. Many of the resources include a short description and the links to the site. Click on the category / sub-category and you are on your way!
3. You can also use Yahoo to search more directly if you do not want to browse through subject categories. Do the following:



USING A SEARCH ENGINE EFFECTIVELY

To help you focus your search and avoid most of those unwanted sources, search engines offer a system known as *Boolean logic*. This enables you to combine search terms in different ways. By using Boolean operators: **AND**, **OR**, and **NOT**, a user can describe the logical relationship of two or more terms.

- **AND** means that both terms must be present.
- **OR** means that either term must be present but that both are not necessary.
- **NOT** means that the term should not be present i.e. if it is present, the source should be excluded.

Look at the following examples: (Note that the inverted commas " " should not be typed in the search.)

- If you wanted to see sources on the "Easter Bunny", you could request "Easter" **AND** "Bunny". If you did not include the AND operator, you would get every reference for "Bunny" as well as every reference for "Easter".
- If you requested "Movie" **OR** "Film", you will get all references that includes the word "Movie" and all references which includes the word "Film".
- If you wanted to find references to "Stars" but only those in astronomy you might use, "Stars" **NOT** "Movie". This search would not remove references to rock stars, but it would reduce the number of irrelevant matches.

MORE TERMINOLOGY

- **Search items** are words that describe the search topic.
- **False drops** are items that are found in a search but are not what you wanted.
- **Results ranking** is an attempt to put the resources returned by the search in an order based on each resource's relevance to your query.
- **Hits** are returned items that match your search terms.

TUTORIAL D1.1

Complete the following statements:

1. A search _____ is a piece of software that gives you the ability to search for Internet resources.
2. In a search, the returned items that match your search terms are called _____.
3. The terms AND, OR and NOT are called _____.
4. Yahoo is an example of a(n) _____.
5. The protocol of the World Wide Web is called _____ .
6. The software that allows you to go from one resource to another by following hyperlinks is called a(n) _____.
7. A code developed to identify resources on the Internet is called the _____.

Something to do.

1. **Yahoo** (http://www.yahoo.com) is a search engine that use subject directories. Browse these subject categories provided and then decide whether these categories represent the subjects you are interested in.
2. **Alta Vista** (http://altavista.digital.com) and **Infoseek Guide** http://guide.infoseek.com) are two popular Web database search tools. **Lycos** http://www.lycos.com) and **HotBot** (http://www.hotbot.com) are similar search tools.

   Think of a topic you would like to retrieve information on (for example, your favourite television show, movie, hobby, sport, or career,) and perform a search for that topic, using all four search engines. How did the results from each engine differ?

CHAPTER D2

THE OUTCOME OF THIS CHAPTER IS TO BE ABLE TO:

- Successfully send and read electronic mail using Pegasus Mail

INTRODUCTION TO ELECTRONIC MAIL

Electronic mail is as the name indicates mail that are being sent electronically. In short we refer to e-mail.

The Internet is now the world's largest electronic mail system. Millions of people all over the world are connected to the Internet and can send and receive electronic mail. Effectively it means that you can send a message to any person who has an e-mail address.

USING PEGASUS MAIL

E-MAIL ADDRESS

The Internet uses an addressing method known as the **domain name system (DNS)** to assign addresse to people and computers. The system divides an address into three parts:

- The **user name** name identifies the person who sends or receives the e-mail.
- The **domain name** identifies the computer system on which the user has an account.

In the example: mitr-g@pelican.vista.ac.za,

- the user name is **mitor-g**
- the domain name is **pelican.vista.ac.za**

The following table shows a summary of different codes and their meanings:

CATEGORIES OF DOMAIN NAMES	
Domain Code	Description
AC	Academic Institution
COM	Commercial organisation
GOV	Government agency
MIL	Military sites
NET	Network resource
ORG	Private organisation

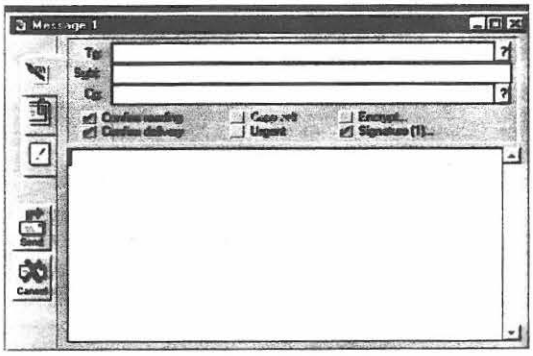
Country Codes	
Domain Code	Country
ZA	South Africa
AU	Australia
CA	Austria
FR	France
IE	Ireland
JP	Japan
UK	United Kingdom
US	Unites States of America

HOW TO SEND A MAIL MESSAGE

1. Click on one of the following buttons that could be found either on the toolbar or button panel:

 or 

A message editing window will be opened. You can click on most parts of this screen and get a description of the function of that particular part of the window.



2. Type the address of the recipient in the **To- field**.
3. Click in the **Subj- field** and type a heading for your message.
4. Click in the **Text** part of the screen and type the message.
5. Click on the **Send-icon** on the left hand of the screen.

The following table shows a summary of different codes and their meanings:

CATEGORIES OF DOMAIN NAMES	
Domain Code	Description
AC	Academic Institution
COM	Commercial organisation
GOV	Government agency
MIL	Military sites
NET	Network resource
ORG	Private organisation

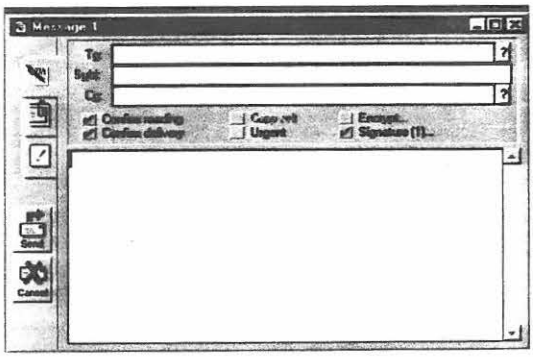
Country Codes	
Domain Code	Country
ZA	South Africa
AU	Australia
CA	Austria
FR	France
IE	Ireland
JP	Japan
UK	United Kingdom
US	Unites States of America

HOW TO SEND A MAIL MESSAGE

1. Click on one of the following buttons that could be found either on the toolbar or button panel:

 or 

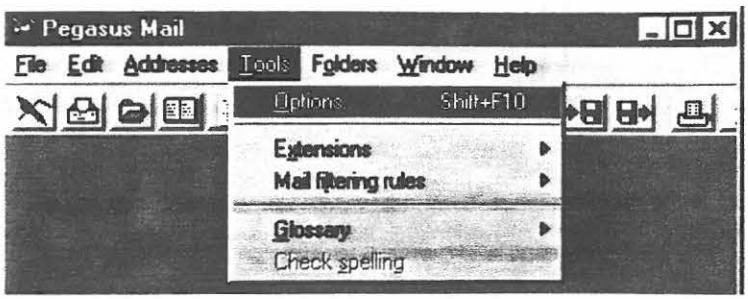
A message editing window will be opened. You can click on most parts of this screen and get a description of the function of that particular part of the window.



2. Type the address of the recipient in the **To- field**.
3. Click in the **Subj- field** and type a heading for your message.
4. Click in the **Text** part of the screen and type the message.
5. Click on the **Send-icon** on the left hand of the screen.

MENU BAR

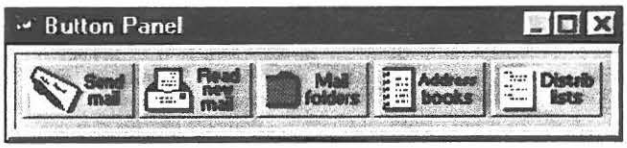
Pegasus Mail's menu bar gives you access to all of the features of the program as well as a range of configuration options. The configuration screens can be reached from the Tools menu and give you complete control over the way in which Pegasus Mail operates. The user can specify everything from the name, which is written into outgoing mail messages, to the details of the Internet provider's mail system.



TOOL BAR

Pegasus Mail's toolbar or button panel is a set of tools which provide access to the most commonly-used parts of the program at the click of a button. Depending on the setting specified in the Button Panel Preferences (see under the Tools/Options menu), the button panel can appear in different formats and at different positions on the screen.

The floating button panel can be horizontal or vertical, though they both have the same buttons. We show the horizontal button panel here:

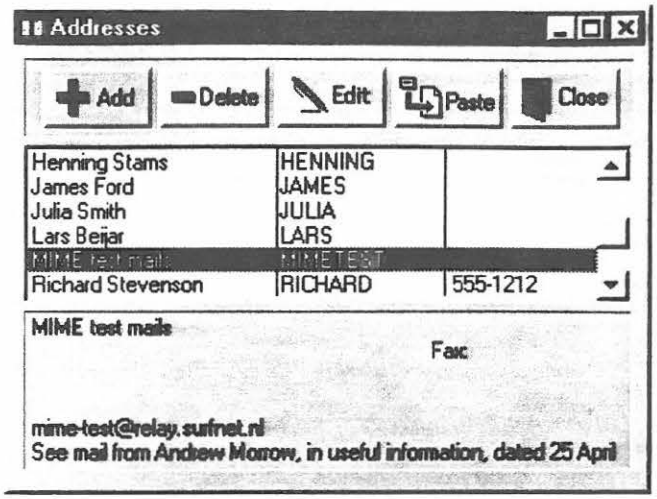


USING THE ADDRESS BOOK

To open an address book, click on the 

or  button on the toolbar or the button panel.

This will open the Address Books Manager as shown below:



There are several ways to save a person's information into your address book:

- You can **drag a message from a mail folder** to an open or minimized address book, and the name and electronic mail address of the sender of the message will be added automatically. An address editing window will open to let you fill in any other details that are relevant to that person's entry.

- You can **drag from an address field** (such as To:, From:, CC:, or Reply-to:) in an open mail message to an open or minimized address book. Again, an editing window will open to let you complete the entry.

- You can open a message, then **click on the address book's "Add" button** without clicking on any other of Pegasus Mail's windows in the meantime, and an editing window will open, partially filled in with the details of the author of that message.

- You can open an address book and click on the **"Add" button**, which will open a blank editing window for you to fill in.

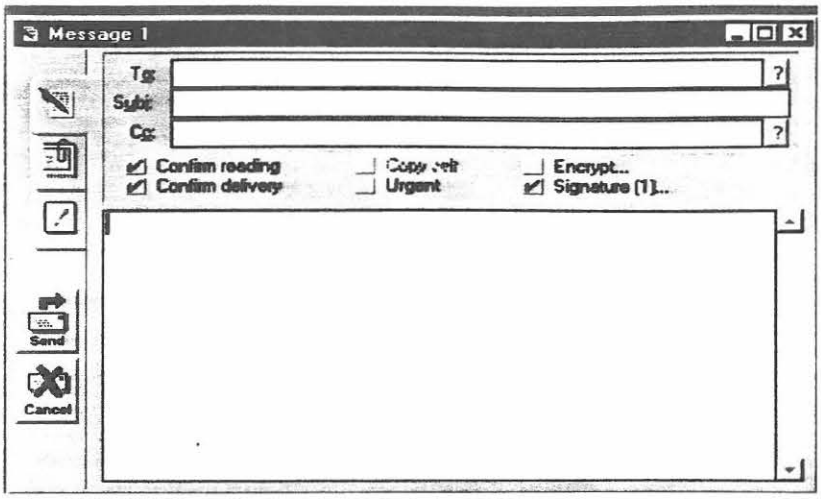
TUTORIAL D2.1

Send a mail message to the following address:
Cher-J@pelican.vista.ac.za.

In the subject line write, *Impressions*.

Provide a copy to Mskl-A@weasel.vista.ac.za.

You want to make sure that message concerning you impression about EUC are being delivered, that it is urgent and also want feedback in terms of when the receivers read your mail.



2. Send the answer of question 2 in the previous unit to your lecturer using Pegasus Mail (you will be provided with an address).

3. Obtain your own e-mail address at Hotmail.com.
Provide this address to your lecturer and explain how you went about obtaining this address

SECTION E: EXCEL

CHAPTER E1

OUTCOMES OF THIS CHAPTER ARE TO BE ABLE TO:

- Explain what a spreadsheet is
- Start Excel
- Identify the parts of the Excel screen
- Explain and use cell addresses
- Navigate around a spreadsheet
- Enter numbers / text / formulas
- Save a workbook
- Close a workbook
- Start a new workbook
- Exit Excel

INTRODUCTION TO SPREADSHEETS

A spreadsheet is created by a computer program to organise information into columns and rows. The aim is to manipulate numbers, do calculations, analyse and draw graphs of data. A major feature of a spreadsheet is the easy and fast way in which the computer can do calculations. Data is entered in cells and can be one of different data types i.e. numbers, dates, time or text.

Popular spreadsheet packages are Quattro Pro, Lotus 1-2-3 and Excel. In Excel a spreadsheet document is referred to as a *workbook.*

NOTE: *For the information on the application and advantages of using a spreadsheet, refer to Chapter A3.*

BASIC CONCEPTS

The screen is divided into *rows* and *columns* which create a grid of cells. These cells are identified by a row and column position, called the *address of the cell.* The information the cell contains, is called its *contents.* Each cell may contain one of the following types of data:

- *Values* that can be any numeric data.
- *Text* that can be any combination of characters.
- *Formula* that uses mathematical operands (i.e. + , -) and cell addresses to calculate values.
- *Date* which can be displayed in different formats.
- *Time* which can be displayed in different formats.

Consider the following very simple spreadsheet and take note of the remarks:

Cell E5

	A	B	C	D	E	F
1			Yearmark	Gr 12	1997	
2						
3	NAME	CLASS	MARCH	JUNE	SEPT	YEARMARK
4						
5	Smith K	A	70	80	70	73.33
6	Naidoo R	B	60	65	70	65.00
7	Clamini W	A	55	75	70	66.67
8						

- Row 1 contains the heading for the workbook.
- Row 3 contains the labels for each column.
- Row 5, 6 and 7 contain the data for the individual students.
- The cells B5, B6 and B7 contain the classes of the students.
- Cell E5 contains the September mark for Smith K.

TEST YOUR UNDERSTANDING

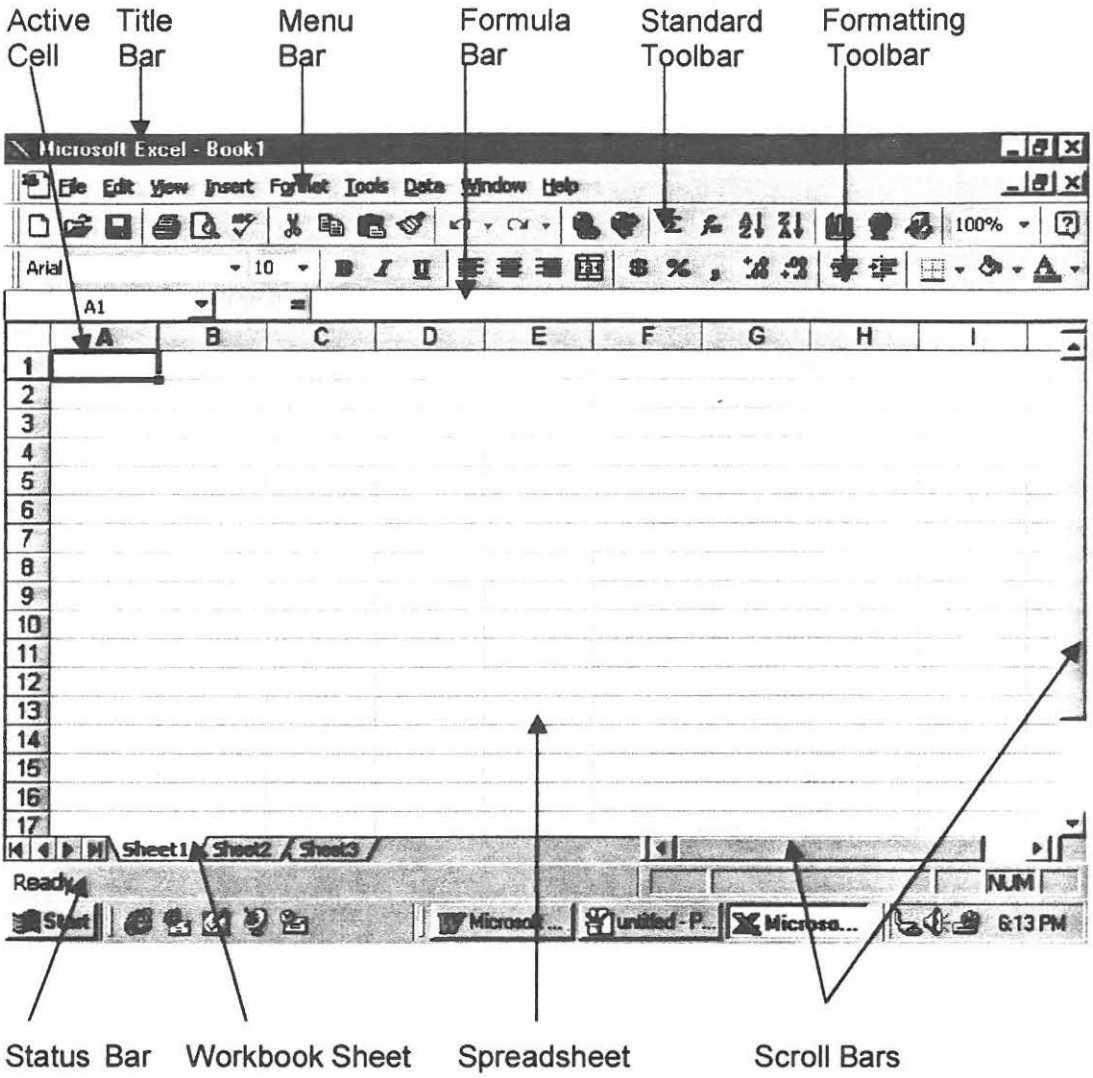
1. Give the cell address for the label **NAME.**
2. What type of data (value, text or formula) is entered in Cell C5?
3. What is the content of cell C7?
4. What is the March mark of Naidoo and in which cell does it appear?
5. Give the cell address for the value 65 and state what it represents.

GETTING STARTED IN EXCEL

As you would have learned when working through the Windows 95 section, there are a number of ways in which programs can be activated. Use one of these methods to activate Microsoft Excel. Look out for the icon:

THE EDITING SCREEN

The Excel application and spreadsheet screen follows:



WINDOW ELEMENTS

Here are certain elements of the Excel application window which are of particular importance when working within a spreadsheet. They are shown in the previous diagram and a brief explanation of their use is outlined below:

- The **Title Bar** displays the name of the application and workbook you are currently working in.
- The **Menu Bar** displays the name of the various application menus available within Excel.

- The **Formula Bar** shows particulars of the text font and size. It also displays the cell reference address for the active cell and the contents of the cell.

- The **Standard Toolbar** is usually displayed below the Menu Bar and contains a number of icons that can be used to activate functions of Excel without having to go through the menus. The user has a choice of displaying a number of different toolbars by right clicking between icons on the standard toolbar.

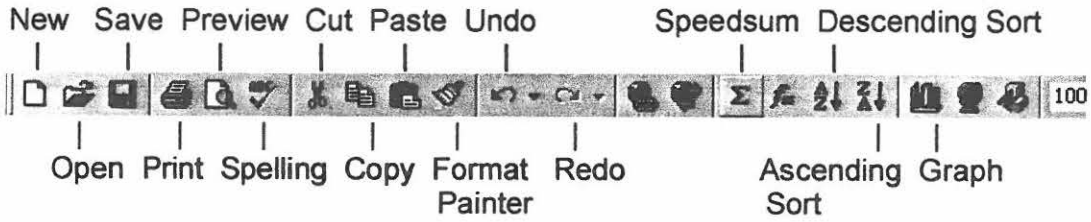
- The **Status Bar** is situated at the bottom of the screen and is used to keep the user informed as to what functions are taking place in the spreadsheet, i.e. if it displays *Ready* the user can proceed with entering data. When the contents of a cell is being changed, the status bar will display the message *Edit*, etc.

- When working in Excel the **Active Cell** at any particular time is "framed" as shown in the above diagram.

- A Workbook consists out of a number of **Sheets** (pages). The user can choose to go to a certain sheet in the workbook by clicking on one of the tags at the bottom of the screen.

- The **Formatting Toolbar** is usually just below the standard toolbar at the top of the screen but can also be displayed at the bottom of the screen. It contains a number of icons that can be used to format the contents of the workbook i.e. bold, italic, underline, left align, right align or centre content in cells. This toolbar resembles the formatting toolbar of MSWord.

IMPORTANT ICONS ON THE STANDARD TOOLBAR



The following are the most important icons that will be used during this course:

- The **New icon** is used to create a new spreadsheet.

- The **Open icon** is used to open an existing document that has already been saved.

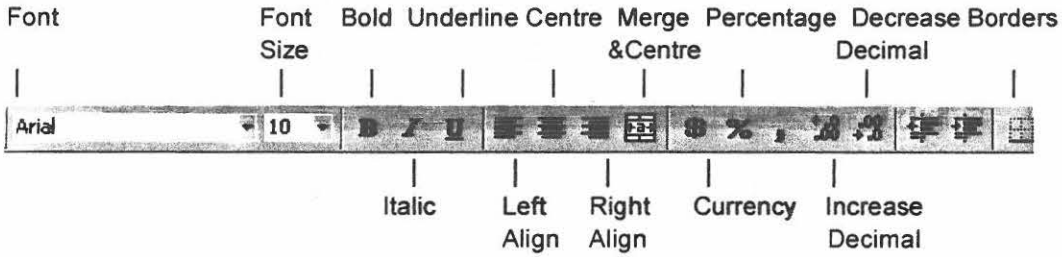
- The **Save icon** is used to save a document that has been saved before.

- The **Preview icon** displays the document in a small format to enable the user to see the format in which pages are going to be printed.

- The **Spelling icon** can be used to do a spellcheck on the spreadsheet.

- The **Cut icon** places highlighted cells onto the Clipboard – removing them from their old position.
- The **Copy icon** places a *duplicate* of the highlighted cells onto the Clipboard – the original data stays untouched.
- The **Paste icon** inserts the current contents of the Clipboard into the spreadsheet.
- The **Format Painter icon** can be used to change the format of data to the same format as that of a selected cell.
- The **Undo** and **Redo icons** can be used to undo or redo previous actions.
- The **Speedsum icon** automatically enters a function that will add all the values in the highlighted text.
- The **Ascending** and **Descending Sort icons** sort the rows in the selected block.
- The **Graph icon** allows the user to create a graph within the spreadsheet.

IMPORTANT ICONS ON THE FORMATTING TOOLBAR



Most of the icons are known from MS Word. The ones that are particularly used in Excel are:

- The **Merge & Centre icon** is used to centre a heading over a series of cells instead of one cell.
- The **Currency icon** is used to display numbers as currency i.e. a $ or R sign is automatically inserted in front of the number. It is important to type the numbers as ordinary numbers and then use this icon to display the R. If the user types in a R followed by the numbers, it will be seen as text and not as numeric values and it will not be possible to do calculations with the numbers.
- The **Percentage icon** is used to convert and display numbers as percentages. The numbers are multiplied by 100 and a % sign is inserted after the number.

- The **Decrease indent** and **Increase indent icons** are used to position content at a specific position within the cell.
- The **Borders icon** is used to draw borders around selected cells.
- The **Increase decimal** and **Decrease decimal icons** are used to specify how many digits after the decimal point should be displayed. In the case of currency, this option should be set to 2 decimal digits.

NAVIGATING AROUND THE SPREADSHEET

Any individual cell in a spreadsheet can be made "active" simply by clicking on it with the mouse pointer. Click on any cell in the window to move to that cell.

You can also click on the scroll button at either end of the vertical or horizontal scroll bars which appear at the bottom and right-hand edges of the spreadsheet in order to move one row or column in the direction indicated by arrows.

However, when typing large amounts of data into adjacent cells, or when working on a large spreadsheet, it is often far easier and quicker to move the cell pointer using the keyboard. The following options are available:

KEYS	ACTION
Arrow keys	Move one by one cell in the direction of the arrow.
Shift + Arrow	Extends the selection by one cell.
Home	Moves to the beginning of the row.
Ctrl + Home	Moves to the beginning of the worksheet.
Ctrl + End	Moves to the lower-right corner of the worksheet.
Ctrl + Shift + End	Extends the selection to the end of the data.
Ctrl + Spacebar	Selects the entire column.
Ctrl + Shift + Spacebar	Selects the entire worksheets.
Shift + Spacebar	Selects the entire row.
Page Down	Moves down one window.
Page Up	Moves up one window.
Tab	Moves right one page.
F5	Goes to a cell, block or page address to which you want to go.

ENTERING DATA INTO A CELL

To enter data into a cell, you can simply move to the cell and start typing. The first character of what is typed, determines what type of data is entered i.e. a *Numeric Value, Text* or a *Formula* (except if the cell was pre-formatted to be able to take only values or a specified type i.e. date or time).

- A *Numeric Value* is entered by simply starting to type any *digit* (i.e. 0, 1, 2, ...9). A value is automatically right-aligned in a cell and can be used in calculations.

- *Text* consists out of words or sentences (i.e. any combination of characters). Text is automatically left-aligned in a cell. Numbers can also be typed as text by starting to type the prefix ` followed by the number. If numbers are entered as text, they cannot be used in calculations.

- A *Formula* refers to cell addresses in the spreadsheet and performs some sort of calculation using values contained within these cells. A formula therefore represents *a calculated result*. A formula is accepted when the user starts typing: + or =.

TUTORIAL E1.1

Create the next spreadsheet by following the instructions carefully:

	A	B
1	MY BUDGET 1999	
2		
3	EXPENSE	JAN
4	Car	500
5	House	600
6	Petrol	100
7	Food	200
8	Clothes	50

1. Use the arrow keys and move the cursor to cell A1.Type the text "MY BUDGET 2000" and press ENTER.

2. Use the arrow keys to move to cell A3. Type the text "EXPENSE" and press ENTER.

3. Complete typing the rest of the data as given in the table above.

4. Save the spreadsheet as BUDGET1.

EDITING DATA IN A CELL

Data entered in a cell can be changed / edited in a number of ways:

TO CHANGE PART OF THE CONTENTS OF A CELL

1. Select the cell to be edited.
2. Press the **F2**-key or **double-click** on the cell.
3. Edit data as required by using backspace, delete or typing.
4. Press **ENTER**.

TO OVERWRITE DATA IN A CELL

1. Select the cell which contents you wish to overwrite.
2. Start typing the new data.
3. Press **ENTER**.

TO CLEAR INFORMATION FROM A CELL

1. Select the required cell.
2. Press **Delete**.

TO USE THE UNDO COMMAND

If you clear a group of cells and then immediately realise that you have made a mistake, you can undo the action by using the **Undo command**.

1. Click on the **Undo icon** on the standard toolbar.

TO USE THE RE-DO COMMAND

The re-do command is used to undo the undo-command.

1. Click on the **Re-do icon** on the standard toolbar.

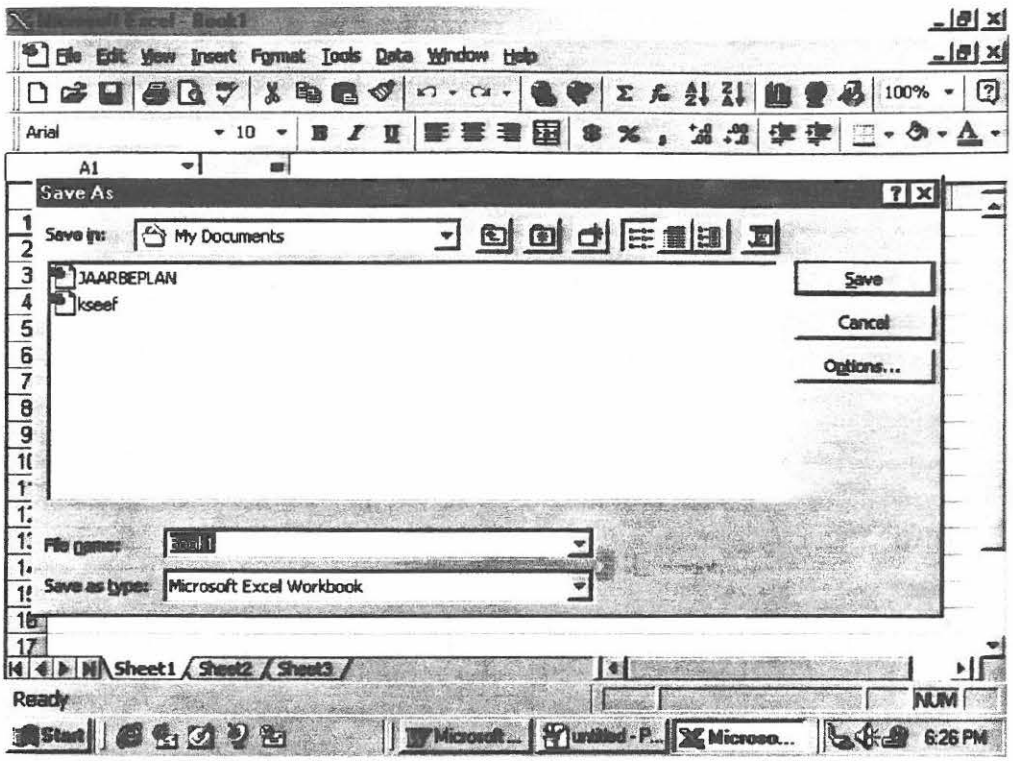
SAVING DOCUMENTS

- The **Save** command will place a copy of the workbook on a disk. If a previous copy has been saved already, the save command will replace the previously saved versions of the workbook with the current version, including all changes that you have made. The newly saved workbook will still be displayed on the screen.

- The **Save As** command allows you to save another copy of the workbook under a different name or on a different drive / directory.

TO SAVE A DOCUMENT FOR THE FIRST TIME

1. Click on the **File menu.**
2. Click on **Save**. The following dialog box appears:



3. Click in the **File name box** and type the name that you wish to give to your workbook.
4. If you want to change the drive and directory specification, click in the **Save in box**. Click on the **down arrow** next to the box and then select the drive and directory you wish to save your workbook in.
5. Click on **Save.**

TO SAVE A DOCUMENT WHICH HAS ALREADY BEEN SAVED

1. Click on the **Save icon** on the Toolbar. The workbook will be saved with the same name as used previously.

TO SAVE A DOCUMENT USING ANOTHER NAME, DRIVE OR DIRECTORY

1. Click on the **File menu.**
2. Click on **Save As.**
3. Click in the **File name box** and type the new name that you wish to give to your workbook.
4. If you want to change the drive and directory specification, click in the **Save in box.** Click on the **down arrow** next to the box and then select the drive and directory you wish to save your workbook in.
5. Click on **Save.**

CLOSING A DOCUMENT

When you have finished working with a workbook, you can close it and it will no longer be available on the screen. The workbook can however, at any time be re-activated by retrieving it from the disk (IF IT HAS BEEN SAVED ON DISK).

TO CLOSE A DOCUMENT

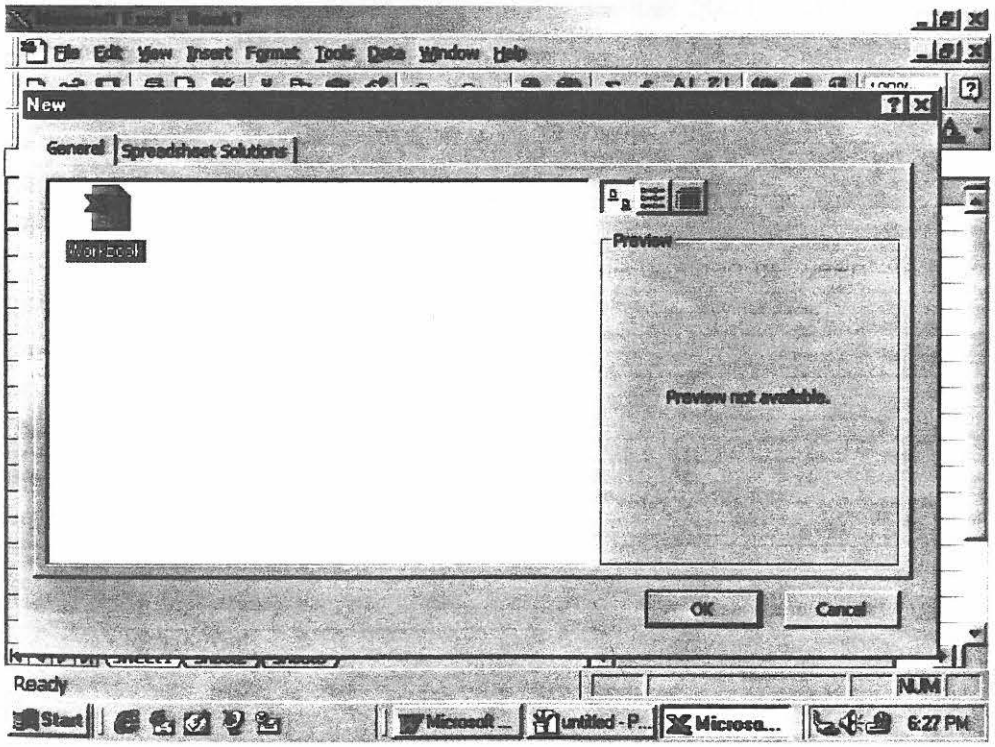
1. Click on the **File menu.**
2. Click on **Close**.
3. If you have not yet saved your workbook, then Excel will open a dialog box which will prompt you whether you would want to save the workbook. You could now choose **Yes** (which will lead to the Save-As-dialog box) or **No** which will result in the workbook being closed and not being saved or **Cancel** which will result in the workbook not being closed and will allow you to continue working in the workbook.

CREATING A NEW DOCUMENT

When you open Excel, it automatically creates a new workbook. If you are already working in Excel and you want to create yet another workbook, then the following steps could be taken:

TO CREATE A NEW DOCUMENT

1. Click on the **File menu** *(or click on the **New icon**).*
2. Click on **New**. The following dialog box appears:



3. Select the **Workbook** option.
4. Click on **OK**. The new workbook will appear on the screen.

EXIT EXCEL

1. Click on the **File menu.**
2. Click on **Exit.**
3. If prompted, indicate whether or not you would like to save the workbook.

TUTORIAL E1.2

Work with the spreadsheet BUDGET1 created in TUTORIAL E.1.1. Change the spreadsheet by following the instructions carefully:

	A	B
1	MY BUDGET 2000	
2		
3	EXPENSE	JAN
4	Car	600
5	House	600
6	Petrol	100
7	Food	200
8	Clothes	50

1. Move the cursor to cell A1. Change the text to read "MY BUDGET 2000".
2. Move the cursor to cell B4. Change the number 500 to 600.
3. Delete the value in cell B8.
4. Save the spreadsheet again using the name BUDGET1.

CHAPTER E2

OUTCOMES OF THIS CHAPTER ARE TO BE ABLE TO:

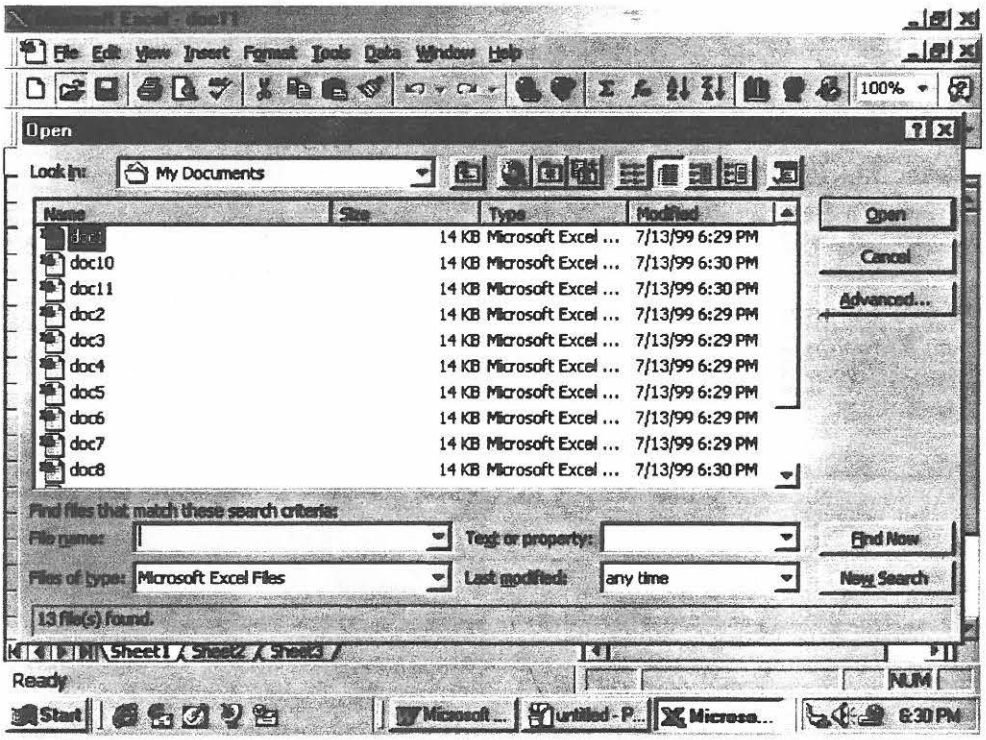
- Open an existing file
- Work with more than one workbook at a time
- Insert / delete rows and columns
- Hide and unhide columns
- Change column widths
- Change row heights
- Use different formatting techniques
- Print a workbook

WORKING WITH EXISTING FILES

When a file has been saved, the user can open the file and work with it.

TO OPEN AN EXISTING WORKBOOK

1. Click on the **File menu** (*or click on the* ***Open icon).***
2. Click on **Open.** The following dialog box appears:



3. If you need to change the drive or directory click on the arrow next to the **Look in box** and select the drive and directory where the file can be found.

4. Click on the name of the file that you want to open or type the name of the file in the **File name box**.
5. Click **Open.**

MORE THAN ONE WORKBOOK OPEN AT THE SAME TIME

It is possible to have more than one workbook open at the same time.

TO SWAP BETWEEN OPEN WORKBOOKS

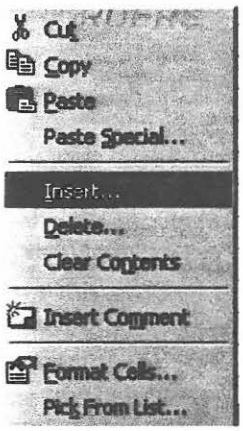
1. Click on the **Window menu**.
2. All the names of the active books will be displayed. Select the one you want to work with.

INSERTING AND DELETING ROWS / COLUMNS

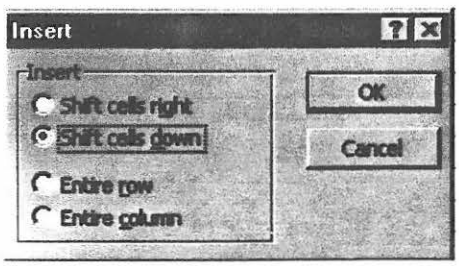
It is possible to insert rows and/or columns to an existing spreadsheet.

TO INSERT ROWS / COLUMNS

1. Move the mouse pointer to anywhere in the column / row where you want to insert a new column / row.
2. Click the **right mouse button**. The following menu appears:



3. Click on **Insert**. The following dialog box appears:



4. Click on **Entire row** or **Entire column** – whatever is applicable.
5. Click on **OK**.

TO DELETE ROWS / COLUMNS

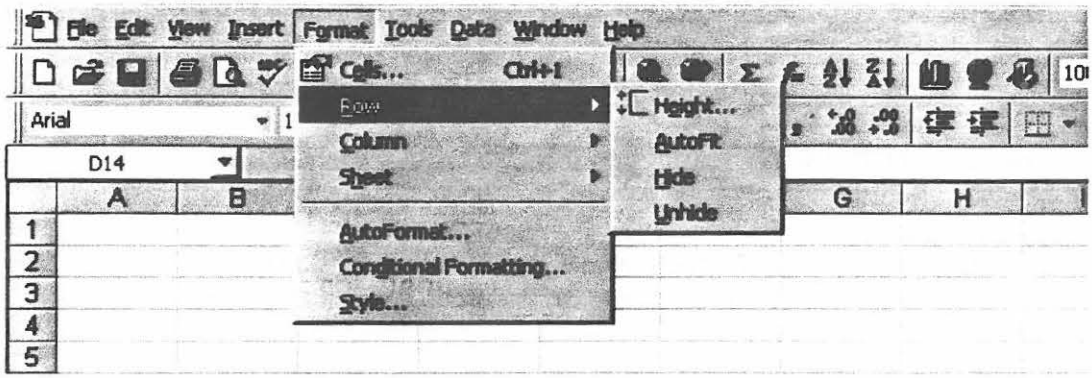
1. Select the row / columns that you wish to delete.
2. Click the right mouse button in the row / column. A menu appears.
3. Click on **Delete**.
4. Click on **Entire row** or **Entire column** whichever is applicable.
5. Click on **OK**.

HIDING ROWS AND COLUMNS

Excel allows the user to hide a row or column. This option would be used when sensitive information should not be displayed on the screen.

TO HIDE ROWS / COLUMNS

1. Select the row or column you wish to hide.
2. Click on the **Format menu**.
3. Click on **Row** or **Column**.
4. Click on **Hide**.



TO UNHIDE ROWS / COLUMNS

1. Select the rows or columns adjacent to the rows / columns that are hidden.
2. Click on the **Format menu**.
3. Click on **Row** or **Column**.
4. Click on **UnHide**.

TUTORIAL E2.1

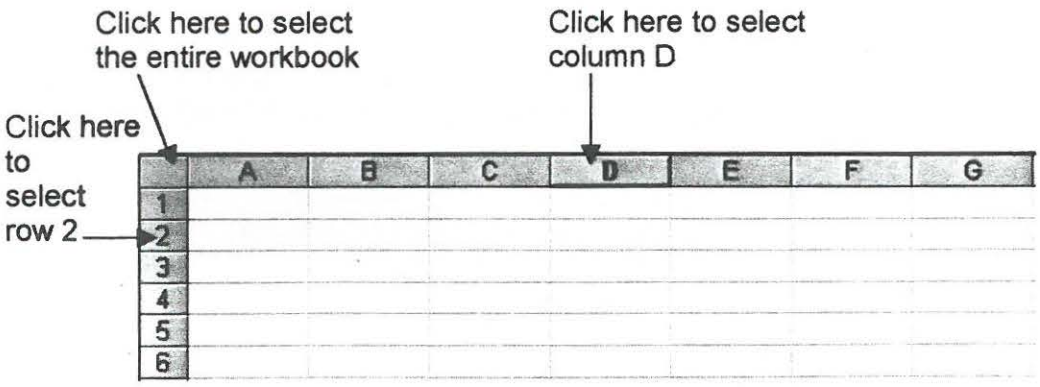
	A	B	C
1	MY BUDGET 2000		
2			
3	EXPENSE	INCOME	JAN
4			
5	Car		600
6	House		600
7	Petrol		100
8	Food		200
9	Clothes		50

1. Open the file BUDGET1 that was created in CHAPTER E1.
2. Insert an empty row between rows 3 and 4.
3. Insert a new column between EXPENSE and JAN and type the heading INCOME.
4. Hide the new column with the heading "INCOME".
5. Unhide the column with the heading "INCOME"
6. Save the file as BUDGET2.

SELECTING CELLS AND BLOCKS

It is often necessary to select cells or a block of cells in a workbook.

- To select *a cell*, click on the cell.
- To select *a block*, drag it by clicking a cell in one corner, holding down the left mouse button, moving to the opposite corner and releasing the mouse button.
- To select *a non-contiguous block* (a selection consisting of more than one disconnected block of cells), select the first block and then hold down the **CTRL key** while you click to select other cells.
- To select *a complete row*, click on the row number.
- To select *a complete column*, click on the column letter.
- To select *the entire workbook*, click on the position between the first row and the first column.



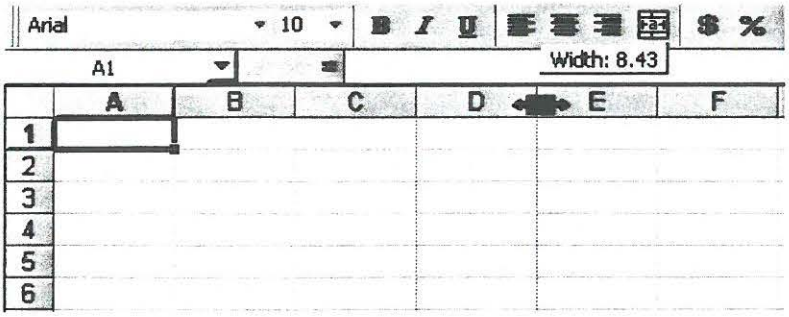
RESIZING COLUMNS and ROWS

There are several ways to change the width of columns and the height of rows with the mouse i.e.

- *drag* the row or column border to the correct size.
- *specify* an exact numerical setting through the Format menu.

TO DRAG ROW AND COLUMN BORDERS

1. Move the pointer over the **right edge** of the column border to be resized, or over the **bottom edge** of the row border to be resized. The pointer turns into a double arrow.



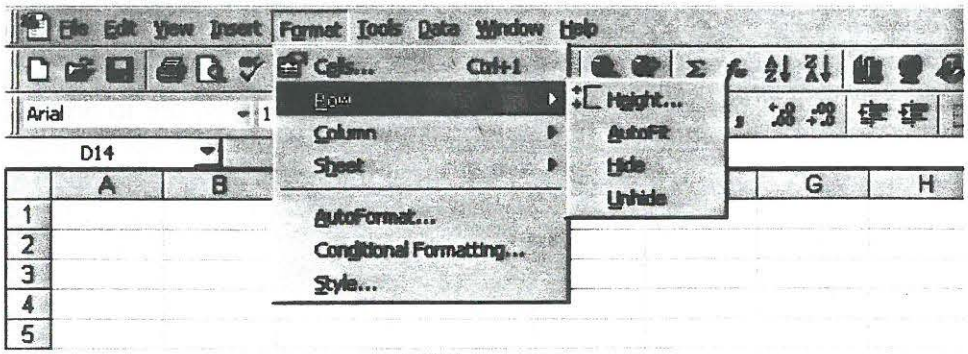
2. Drag the double-arrow until the row or column is the required size.

TO RESIZE SEVERAL ROWS OR SEVERAL COLUMNS IN THE SAME PAGE TO A UNIFORM SIZE

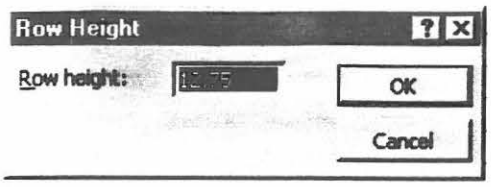
1. Select contiguous rows or columns (by clicking and dragging their borders).
2. Decide on a row or column within the selection that you want to govern the uniform size, then drag the double-arrow. All the rows or columns are resized to the same dimension even if they started out with different sizes.

TO RESIZE ROW HEIGHT THROUGH THE FORMAT MENU

1. Select the row / column you wish to change.
2. Click on the **Format menu**.
3. Click on **Row** or **Column**.
4. In the case of row, click on **Height** - in the case of column click on **Width**.



The following screen appears:



5. Type the required row height.
6. Click on **OK**.

CHANGING THE WAY DATA LOOKS

A simple way to enhance your workbook's appearance is through the use of different fonts and style options such as **Bold**, *Italic* and Underline.

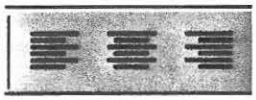
TO CHANGE THE APPEARANCE OF CONTENT

1. Select the cells that have to be changed.
2. Click on the appropriate **icon** on the **Formatting Toolbar** as explained in Chapter B1 (i.e. change the font type or font size or select **Bold**, *italic*, Underline).

TO CHANGE THE ALIGNMENT OF DATA

Text is automatically left-aligned in a cell and numeric values are automatically right-aligned in a cell. The user can however, select to place data to the left, right or centre of the cell.

1. Select the cells you want to change.
2. Click on the appropriate **icon** on the **Formatting Toolbar** as explained in Chapter E1 (i.e. choose Left aligned, Centre or Right aligned).



TO CENTRE A HEADING OVER A SERIES OF CELLS

Using the icons showed above, the content will be aligned within one cell. It is also possible to centre a heading over a series of cells i.e. the user might want to centre the main heading of the workbook across several columns.

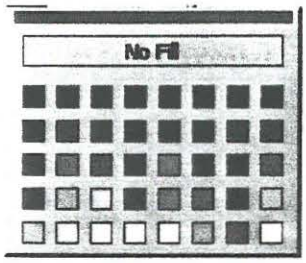
1. Select the cells in which the content should be centred.
2. Click on the **Merge & Centre icon**.
3. Type the content into the merged cells.

SHADING CELLS

Cells could be shaded to a number of different colours. If you use a colour printer, the colour selected will be printed. If you use a black and white printer, different shades of grey will be printed.

TO SHADE CELLS

1. Select the cells that you wish to shade.
2. Click the arrow on the **Fill Color icon**  on the **Formatting Toolbar.** The following window appears:



3. Click on the colour you would like to use. If you do not have a colour printer, you will have to select one of the shades of grey.

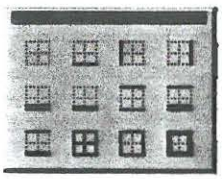
ADDING BORDERS

Excel allows you to add borders around your data in order to emphasise important parts of a workbook. Excel has a number of borders to choose from i.e. thin, thick, solid or double lines. You can also select to place the border above, below, right, left or around all four sides of a cell.

TO ADD A BORDER TO CELLS

1. Select the cells you wish to apply a border to.
2. Click the right arrow next to the **Borders icon** on the **Formatting Toolbar.**

The following window appears:



3. Select the type of border that you wish to be applied to the cell(s).

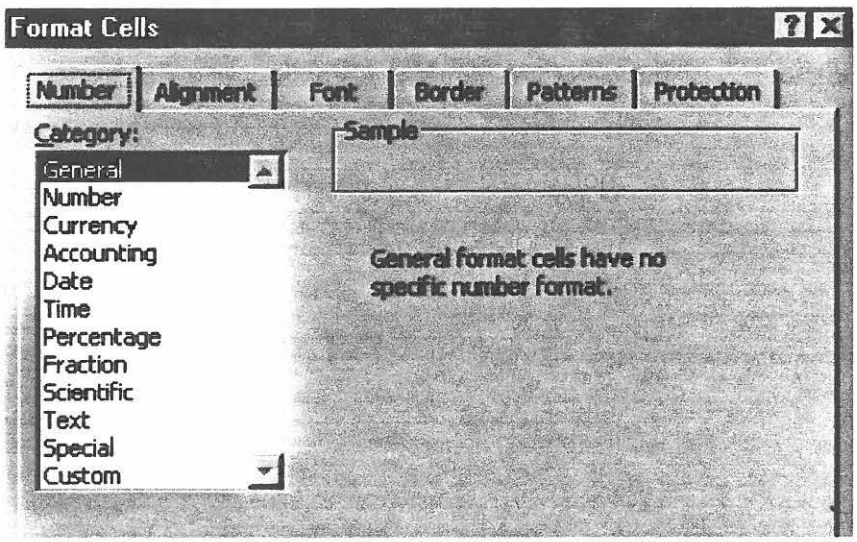
TO CHANGE THE FORMAT OF DATA

Data in a cell can be displayed in different types of formats. The most important formats are:

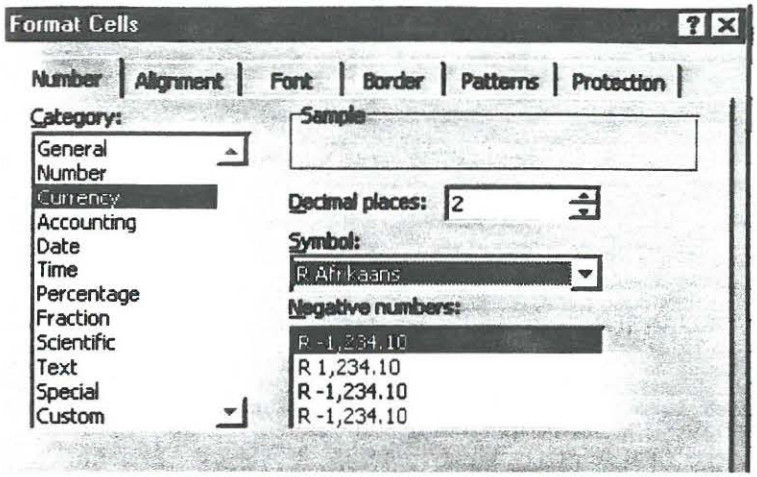
- *General* where the content is determined by the first character of input and numbers are not displayed in any pre-set format.
- *Numbers* where the user can specify how many decimal digits should be displayed. If it is set to 2 decimal digits and the number 5 is typed in, it will be displayed as 5.00.
- *Currency* where the user can specify which symbol should be displayed in front of the numbers. *It is important to type in values without the currency symbol and then format it to display the symbol otherwise it cannot be used in calculations.*
- *Date* where the user can specify in which format a date should be displayed.
- *Time* where the user can specify in which format time should be displayed.
- *Percentage* where the number will automatically be multiplied by 100 and the percentage sign % will be displayed in the cell.

TO SET THE FORMAT OF A CELL

1. Select the cell(s) you want to change the format of.
2. Click on the **Format menu**.
3. Click on **Cells**. The following window appears:



Select the desired format. With most of the options further selections have to be made i.e. if you click on currency the following screen appears:

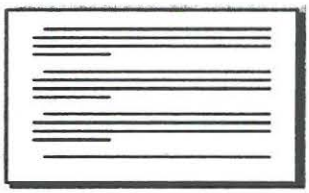


The number of digits after the decimal point; the symbol displayed in front of the numbers and the way negative numbers are displayed, can be selected.

PRINTING WORKBOOKS

Before a spreadsheet is printed, the user has to decide whether it must be printed in *Portrait* or *Landscape* view.

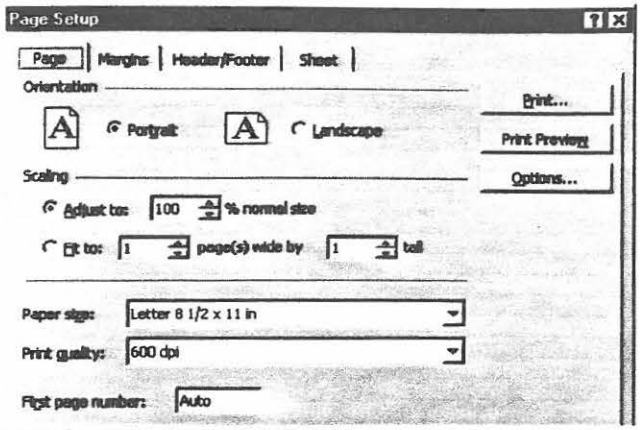
Portrait view



Landscape view

TO SELECT PORTRAIT OR LANDSCAPE VIEW

1. Click on the **File menu.**
2. Click on **Page Setup.** The following dialog screen appears:

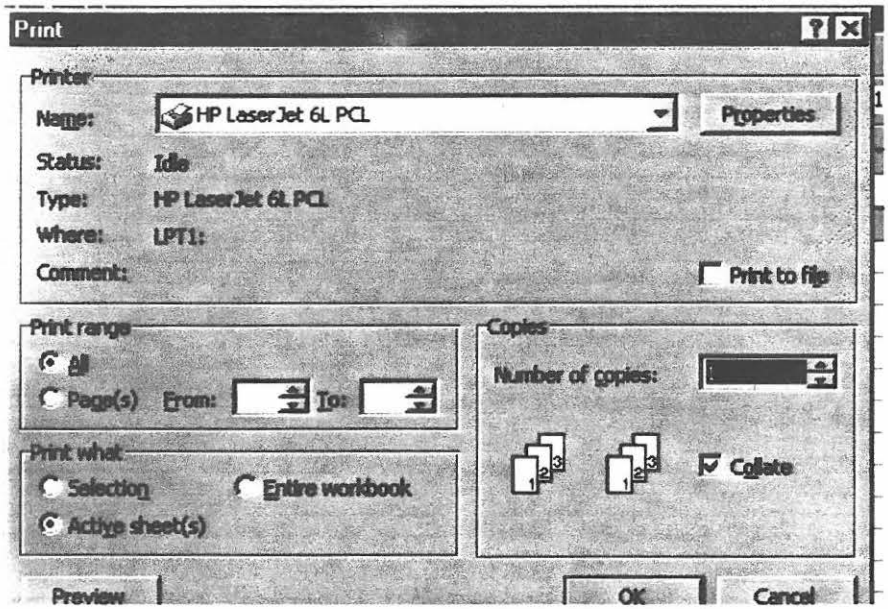


3. Click on **Portrait** or **Landscape.**
4. Click on **OK.**

There are many other printing options available in Excel that can be selected from the print dialog box.

TO PRINT A SPREADSHEET

1. Click on the **Print icon** in the **Standard Tool bar.** The following dialog box appears:



2. Select the desired options.
3. Click on **OK.**

TUTORIAL E2.2

	A	B	C
1	MY BUDGET 2000		
2			
3	EXPENSE	INCOME	JAN
4		R2000-00	
5	Car		R600-00
6	House		R600-00
7	Petrol		R100-00
8	Food		R200-00
9	Clothes		R50-00

1. Open the file BUDGET2 created in TUTORIAL E2.1.
2. Resize Column A to be wider than the other columns.
3. Change the row height of the whole spreadsheet to 14 points.
4. Centre the headings in row 3.
5. Centre the main heading "MY BUDGET 2000" over columns A, B and C.
6. Shade the text in row 3.
7. Add a grid border to the whole spreadsheet.
8. Change the format of the values in column B and C to be displayed as currency with 2 decimal places.
9. Enter the value 2000 in cell B4.
10. Save the spreadsheet as BUDGET3.
11. Print the spreadsheet.

CHAPTER E3

OUTCOMES OF THIS CHAPTER ARE TO BE ABLE TO:

- Use formulas in Excel
- Use functions in Excel
- Move and copy data in a workbook

INTRODUCTION TO FORMULAS and FUNCTIONS

In Excel we can use formulas and functions to quickly calculate values from the data contained in cells of the workbook.

IMPORTANT TERMS

- A *prefix* is a character that indicates that a formula / function will be following. The most commonly used prefixes in Excel, are **+** and **=**
- *Operators* are used to indicate arithmetic calculations i.e.
  - **+** used for addition
  - **-** used for subtraction
  - ***** used for multiplication
  - **/** used for division
- *Cell addresses* are letters and numbers that refer to a cell's location in the spreadsheet i.e. A4, B7, etc.
- A *range of cells* is a reference that indicates a contiguous block of cells i.e. *A1:A50* indicates all the cells from cell A1 to cell A50.
- A *constant* is a fixed number used in calculations.

FUNCTIONS

Functions are *pre-defined modules* that are built into the spreadsheet and can be used to do calculations. Most functions consist of a *prefix, function name and range*. An example of a function is

=SUM(B1:B5)

In the example,

- the prefix is **=**
- the name is **SUM**
- the range is **B1:B5**

FORMULAS

Formulas are arithmetic expressions that consist of a *prefix, operators, relevant cell addresses and / or constants*. It is used to calculate values. Formulas could also include functions. An example of a formula is: *=C5 + D3*

Both formulas and functions are created by starting to type the prefix **=** or **+**

Functions and formulas could be understood better by studying some examples. Consider each of the following formulas /functions and the explanation of what result it will calculate:

Formula	Formula/ function	Description
+C3+C7	Formula	*Add the contents of cell C3 to the contents of cell C7*
=sum(B1:B10)	Function	*Add all the values of range B1 to B10*
=average(F5:F50)	Function	*Determine the average of the values in the range*
=sum(A1:F1)/6*100	Formula	*Calculate the sum of the values in the range; then divide by 6 and then multiply by 100*

THE ORDER OF CALCULATIONS

If you combine several operations in a single formula / function, Excel will perform the operations according to the order of the operators as listed in the table below:

Operator	Description
( )	Expressions in parenthesis will be evaluated first
:	Range
Space	Intersection
`	Union
-	Negation
%	Percentage
^	Exponentiation
* and /	Multiplication and Division
+ and -	Addition and Subtraction
&	Text joining
= < > <= >= <>	Comparison

If the formula / function contains more than one operator with the same priority level, Excel will evaluate the operators in the formula / function from left to right. However, parenthesis can be used to alter the order of evaluation. Consider the following examples:

+3+6*5 = +3+30 = 33 BUT +(3+6)*5 = +9*5 = 45

TO CREATE A FORMULA BY TYPING

1. Select the cell where you want the result of the formula / function to appear.
2. Type the **+ (plus sign)**.
3. Type the desired cell addresses and mathematical operators.
4. Press **Enter**.

TO CREATE A FORMULA BY POINTING

1. Select the cell where you want the result of the formula / function to appear.
2. Type the **+ (plus sign)**.
3. Click with the mouse or move with the arrows to the first cell required in the formula / function.
4. Press the desired **mathematical operator (+, *, -, /)**.
5. Click with the mouse or move with the arrows to the next cell required in the formula / function.
6. Repeat steps 4 and 5 until the formula / function has been finalised.
7. Press **Enter**.

TO CREATE A FUNCTION BY TYPING

Every function is typed by starting with the prefix **= (equal sign)**.

Most functions have the following format: **=FUNCTIONNAME(RANGE)** where:

- the prefix is usually **=**
- *FUNCTIONNAME* is the name of the function i.e. *SUM, MAX* or *MIN*.
- *RANGE* specifies the range of values in the spreadsheet that should be used.

The following table gives a summary of functions that are often used by end users:

Function	Description	Example
=SUM(RANGE)	Calculate the sum of the values in the specified range	=SUM(A1:A20)
=MIN(RANGE)	Determine the smallest value in the specified range	=MIN(B7:B15)
=MAX(RANGE)	Determine the highest value in the specified range	=MAX(C1:C10)
=AVERAGE(RANGE)	Calculate the average of the values in the specified range	=AVERAGE(A1:A30)

USING SPEEDSUM

The most efficient way to calculate the sum of a group of cells is by clicking the Speed Sum icon on the standard Tool bar.

1. Select the range of cells that must be added – including one empty cell.
2. Click on the **Speed Sum icon**. Excel will automatically enter the **=SUM-function** with the appropriate range and place the result in the blank cell.
3. Press **Enter**.

TUTORIAL E3.1

	A	B	C
1	MY BUDGET 2000		
2			
3	EXPENSE	INCOME	JAN
4		R2000-00	
5	Car		R600-00
6	House		R600-00
7	Petrol		R100-00
8	Food		R300-00
9	Clothes		R50-00
10			
11	Total		Rxxxx-xx
12			

1. Open the file BUDGET3 that was created in TUTORIAL E2.2.

2. Type the text "Total" in cell A11.

3. Use a function in cell C11 to calculate the total expenses of the "JAN" column. (the Rxxxx.xx indicates that a formula / function is used in this cell)

4. Change the value of cell C8 to 300. (Note that the total is adjusted automatically

5. Save the spreadsheet as BUDGET4.

COPYING DATA FORMULAS / FUNCTIONS

Data (including formulas and functions) in any cell or range of cells can be copied or moved to another cell / range of cells.

TO COPY DATA

1. Select the data to be copied.
2. Click on the **Copy icon.**
3. Click on the cell or select the range where data has to be copied to.
4. Click on the **Paste icon.**

TO MOVE DATA

Data in any cell or range of cells can be moved to another cell / range of cells.

1. Select the data to be moved.
2. Click on the **Cut icon**. 
3. Click on the cell or select the range where data has to be copied to.
4. Click on the **Paste icon**. 

NOTE: *Formulas and functions can also be copied from one cell to another cell or to a range of cells by using the same procedure as described above. Keep the following in mind:*

REFERENCES

A reference identifies a cell or group of cells in a spreadsheet. There are two basic types of references in Excel i.e. *relative references* and *absolute references*. If you want to refer to cells relative to a cell containing a formula / function, then a relative reference should be used. If you want to refer to a cell by its exact location, then an absolute reference should be used.

- To indicate a *relative reference* type the formula / function as usual i.e. +A1 + A2 or =SUM(A1:A10)

- To indicate an *absolute reference*, type a $-sign in front of the cells that should not be changed when copied i.e. +$A$1 + A2 or =SUM($A$1:$A$10). The $-sign indicates that the reference to the cell is absolute. The result will be that when the formula / function is copied to other cells, the cell address $A$1 will not be changed but will be repeated exactly in the new position.

Summary: *When you copy a relative cell address, the cell address in the copied formula / function will change accordingly. When you copy an absolute cell address, the cell address in the copied formula /function will stay the same.*

Example:

	A	B	C	D	E	F
1			Yearmark	Gr 12	2000	
2						
3	NAME	CLASS	MARCH	JUNE	SEPT	YEARMARK
4						
5	Smith K	A	70	80	70	73.33
6	Naidoo R	B	60	65	70	65.00
7	Clamini W	A	55	75	70	66.67
8						

Assume the following function is typed into cell C6 **=sum(C3:C5)** and it is copied to cell D6 then it will be changed to **=sum(D3:D5)**. The reason is that the cell references are relative.

If the function were typed as **=sum($C$3:$C$5)** and then copied to cell D, it will remain to be displayed as **=sum($C$3:$C$5)** because the cell references were typed as absolute references.

TUTORIAL E3.2

	A	B	C	D
1	MY BUDGET 2000			
2				
3	**EXPENSE**	**INCOME**	**JAN**	**FEB**
4		R2000-00		
5	Car		R600-00	R600-00
6	House		R600-00	R600-00
7	Petrol		R100-00	R150-00
8	Food		R300-00	R250-00
9	Clothes		R50-00	R150-00
10				
11	Total		Rxxxx-xx	Rxxxx-xx
12	Difference		Rxxxx-xx	Rxxxx-xx

1. Work with the file BUDGET4 that was created in TUTORIAL E3.1.
2. Enter the new data, as shown above, in column D.
3. Copy the function that was used in C11 to cell D11. (Note how the cell references change when the formula is copied.)
4. Type the text "Difference" in Cell A12.
5. Use a formula and absolute referencing in cell C12 to determine the difference between the Income given in cell B4 and the total Expenses given in cell 11.
6. Copy the formula from cell C12 to cell D12. (Note how the absolute cell references stay the same when the formula is copied.)
7. Save the file as BUDGET5.
8. Print the spreadsheet.

CHAPTER E4

OUTCOMES OF THIS CHAPTER ARE TO BE ABLE TO:

- Sort data in a workbook into either ascending or descending order
- Create different types of charts in Excel

SORTING DATA IN EXCEL

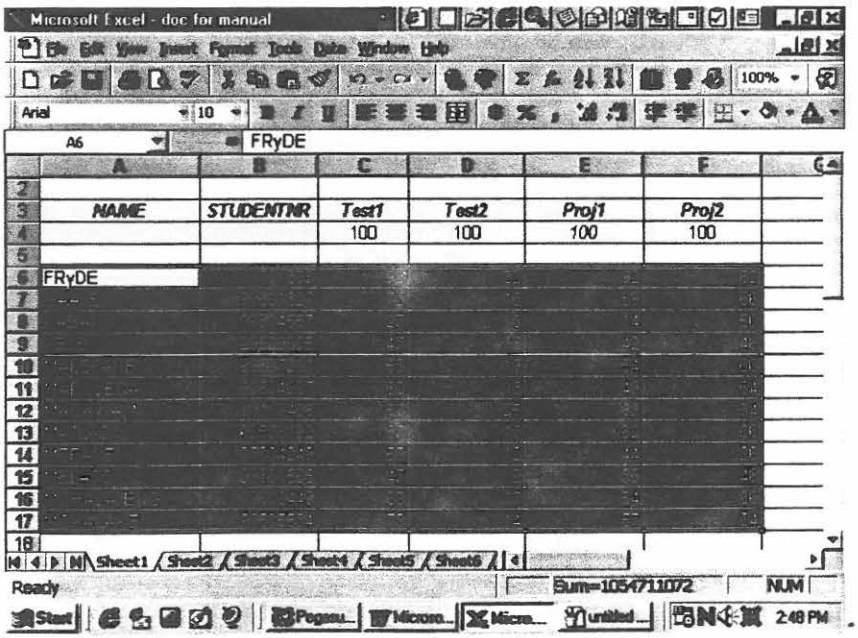
INTRODUCTION

Sorting data in a specific order has many uses. Data can be sorted into ascending (from the smallest to the highest) or descending (from the highest to the smallest) order and according to any specified column. When sorting data in a workbook the following should be kept in mind:

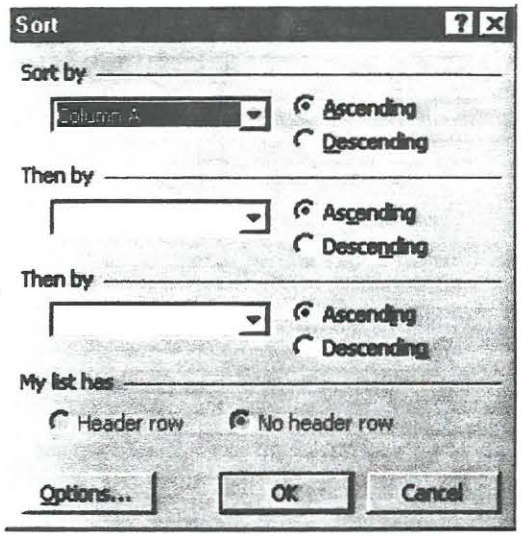
- all numeric values come after text values and are sorted in order to magnitude
- numbers entered as text are sorted character by character and therefore '12' will come before '3'
- where two characters are the same, lower case letters will be sorted before capitals.

TO SORT DATA IN A WORKBOOK

1. Highlight / select ONLY the block of data that should be sorted. Note that usually column labels are not included but all columns that should form part of the sorting process must be selected.



2. Click on the **Data menu**.
3. Click on **Sort**. The following screen appears:



4. Indicate which column should be sorted by in the **Sort by box**. The user can choose to sort by any column which contains values i.e. column A, B, C, D, etc.
5. If necessary more than one column can be indicted to sort by. To do this, click on the two boxes **Then by** and specify the columns.
6. Next to each box the user can specify whether the content should be sorted in **Ascending** (from low to high) or **Descending** (from high to low) order.
7. If the selected area includes a row of labels (headers), click on **Header row**. If only the data that has to be sorted is selected, click on **No header row**.
8. Click on **OK** and the data will be sorted.

TUTORIAL E4.1

	A	B	C	D
1	MY BUDGET 2000			
2				
3	**EXPENSE**	**INCOME**	**JAN**	**FEB**
4		R2000-00		
5	Car		R600-00	R600-00
6	House		R600-00	R600-00
7	Petrol		R100-00	R150-00
8	Food		R300-00	R250-00
9	Clothes		R50-00	R150-00
10				
11	Total		Rxxxx-xx	Rxxxx-xx
12	Difference		Rxxxx-xx	Rxxxx-xx

1. Open the file BUDGET5 that was created in TUTORIAL E3.2.
2. Sort the data in the spreadsheet in descending order of column C.
3. Print the spreadsheet.
4. Sort the data in descending order of column D.
5. Print the spreadsheet.
6. Save the file as BUDGET6.

CREATING CHARTS IN EXCEL

INTRODUCTION

In EXCEL (as in most spreadsheet packages), a chart may be defined as a graphic representation of spreadsheet data. When you create a chart, Excel plots the chart shape based upon the data contained within the range of selected cells, as well as the type of data in the rows and columns.

You can create a chart to be displayed directly on a spreadsheet and save it as part of the spreadsheet. This is called an *embedded chart*. Alternatively, you can create a separate chart sheet. In this case the worksheet and the chart are kept separate.

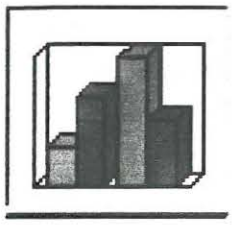
CHART TYPES

The user can create different types of charts. The best chart to choose, will depend on the data that has to be represented. The following table is a summary of the most commonly used chart types:

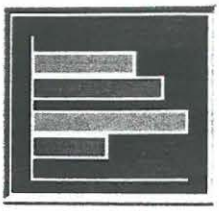
Chart type	Purpose
Pie	This chart can be used to show the relationship amongst parts of a whole.
Bar	This chart is used to compare values at a given point in time.
Column	This chart is used to emphasise the difference between items.
Line	This chart is used to emphasise trends and values over time.

EXAMPLES OF CHARTS

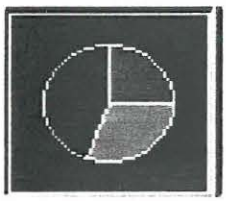
Column Chart



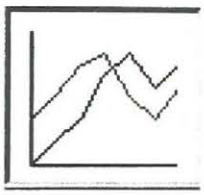
Bar Chart



Pie Chart



Line Chart



TERMINOLOGY USED WITH CHARTS

TERM	EXPLANATION
Data series	The cell references to values that are represented as bars, pie wedges, lines or other plotted values in charts.
Categories	Categories reflect the number of elements in a series. Categories usually respond to the columns in the spreadsheet.
Axis	The axis is one side of the spreadsheet. A two-dimensional chart has an X-axis (horizontal) and a Y-axis (vertical). The X-axis contains all the data series and categories in the chart. The Y-axis gives an indication of the values of the bars, lines or plotted points.
Gridlines	Gridlines emphasise the Y-axis or the X-axis scale of the data series.
Legend	The legend gives a definition of each series of a chart.

CREATING A CHART

When data is entered into a well organised worksheet, the user is ready to create a chart. The following example creates a bar chart. The steps given will guide you in creating a chart.

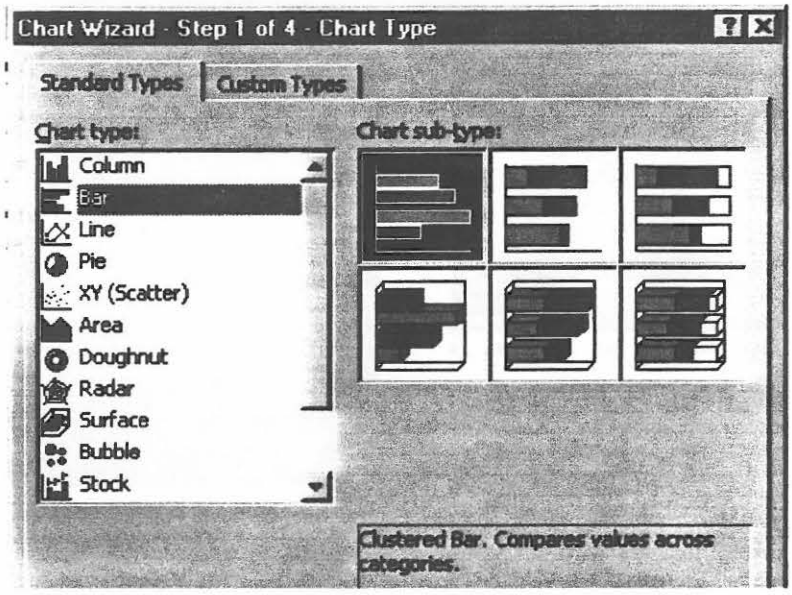
1. Create the following workbook:

Budget			
Description	***Jan***	***Feb***	***March***
Clothing	100	150	200
Food	20	250	200
Travelling	50	70	30

2. Select the data that will be displayed on the chart.

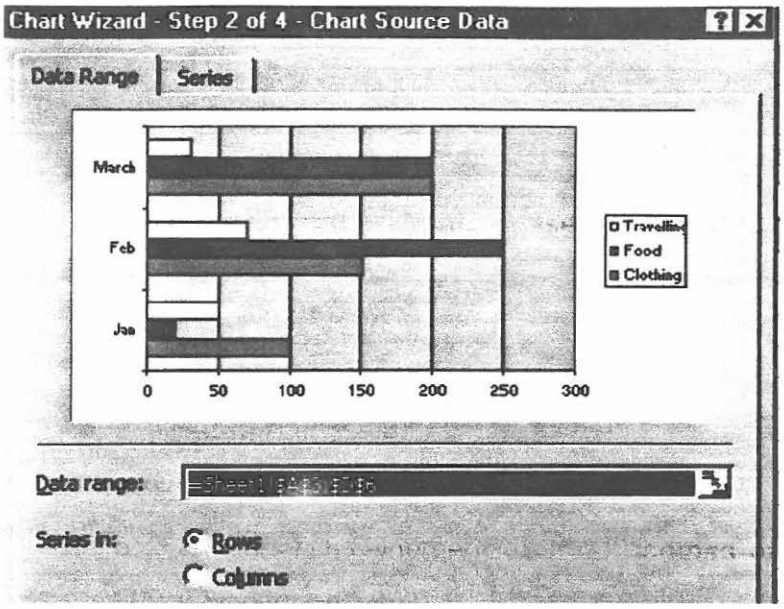
Budget			
Description	***Jan***	***Feb***	***March***
Clothing	100	150	200
Food	20	250	200
Travelling	50	70	30

3. Click on the **Insert menu.**
4. Click on **Chart.** The following dialog box appears:

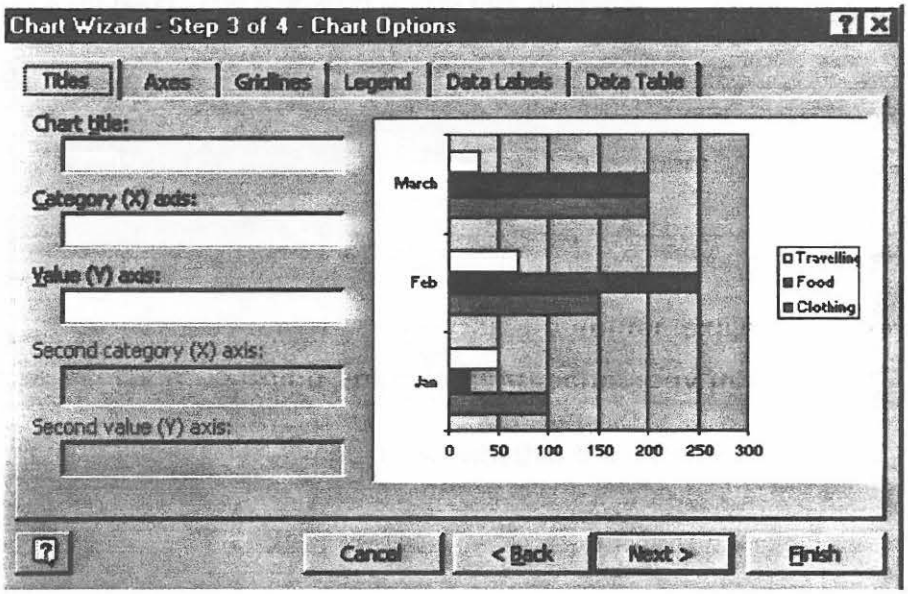


5. Select the type of chart that has to be created. In the example we want to select **Bar.** A number of different bar-chart options are given on the right hand side of the screen. Select the one you prefer.

6. Click on the **Next button.** The following dialog box appears:



7. Make sure the data range is correct. If necessary, type the correct range in the required box. Click **Next.** The following dialog box appears:

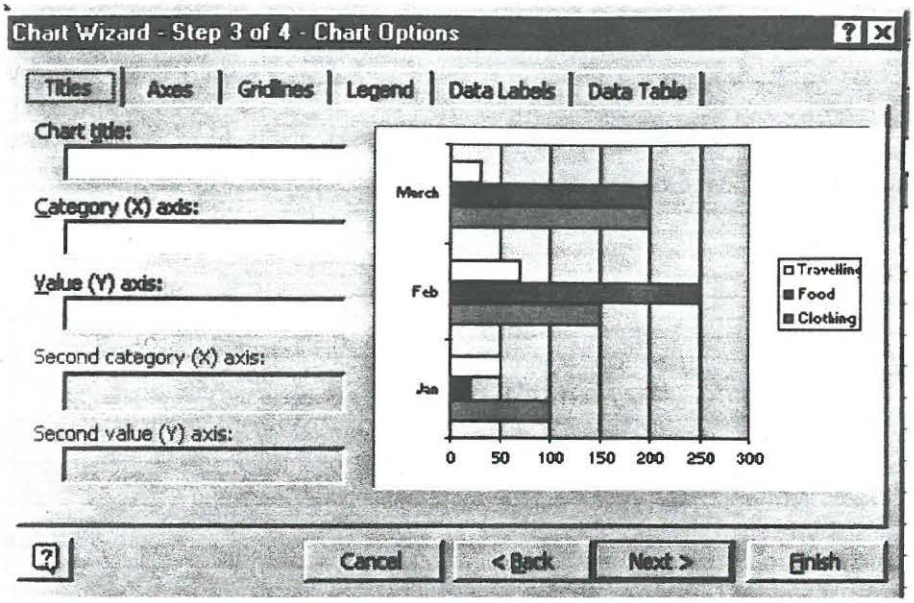


8. Type in the title **Budget** in the **Chart title box**.

9. Type in a description for the **Category (X)-axis** i.e. in this case the description is **Rand.**

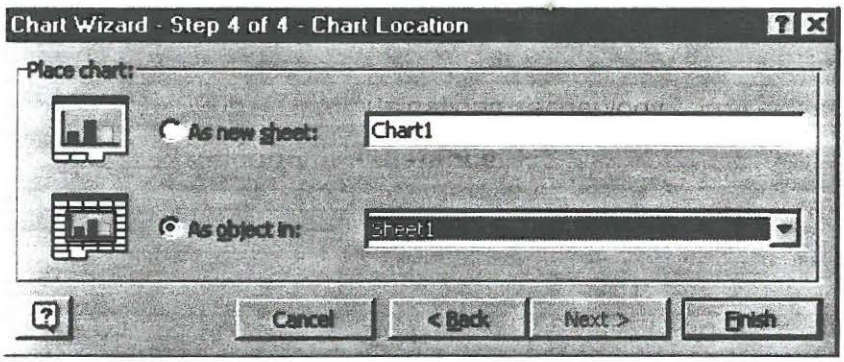
10. Type in a description for the **Category (Y)-axis** i.e. in this case the description is **Month.**

11. Click on **Legend.** The following dialog box appears:



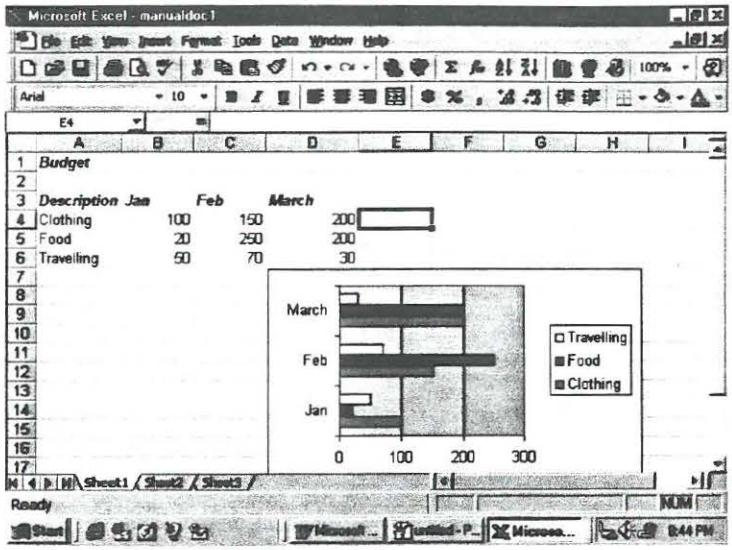
12. Select the position of the legends in the **Placement option**. If you do not want the legend to be displayed, click on the option **Show legend** to remove the check mark in the box.

13. Click on **Next.** The following dialog box appears:



14. In this dialog box, you can choose whether the chart should be displayed **As a new sheet** or **As object in** a specific sheet. In the case of the example, click on **As object in Sheet 1.**
15. Click on **Finish.** The chart will be displayed in the workbook.

16. The chart can now be customised by manipulating it as an object i.e. it can be enlarged, moved to different positions in the sheet, etc.



TO SAVE A CHART

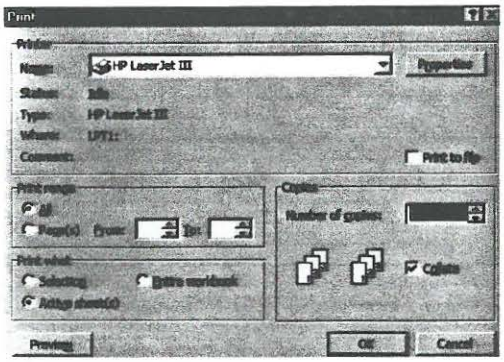
1. Click on the **File menu.**
2. Click on **Save.** The chart will be saved in the workbook.

TO PRINT AN EMBEDDED CHART

1. Click on the **File menu.**
2. Click on **Print.**

TO PRINT A SEPARATE CHART

1. Select the **Chart sheet** where the chart is displayed.
2. Click on **Print.**



3. Select **Active sheet(s).**
4. Click on **OK.**

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