

**INTEGRATING METHODOLOGIES TO DEVELOP A BLENDED
LEARNING COMPUTER LITERACY PROGRAMME FOR SOUTH
AFRICAN STUDENTS**

by

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DECLARATION

I, the undersigned, declare that:

INTEGRATING METHODOLOGIES TO DEVELOP A BLENDED LEARNING COMPUTER LITERACY PROGRAMME 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 thesis was not previously submitted by me for a degree at any other university.

.....

Marita Oosthuizen

(November 2004)

"O diepte van die rykdom en wysheid en kennis van God! Hoe ondeurgrondelik is sy oordele, hoe onnaspeurlik sy weë! Uit Hom en deur Hom en tot Hom is alle dinge. Aan Hom behoort die heerlikheid tot in ewigheid!

Amen.

(Rom. 11:33,36)

A word of thanks to all the lecturers and students who participated in this research project.

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ABSTRACT

For some years, proponents of distance and online learning have touted the efficacy of their methods, while traditionalists have argued the superiority of face-to-face learning environments. Each side in this debate has pointed to strengths in their own methodologies, while criticising the lack of comparable features in the methodologies of their opponents. Blended learning, as the name implies, allows practitioners to combine traditional education with a variety of instructional technologies – solving the argument by joining forces, and creating a better overall product as a result. With this study the researcher aims to explain the concepts of blended learning and discuss the factors that make each form of educational delivery successful. The thesis addresses the necessary components of a computer literacy programme and Outcomes-Based Education, as well as elaborate on good teaching principles. These strands of research are then combined into the foundations for a unique programme, to deliver a computer literacy course using blended learning techniques to South African students. The programme was developed, implemented and tested through three cycles of action research.

Keywords: *Blended learning, computer literacy, computer-assisted learning, e-learning, online learning, instructional technologies, web-based instruction.*

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CHAPTER ONE

INTRODUCTORY ORIENTATION

1.1 INTRODUCTION

“Blended learning can be described as a learning programme where more than one delivery mode is being used with the objective of optimising the learning outcome” (Singh & Reed, 2001:1). It is quite possible that even educationists at the cutting edge of their field may not recognise the term “blended learning”. As stated by Kiser (2001:Online), the term “blended learning” came to the fore only in the year 2000. It refers to the mixing and integration of different learning delivery approaches, including face-to-face classroom learning, e-learning and self-paced computer-mediated learning to create a single learning programme. Unlike earlier concepts where e-learning and face-to-face classroom learning were seen as mutually exclusive, blended learning is seen as the AND model rather than the OR model. It is about using the best of all worlds to create the most effective integrated offering. It combines the power and effectiveness of the classroom with the flexibility and any-time nature of e-learning and allows learning to be more tailored and more individual. Marsh (2001:Online) underlines the fact that blended learning, which combines e-learning tools with traditional classroom training to ensure maximum effectiveness, is one of the leading trends in training today.

1.2 STATEMENT OF THE PROBLEM

“Computers” is the buzzword of the 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. It has become so

strategically essential, 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).

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. Furthermore, many higher education institutions in South Africa have made it compulsory for all students to complete a basic computer literacy course. This leads to the fact that training institutions are inundated with large numbers of students who need to be trained in computer literacy. Computer literacy entails practical training that necessitates the forming of groups. The number of groups is determined by the number of computers available in the computer laboratories, e.g. if 2000 students are enrolled and there are 50 computers in the lab, there will be 40 practical groups. This places a heavy burden on lecturing staff. By combining face-to-face lecturing with the use of self-paced e-learning methods, it is envisaged that large numbers of students can be accommodated more effectively.

Countries like the United States of America, Britain and Australia are currently presenting computer literacy courses where e-learning techniques are combined with face-to-face classes (Spear, 1999:3). However, because of the fact that South Africa is on the disadvantaged side of the digital divide, it is not possible to copy such courses and present them in the same format in South Africa. Digital divide is the term used to describe the technology gulf that separates the computer-literate rich from the world's poor masses (Hofstetter, 1998:6). There is a need to develop courses that, on the one hand comply with global standards, and on the other hand suit the needs of the particular circumstances of South African students and meet the requirements of the South African outcomes-based education (OBE) approach.

Taking the above-mentioned factors into consideration, the questions to be answered in this study are:

- ☞ What is the role of blended learning in education?
- ☞ What influence do the principles of good practise and OBE have on developing a blended learning, computer literacy programme?
- ☞ What factors should be taken into account in developing a blended learning computer literacy programme for South African students?
- ☞ Can a blended learning computer literacy programme be effectively implemented for South African students?

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

1.3 AIM OF THE RESEARCH

The researcher's primary aim with this study is to establish the factors that should be taken into consideration in developing a blended learning computer literacy programme for South African students and to develop such a programme to ensure that effective teaching and learning can take place.

In order to accomplish this aim, the following objectives should be realised by this study:

- ☞ to establish the role of blended learning in education by researching the different methodologies that can be used in presenting blended learning programmes;
- ☞ to determine how the principles of good practice and OBE influence the development of a blended learning computer literacy programme, by researching the core elements of good practice, OBE and computer literacy;

- ☞ to investigate the most appropriate way to go about developing a blended learning computer literacy programme in the South African context, and
- ☞ to establish how a blended learning computer literacy programme can be implemented to enable more productive computer training; implement such a programme and evaluate the outcomes of the programme.

1.4 PRELIMINARY LITERATURE REVIEW

Computer literacy 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, spreadsheet, 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 computer literacy programme would thus have to include teaching people to use at least one or two of these important tools. Furthermore, people from all walks of life are using the Internet on a daily basis (Hofstetter, 1998:5). The Hobbes’ Internet Time Line gives startling information as to how the number of Internet users has grown during the past few years. The number of Internet hosts, which each has a number of Internet users, grew from 313 000 in October 1990 to 171 638 297 in January 2003 (Hobbes, 2004:Online). Taking this into consideration, it could therefore be deduced that people taking a computer literacy course, should also learn to use the Internet and the various kinds of possible uses it offers.

With the policy of the South African government (Department of Education, 1997:2) to implement outcomes-based education (OBE) as the methodology of teaching in South African schools in 1998, it has become necessary for higher education institutions to redevelop courses to comply with the principles of the OBE methodology. An outcome can be seen as the result of the learning process

and refers to what the learner knows and can do (Isaacman, 1996:4). A computer literacy programme for South African students would thus have to lead students to *know how* and *be able to use* a microcomputer to increase their productivity and effectiveness. The proposed programme indicates a practical approach rather than merely learning about the technical aspects related to computers.

The envisaged programme resulting from this study will be based on the fundamentals of the methodology of blended learning. As indicated in the introductory paragraph, blended learning is a learning solution, which includes face-to-face, live e-learning and self-paced learning (Valiathan, 2001:1). Blended learning means different things to different people, and can variously be defined as (Strategic Visions International, 2002:Online):

- ☞ combining modes of web-based technology to accomplish an educational goal;
- ☞ combining various pedagogical approaches (e.g. constructivism, behaviorism, cognitivism) to produce a learning outcome with or without technology, or
- ☞ combining instructional technology with actual job tasks to create a synergy between learning and working.

The primary learning delivery methods of a blended learning solution are:

- ☞ *Face-to-face classroom training*, i.e. instructor-led training in the classroom. This setting is best for hands-on access to equipment, complex curricula, and high interactivity needs.
- ☞ *Synchronous e-learning*, i.e. virtual classroom e-learning that delivers live instructor-led training. This setting leverages the best instructional elements of the classroom while taking advantage of technology benefits. Students and instructors can collaborate on content, participate in coaching or mentoring, access software and hardware remotely, and save the time and costs of travelling.

☞ *Asynchronous e-learning*, i.e. self-paced e-learning, either accessing study material from the Internet, or from a CD. This is a quick and cost-effective method, and good for providing introductory, prerequisite learning, and refresher courses.

According to Reay (2001:1), blended learning has become all-pervasive in the training industry. Rather than creating an artificial divide between e-learning and the more traditional approaches, many institutions are attempting to find the best mix of both to provide the most effective learning solution. However, successful implementation requires:

- ☞ an understanding of the strengths of the respective delivery media;
- ☞ recognition of how learners approach and use information directed through each medium;
- ☞ an awareness of available knowledge resources, and
- ☞ how resources can best be leveraged through online and traditional teaching methods.

1.5 RESEARCH DESIGN AND METHODOLOGY

1.5.1 The design

The qualitative method of research, and in particular the participatory action research component thereof, is to be implemented in this study. Qualitative research enables the researcher to examine people's words and actions and report in narrative and descriptive ways - more closely representing the situation as experienced by the participants (Maykut & Morehouse, 1995:2). Hummelvoll and da Silva (1998:465), as well as McMillan and Schumacher (1997:372-373), state that qualitative researchers accumulate data by interacting with selected

individuals in their settings (field research) and by acquiring documents relevant to the study.

McNiff (2002:15) asserts that participatory action research is used to improve practice rather than to produce knowledge. 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 used by instructors in graduate studies programmes. As the focus of this study is to develop an efficient computer literacy programme for undergraduate students, it is deemed appropriate to implement action research in this research study.

In addition to qualitative research, the researcher will employ quantitative research strategies in the study. Quantitative research deals with quantifying relationships between variables (Hopkins, 2000:Online). Quantitative studies can either be descriptive or experimental. In a descriptive study, no attempt is made to change behaviour or conditions - things are measured as they are. There are countless texts that distinguish between quantitative and qualitative research and demonstrate a loyalty to the one or the other (Pring, 2000:1). Pring (2000:2) states that, although the two methodologies are often seen in opposition, an either/or position is misleading and the two methodologies should rather be used simultaneously to supplement each other's weaknesses and strengths. Quantitative research will form a small part of this study, but is deemed necessary to build a profile of the students with regards to factors like, for instance, the access students have to computers outside the university campus and the experience of working on computers before enrolling for the envisaged course.

1.5.2 Data collection and analysis

Silverman (2000:90) asserts that qualitative research can be performed by observations, accumulating texts and documents, interviewing people or making audio and video recordings of naturally occurring interactions. During this study relevant texts and documents will be accumulated and semi-structured interviews will be conducted. Through qualitative interviews researchers can understand experiences and reconstruct events in which they did not previously participate (Rubin & Rubin, 1995:1). The quantitative data will be collected by requesting participants to complete questionnaires.

The participants to the research study will be selected by using the method of purposeful 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.*”

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), Lippert and Radke (1946), Elliot (1978), Ebbutt (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. Schmuck (1997:50) and Sagor (1992:23) suggest that 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 conducted in a number of cyclic phases.

Data will be collected by implementing the following research techniques:

- ☞ A thorough literature study of the aspects and concepts imbedded in developing a blended learning programme will be undertaken.
- ☞ Quantitative data will be collected by requesting students to fill in questionnaires. A profile of students’ accessibility to computers will be formed by presenting the numerical data in the form of pie charts.
- ☞ The programme will then be developed and implemented at one site for a six month period.
- ☞ While the programme is running for the first time, data will be collected by means of questionnaires, semi-structured focus group interviews and observations.
- ☞ After the initial implementation, the programme will be revised according to the results from analysing the data.
- ☞ The revised programme will be implemented at a number of different sites and a further cycle of data collection will be undertaken, using the questionnaires, semi-structured interviews and observations.
- ☞ After analysing the data, the programme will be changed accordingly and the result of this study, the final blended learning programme, will be produced.

According to Maykut and Morehouse (1995:126), one of the defining characteristics of qualitative research is the inductive approach to data analysis, where data is collected that relate to a focus of inquiry instead of a hypothesis being generated. The constant comparative method is one way to conduct an inductive analysis of qualitative data and this is the method that will be used to analyse the data collected in this study.

In addition to the above-mentioned methods used for collecting data, the following methods, specifically used in action research, will also be employed (McKernan, 1996:81-91):

- ☞ The researcher will keep a journal to record events.
- ☞ 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 manual that will be developed, the media or technology that will be used and the implementation strategies that will be followed.
- ☞ The researcher will use a checklist, that is a set of questions one answers oneself, to evaluate the process of implementation.
- ☞ Document analysis will be done involving all documentation relevant to the programme, e.g. the study guide, curriculum, tests, examination papers, examination results and student assignments.

The trustworthiness of the research will be ensured by using multiple methods of data collection, as well as building an audit trail (Maykut & Morehouse, 1995:146).

1.6 DELIMITATION OF THE STUDY

The study will be performed in the field of Didactics. Both qualitative and quantitative methods of research will be used to accumulate data to be able to integrate teaching methodologies in developing a blended learning computer literacy programme for South African students. This programme will be implemented at the Welkom campus of Vista University during the first semester of 2003. The programme will be evaluated through action research and then changed according to the results of the data analysis. The changed programme will be implemented at the other campuses of Vista University, i.e. Bloemfontein, Port Elizabeth, Mamelodi, Soweto and East Rand during the second semester of 2003. During this phase, July – November 2003, data will again be collected. This data will be analysed in December 2003 and the programme will be changed once more. The final programme will then be produced to be implemented in 2004.

1.7 LIMITATIONS OF THE STUDY

Modern technology, e.g. videoconferencing facilities and up-to-date computers with high-speed Internet connectivity is not freely available amongst the developing communities of South Africa. This factor could limit the design of the envisaged programme.

Vista University, a multi-campus institution, is set to unbundle and merge with a number of other Higher Education institutions at the beginning of 2004. This may mean that the programme will not necessarily continue to run on all campuses from the year 2004 onwards. The researcher, however, believes that this research will result in such an excellent programme that merger partners could be convinced to continue using the blended learning programme.

1.8 PROGRAMME OF THE STUDY

Chapter One: Introductory orientation

In Chapter One, the researcher gives a statement of the research problem, and outlines the aims of the study. A brief literature overview provides definitions for the key concepts *computer literacy*, *outcomes-based education* and *blended learning*. The methods of the research are outlined, indicating the research methodologies, the design and the data collection and analysis procedures to be used.

Chapter Two: Blended learning

Chapter Two provides an in-depth literature study of concepts related to the blended learning methodology. It investigates different elements that can be used in a blended learning programme looking at both the advantages and disadvantages of each of these elements. Furthermore, the chapter provides sound instructional design principles that can be followed to develop an effective blended learning programme.

Chapter Three: Blending principles of good practice, computer literacy and outcomes-based education

In Chapter Three the researcher reviews literature related to principles of computer literacy, outcomes-based education and good teaching methods. The aim of this review is to establish a sound pedagogical framework for developing the envisaged programme.

Chapter Four: Research methodology, data collection and analysis

Chapter Four gives a detailed account of the research methods implemented in this study. It explains how the cycles of action research are applied, how data is collected and analysed and gives the final conclusions and recommendations of the research.

Chapter Five: An outcomes-based computer literacy programme for South African students presented by the methodology of blended learning.

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

1.9 CONCLUDING REMARKS

For some years, proponents of distance and online learning have touted the efficacy of their methods, while traditionalists have argued the superiority of face-to-face learning environments. Each side in this debate has pointed to strengths in their own methodologies, while criticising the lack of comparable features in the methodologies of their opponents. Blended learning, as the name implies, allows practitioners to combine traditional education with a variety of instructional technologies – solving the argument by joining forces, and creating a better overall product as a result. With this study the researcher aims to explain the concepts of blended learning and discuss the factors that make each form of educational delivery successful. The thesis will address the necessary components of a computer literacy programme and OBE, as well as elaborate on good teaching principles. The aim is to combine these strands of research into the foundations for a unique programme, to deliver a computer literacy course using blended learning techniques to South Africa students. The programme will be developed, implemented and tested through three cycles of action research.

CHAPTER TWO

BLENDED LEARNING

2.1 DEFINITION OF BLENDED LEARNING

Literature reveals a number of different definitions for blended learning. The most widely used definition of blended learning, is that it is the integrated combination of traditional, face-to-face methods of learning with web-based, online approaches (Harrison, 2002:Online).

However, Driscoll (2002:Online) found in her research that the term can actually refer to any of the following scenarios:

- ☞ to combine or mix modes of web-based technology (e.g., live virtual classroom, self-paced instruction, collaborative learning, streaming video, audio, and text) to accomplish an educational goal;
- ☞ to combine various pedagogical approaches (e.g., constructivism, behaviourism, cognitivism) to produce an optimal learning outcome with or without instructional technology;
- ☞ to combine any form of instructional technology (e.g., videotape, CD-ROM, web-based training, film) with face-to-face instructor-led training and
- ☞ to mix or combine instructional technology with actual job tasks in order to create a harmonious effect of learning and working.

Labrow (2002:Online) asserts that blended learning is simply the mixing of more than one type of learning within a single learning programme, and according to Smith (2001:Online), it is a new surge combining the synergy of consulting services and content via several deliveries including web-based, self-paced and instructor-led classes. The focus is on improved performance of both students and educators.

According to Masie (2002:137), blended learning is the use of two or more distinct methods of training. This may include combinations such as:

- ☞ blending classroom instruction with on-line instruction;
- ☞ blending on-line instruction with access to an instructor;
- ☞ blending simulations with structured courses and
- ☞ blending managerial coaching with e-learning activities.

The fact that blended learning means different things to different people may appear to be a problem, but in reality these definitions illustrate the untapped potential of this methodology.

The following section looks at reasons why blended learning has become such a popular trend in education.

2.2 WHY SELECT BLENDED LEARNING?

According to Reay (2001:6), blended learning has become all pervasive in the training industry. Rather than create an artificial divide between e-learning and more traditional approaches, many organisations are attempting to find the best mix of both to provide the most effective learning solution. It should be noted that e-learning is often seen as the equivalent of on-line distance learning. However, in this study the researcher prefers to use the broader definition of e-learning, i.e. that it is anything delivered, enabled, or mediated by electronic technology for the explicit purpose of learning (Hicks, 2000:75).

Ward and LaBranche (2003:22) assert that blended learning is often referred to as the best of both worlds where learning events take place by combining aspects of face-to-face instruction and e-learning. It is seen as a powerful strategy that expands and enhances the learning experience.

McC Campbell (2001:71) identifies some of the strengths of e-learning:

- ☞ The use of varied e-learning methods results in highly engaging programmes.
- ☞ Huge cost savings come from students not needing to leave their work, or homes and travel long distances.
- ☞ Students progress at their own pace and do not hold back others or become bored by a slower pace. Students can repeat parts of a programme that are not clear to them.
- ☞ Students can complete learning at times that work best for their schedules.
- ☞ Many students learn more effectively on their own rather than in groups.
- ☞ E-learning seems especially appropriate for transfer of information and cognitive understanding.
- ☞ Complex performance skills can be learned efficiently with technology-enhanced learning such as flight simulators.
- ☞ Highly efficient e-learning programmes can be developed by following the principles of good instructional design.

According to McC Campbell (2001:71), centuries of experience have shown the power of students coming together for face-to-face lectures. The following are some of the strengths of face-to-face learning:

- ☞ The enthusiasm of the facilitator for the content is contagious and encourages learning.
- ☞ Students prefer to learn in a social situation.
- ☞ There is accountability in a classroom that is missing in e-learning.
- ☞ Learning occurs casually and indirectly when individuals interact.
- ☞ Instructor-led sessions remove students from their daily work responsibilities, so participants can focus on learning. There is no such protection when using e-learning methods.

- ☞ The questions and comments of students help raise and address important issues, and make it comfortable for others to talk.
- ☞ The pattern of learning in a group environment is established in almost every educational institution and connects with past learning experiences.
- ☞ The facilitator speeds up the process of knowledge acquisition.
- ☞ Classroom experiences provide opportunities for students to practise and rehearse skills and to receive feedback from others.

Bersin (2003:Online) states that e-learning became a craze in the late 1990's - every training institution started an initiative, purchasing training software, and putting courses and instructors on the web. However, now that the first few millions have been spent, important questions need to be asked:

- ☞ What results are achieved from the e-learning programmes?
- ☞ How can results of all the training be correlated and measured?
- ☞ Which of the investments is giving the highest return?
- ☞ Should investment in e-learning be increased or decreased?

The unfortunate truth is that many e-learning programmes do fail, often as a result of under-estimating the complexity of the development, rollout, or measurements needed. In many instances the emphasis is on the "e" of e-learning instead of focusing on the learning part thereof. Reay (2001:6) re-enforces this idea by stating that e-learning brings advantages and new opportunities to the learning situation. However, its limitations, particularly in presentation and delivery, affect the content and design of material and the effectiveness of the learning process. For many learning needs there is nothing that surpasses real-time presentation to an audience or face-to-face tuition. This fact results in the growing trend to integrate e-learning into conventional learning, creating blended learning programmes.

Harris (2002:Online) stresses that the need for blending is simple: students are very different, and if training solutions should be developed that will work for many students, then the differences must be acknowledged,

accommodated and catered for, by ensuring the maximum range and variety of learning opportunities. Some students like to work on their own, without any direction at all. Others also like to learn on their own, but in a structured and directed environment. Still others prefer socialized learning which entails working through concepts and formal principles by experimentation in a primarily social context, and others like to reflect privately on material, whether presented on the electronic or traditional page.

The world-class Thomson Job Impact Study (Harris, 2002:Online), the first of its kind to measure the effectiveness of blended learning against single training options, developed a study in collaboration with leading corporate organizations and academic institutions including Lockheed-Martin; Utah State University; University of Limerick, Ireland; Anoka-Ramsey Community College, Minnesota; Executive Service Corps of Chicago; and KnowledgePool.

The first phase of the study, released in 2002, aimed to determine if there were significant differences in the accuracy and time it took students to perform real-world tasks after using blended learning training approaches, e-learning training programmes or no training at all. Results from this phase revealed that a structured curriculum of blended learning generated a thirty percent increase in accuracy of performance and a forty one percent increase in speed of performance over single-delivery options. Lead researcher Stacey Boyle (Harris, 2002:Online) says the biggest surprise was the fact that the students who were exposed to the blended curriculum were able to save so much time performing the tasks. *"What it really means is that those who had the blended learning were able to work more efficiently," and that "They had the resources available to them, and the instruction was structured better for them to be successful at the real-world task at the end."*

Boyle and her team also identified five core features as contributing to the success of the blended learning model used in the study, namely:

☞ access to live mentors during the online portion of the training;

- ☞ assessments designed to mime real-world tasks;
- ☞ early use of the software being taught;
- ☞ integration of learning objects with realistic scenarios and
- ☞ use of scenario-based exercises to teach the software application.

The second phase of the study sought to identify the essential instructional components of a successful blended learning solution. The researchers studied five separate groups of students to compare e-learning with three different types of blended learning solutions: instructor-led training, text-based programmes and scenario-based exercises.

- ☞ The instructor-led training group received blended learning driven by scenario-based exercises within the context of an instructor-led course.
- ☞ The text blend group received scenario-based exercises that included access to text objects.
- ☞ The scenario-based exercise group received scenario-based exercises that included access to NETg Learning Objects (NLOs).
- ☞ The e-learning group received a standard e-learning course.
- ☞ The control group was established to benchmark performance and did not receive any training.

All of the groups completed a post-assessment and three real-world tasks.

As in phase one of the study, the new results also confirm that a defined blended learning solution heightens overall on-the-job performance achieved by e-learning alone and that either blended or single-delivery models are more effective than no training at all. When compared with the e-learning group, the blended learning groups were twenty seven to thirty two percent more accurate in task performance and performed the tasks forty one to fifty one percent faster.

The following remarks by Ward and LaBranche (2003:23) summarise why blended learning is fast becoming the most popular teaching methodology: *“Like something that is greater than the sum of its parts, blended learning offers the potential to offer a better learning experience and greater value. Blended learning is a student-centered strategy. Students have more options, more time and more freedom to explore learning. It extends learning before or after the physical learning experience, and enhances learning by taking the student outside of the traditional classroom to take advantage of the power and depth of the Internet and other e-learning opportunities.”*

As indicated in the previous paragraph, blended learning solutions can enhance learning programmes. However, the promise of effectiveness and value that blended learning brings to the table depends upon thorough evaluation of the many delivery options available and a well thought out strategy for integration and implementation (Strategic Visions International, 2002:Online).

2.3 WHAT IS THE RIGHT BLEND?

In blended learning, it is not the mixing and matching of different learning delivery modes by itself that is of significance, but the focus on the learning outcome (Singh & Reed, 2001:1). They therefore propose a refined definition for blended learning by stating that it focuses on optimising achievement of learning objectives by applying the “right” learning technologies to match the “right” personal learning style to transfer the “right” skills to the “right” person at the “right” time.

The following principles are embedded in this definition:

- ☞ focus is placed on the learning objective rather than the method of delivery;
- ☞ many different personal learning styles need to be supported to reach broad audiences;

- ☞ each student and instructor brings different knowledge into the learning experience and
- ☞ in many cases, the most effective learning strategy is “just-what-I-need, just-in-time”.

According to Valiathan (2002:1), there is no single formula that guarantees effective learning, but there are some guidelines which categorise blended learning into three models:

- ☞ skill-driven learning, which combines self-paced learning with instructor or facilitator support to develop specific knowledge and skills;
- ☞ attitude-driven learning, which mixes various events and delivery media to develop specific behaviours and
- ☞ competency-driven learning, which blends performance support tools with knowledge management resources and mentoring to develop workplace competencies.

Reay (2001:6) asserts that blended learning is not just about adding online materials to a conventional training catalogue. Blended learning must be relevant, and demand a holistic strategy leveraging the best characteristics of all learning interventions, as well as considering the mix of mediums, e.g. how a blend of synchronous, instructor-facilitated and asynchronous, self-directed, self-paced approaches can best be combined to meet student needs. An effective blended approach will find the strengths and supporting competencies of traditional classroom training, presentations, stand-alone interactive online training and asynchronous and synchronous Web-based training. Successful implementation requires an understanding of the strengths of the respective mediums, recognition of how students approach and use information directed through each medium and an awareness of available knowledge resources and how they can be best leveraged through online and traditional teaching methods.

In this study the researcher investigates the strengths and weaknesses of the different mediums that can be used in a blended learning approach (*cf.* 2.4). In a further quest to find the right blend, the researcher looks at sound instructional design models (*cf.* 2.5), as well as principles of good teaching practice (*cf.* 3.4).

2.4 ELEMENTS OF BLENDED LEARNING

The following sections look at the advantages and disadvantages of different types of elements that could be selected to form part of a blended learning programme.

2.4.1 Printed material

Print is the foundation of any form of educational delivery. While the technological developments have added to the repertoire of tools available to instructors, print continues to be a significant component of all education programmes (Wills, 2001:Online).

Hartley (1995:279) asserts that a student should receive 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.

A number of different printed materials can be used as part of educational programmes. Some examples are:

◆ Textbooks

Wills (2001:Online) claims that textbooks should be the basis and primary source of content for the majority of educational programmes. Textbooks play a critical role – specially 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**

Holmberg (1995:71) 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. He suggests 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 is 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.

◆ **Workbooks**

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:Online).

◆ **Syllabus**

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, specially in the absence of daily contact with the instructor. Sorrentino (1997:Online) adds that a syllabus should include programme goals, performance objectives, examples of student work as well as information on 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:Online).
- ☞ 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 screens 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:Online) 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 develop (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:Online).

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 takes more self-motivation from students to read a book than for instance watch a television programme. 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 losing interest (Wills, 2001:Online).
- ☞ If students do not have good reading skills, the effectiveness of printed material could be crippled (Schlebusch, 2000:60).

2.4.2 Face-to-face instruction

Traditional face-to-face instruction can also be included as an element in a blended learning programme (Singh and Reed, 2001:3). The aim of teaching is simply to make student learning possible. The instructor has a crucial and demanding role to play in the process of student learning, by creating a

context in which the students' desire and ability to learn can work most effectively.

Lectures continue to be one of the most commonly used teaching methods in education (D'Cruz, 2003:Online). Research done as far back as 1988, suggests that traditional lectures, if well planned and presented, are as effective as other methods - but not necessarily more effective - for conveying information (University of Technology, Sydney, 2002:Online). However, there is little point in simply conveying information without stimulating students' motivation to learn and giving them opportunities to develop understanding. Methods which actively involve students are more effective than lectures for encouraging them to take deep approaches, which are likely to result in developing understanding, encouraging critical thought, challenging opinions or changing conceptions. This, of course, does not mean that lectures should be abolished, but rather that lectures should be conducted in such a way that they maximise the chances of students developing understanding.

Lectures can be used to give broad contextual information, to highlight the important or interesting aspects of a topic, to demonstrate problem solving techniques, or to show the relative strengths of two sides of an academic controversy. However, they should not be used to transmit information that the students can acquire (perhaps more effectively) from reading a textbook or accessing the Internet. Lectures which are based around a set text should be used to clarify, expand, or explain the content of the text rather than merely to repeat it. It should also not be assumed that transmission by the instructor implies reception and learning by students. Felder (1992:Online) asserts that of all instructional methods, lecturing is the most common, the easiest, and the least effective. Unless the instructor is a real spellbinder, most students cannot stay focused throughout a lecture. One of Felder's studies indicates that immediately after a face-to-face lecture students recalled 70% of the information presented in the first ten minutes and only 20% of that from the last ten minutes. However, actively involving students in learning instead of simply lecturing to them leads to improved attendance, deeper questioning, higher grades, and greater lasting interest in the subject. Students learn more

effectively when lectures include activities which engage their thoughts and motivation.

The following factors should be taken into consideration when planning lectures (University of Technology, Sydney, 2002:Online):

- ☞ Students are not empty vessels into which knowledge can be poured. They try to make sense of new information in the context of their existing knowledge. Students can have pre-existing misconceptions about the subject which affect the way they interpret and try to understand new concepts. It follows that in order to encourage student understanding, the instructor needs to know about students' prior knowledge and conceptions and help them to change misconceptions. This can be done by asking students to explain concepts in their own words; to discuss and to debate the conflicts and paradoxes present in the subject; to point out links between the specific subject and others and to relate new knowledge to everyday examples. Students take an active role in their learning when they are constructing knowledge themselves.
- ☞ As novice students, students often experience subjects as a collection of topics, without being able to gain an idea of the relationships between them or how they link to related subjects. To help overcome this, instructors should give students an overview of the whole subject at the beginning, e.g. a written subject outline or diagram of the subject can be helpful. Students can then link each new session back to this overview and to previous sessions. Making the structure of each session clear to students can help them to fit the topics together in their minds and begin to make sense of them.
- ☞ Students can be easily overburdened. Presenting too much content too quickly can rapidly overwhelm students' ability to understand it. This is particularly so if the content is very new, detailed or conceptually difficult. Students are likely to have a greater chance of understanding if given opportunities to mentally process and reflect on new material. This may mean that the amount of material an instructor plans to cover in a lecture

should be reduced, providing other sources of information - such as printed or Web-based lecture notes, in order for students to learn important concepts more effectively.

- ☞ Involving the students in activities where they engage with the content can promote understanding and critical thought, and hence raise the quality of student learning from lectures. There is a wide range of activities that can be used to get students to actively participate in the lecture. Instructors should choose a variety of activities and always focus on those that will best suit the aims of the specific learning process. Whatever activity is chosen, it is important to explain to students how the activity aims to assist their learning. After any activity students should be allowed to report back to enable them to hear different perspectives from the instructor and their peers.

The task of an instructor has many dimensions (University of Technology, Sydney, 2002:Online; Young, 2002:Online). It involves:

- ☞ the provision of a broad context of knowledge within which students can locate and understand the content of their more specific studies;
- ☞ the creation of a learning environment in which students are encouraged to think carefully and critically and express their thoughts, and in which they wish to confront and resolve difficulties rather than gloss over them;
- ☞ constantly monitoring and reflecting on the processes of teaching and student understanding and seeking to improve them and
- ☞ helping students to achieve their own aims, leading them to understand that learning requires commitment, hard work, responsibility for their own learning, and a willingness to take risks.

These are not easy tasks, and there is no simple way to achieve them. Still less are there any prescriptions that will hold good in all disciplines and for all students. Lecturing must be carefully tailored to suit both that which is to be learnt and those who are to learn it.

In the past decade, some instructional experts suggested that a lecture format is not as effective as other forms of instruction due to the passive involvement of the student (McKethan & Everhart, 2001:4). They assert that the traditional lecture method is not suited for the ever-expanding educational objectives of today's society, diversity of students' needs, and the increasing volumes of information. Further, in consonance with these arguments research undertaken by the learning and technology e-lab at The Maisie Center in the United States, suggests that even students involved in e-learning, learn best when they collaborate with others, i.e. when they have a "social context" for learning (D'Cruz, 2003:Online). Collaborating with others as part of the learning experience improves critical thinking, communication skills, recall, course completion and a positive attitude towards learning. This implies that in terms of blended learning there are more benefits to be gained from face to face instruction than merely getting a lecture from the instructor. Some of these benefits are (D'Cruz, 2003:Online; Young, 2002:Online; Kapp, 2002:4):

- ☞ Face to face students get to know each other, connect professionally and socially and might discover how they can mutually benefit from networking.
- ☞ Students develop attitudes partly from seeing them role modelled by others - particularly people they respect. A good practice for classroom learning is to combine a diverse range of people in groups and facilitate an exchange of opinions to positively develop attitudes.
- ☞ An important element for developing team spirit is feeling "included". An instructor should use as many techniques as possible to foster a sense of inclusion. It is particularly useful to set up projects that require collaboration and communication amongst students. Social development is a natural process encouraged by simple events that create a common bond amongst people and synergy happens when a team achieves results that are more than the sum of their individual skills and experience. Setting up class presentations and group projects can present powerful learning experiences.
- ☞ Students are motivated to improve their performance when performance is assessed relative to their peers. In a classroom setting students want to

demonstrate to the instructor and their peers that they are learning or have knowledge. People strive to be at least as good as, if not better than, their peers. Instructors who have commented on positive elements of students' work have found that people respond to this kind of recognition by raising the standard of their work .

- ☞ Where a student develops a relationship with an instructor and other students, a sense of accountability ensues, e.g. students would feel accountable for meeting deadlines to submit assignments. By setting up a common focus and challenge for students, the instructor creates an environment where students depend on each other. This typically results in increased accountability.

The researcher notes that there are some concerns about face-to-face lecturing not being the answer to modern-day teaching. However, in conclusion, it can be stated that there is enough evidence in literature to indicate that the social context still plays an important role in the learning experience.

2.4.3 Instructional television

The third possible element to be used for blended learning, is instructional television. According to Bates (1995:61), there are many forms of instructional television, for example:

- ☞ educational broadcasting where programmes are broadcasted on public or private television channels;
- ☞ tele-programmes where lessons are pre-recorded and distributed to students on video cassette and
- ☞ live television broadcasts where the instructor and students are connected via video-conferencing media and can interact in various ways (*cf.* 2.4.4).

Wills (2001:Online) asserts that instructional television (ITV) is an effective delivery system that can be integrated into the curriculum either as a single lesson, a selected unit or a full programme.

The following advantages of ITV are found in literature:

- ☞ As far back as the 1980s, Bates and Gallaher (1987:6) claim that the following characteristics of television make it valuable for educational purposes: “*Television is 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:Online) agrees 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:Online) continues by saying that since many students have watched television, the medium is familiar and accessible and students will not have any problems using the technology.
- ☞ Video recordings are often better than real demonstrations because they can be replayed, stopped or played in slow motion (Wills, 2001:Online). They are 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 (Wills, 2001:Online). Videotapes could thus be used passively, without interaction in which case their instructional effectiveness is limited.

2.4.4 Video-conferencing

Video-conferencing is yet another element that can be used as part of a blended learning programme. Video-conferencing can be defined as the set-up where an instructor in one area lectures to students at various other locations. Communication is established via a combination of transmission media and devices. Communication can either be one-way, i.e. the students can see and hear the instructor, or two-way, in which case both the instructor and students can see and hear each other. In the latter case it is referred to as interactive video-conferencing (IV) (Wills, 2001:Online).

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 of the remote premises who can facilitate individualised learning, feedback, and integration following the distant presentation.

IV can be effective because of the following factors:

- ☞ IV provides increased contact between instructors and students because it allows real-time interaction. IV enables distant students to see and hear the instructor as well as other students (Porter, 1997:168).
- ☞ According to Reed and Woodruff (1995:Online), 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:Online). 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 important 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 context 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:Online) 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:Online). 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.

2.4.5 Computer assisted learning (CAL)

CAL might be considered as a possible element of blended learning. Raby (2001:17) defines CAL as a technique that uses the computer as a self-contained teaching machine to present discrete lessons to achieve specific educational objectives. Information is delivered via fixed lessons on a compact disc (CD). CAL (also referred to as Computer Based Training, CBT) provides perhaps the best opportunity for student self-guided learning (Cann, 1997:Online). In today's society where there is an increasing emphasis on students to take ownership of learning processes, merits of the lecture approach to instruction is debatable while the usefulness of computer-based instruction appears to be warranted.

According to Lawson (1999:32), CAL is an effective training medium founded on its interactivity with the student. The computer becomes the instructor, using a mix of full-motion video, animation, graphics, text and audio.

The following are some of the advantages of CAL:

- ☞ CAL enhances the accessibility of learning in instances where either distance or time may separate workers from needed knowledge. CAL can give students at various locations, having various working circumstances, equal opportunity to learn. CAL thus vastly improves training flexibility (Cann, 1997:Online; Trepper, 1999:3).
- ☞ CAL programmes come in a variety of types, including tutorials or knowledge-based programmes, games, and simulations (Andrisani, Gaal, Gillette & Steward, 2001:312).
- ☞ Well-planned CAL programmes can in some instances be more cost-effective than live training. Although developing or purchasing CAL course materials and hardware requires a significant investment, live training can be much more costly. Examples of costs involved for live training include the development of the course and course materials, paying for the learning site and instructor, and travelling. Weidner (1999:52) asserts that CAL is expensive to develop, but it costs less per class to present.

- ☞ CAL can include multimedia techniques like graphics, sound, animation and full video clips. This results in learning content being presented in a much more realistic way, making it more interesting to the student (Trepper, 1999:3).
- ☞ CAL course material can be updated frequently and at a low cost. Corrections, additions, and changes to course materials are readily accomplished and new CD-ROMs are less expensive to print and distribute than printed material.
- ☞ CAL allows trainees to deal with learning in bite-size chunks, rather than sitting for hours in a classroom. The flexibility to segment content may lead to students obtaining better results.
- ☞ Classroom training often proceeds at the pace of the slowest student. CAL, however, is self-paced and self-planned, with the students themselves choosing their own paths through the mass of information encompassed by the package. Within a self-paced instructional programme, a student may review specific topics on which he/she needs clarification. Or, if familiar with the topic, he/she may quickly complete the course and progress at a faster rate. Essentially, all students who complete the programme will be able to master the topic and function at similar levels. This is in stark contrast to classroom instruction (CI), in which a group of students is trained based on a predetermined time, and students are individually expected to master the topic during that time.
- ☞ CAL leverages the capabilities of top-notch instructors. It allows a good instructor to serve many students and permits the talents of experts to be made widely available.
- ☞ Successful use of CAL 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.
- ☞ Research done by Maul and Spotts as far back as 1993 (1993:24) indicates that using CAL can reduce the amount of time needed to complete training.

- ☞ According to a study done by Perry (1994:2), it was found that knowledge retention was higher with students that used CAL packages.
- ☞ Trepper (1999:4) asserts that, when using CAL, students get immediate feedback to questions and exercises. This enhances the learning process.
- ☞ Interactive CAL courseware represents a move towards active learning. In a classroom setting, some students tend to be shy and non-participative. The personalised interaction inherent in CAL, however, results in students being more participative and thus gaining more from the training (Trepper, 1999:4).

However many advantages there are to using CAL, instructional designers need to be careful not to fall into the trap identified by Hoyle (2003:3) as the “*deadly sin of e-learning*”. This happens when the printed pages of the text book simply gets transferred to electronic format and what is supposed to be CAL, becomes merely e-reading. The goal of a CAL training programme is to impart knowledge or teach a particular skill. The most important components of CAL include meaningful programme content, a creative design, and the incorporation of interactivity appropriate to the programme's task. It is imperative to take cognisance of some of the most important guidelines for developing well-designed CAL programmes:

- ☞ The interactive nature of CAL has been credited with a 50% gain in learning and a 20-40% gain in retention over traditional instruction (Andrisani *et al.*, 2001:320). The key factors in promoting interaction in any CAL programme include the method of interactivity employed and the type of feedback used. The type of knowledge being imparted or the particular skill being taught should dictate the appropriate level of interactivity – this can range from minimal user intervention to high user control. Developers must give users a sense of control while providing training in a structured environment that promotes optimal learning and retention. The key to successful CAL involves developing an interesting programme, asking relevant and well-conceived questions, calculating the many paths users will take in exploring the programme, and anticipating varied user responses - all in the context of a visually rich environment.

- ☞ Special consideration should be given to the screen layout. Good principles of design, such as the proper use of colour and white space, the absence of scrolling, the limited use of attention-capturing devices, and the variation in font type sizes and styles for effect, all impact how students view a CAL programme. Additionally, consistency in the placement of text, graphics, audiovisual elements, and navigational devices are crucial in gaining user confidence, which results in credibility for a CAL programme (Andrisani *et al.*, 2001:321).
- ☞ One of the most important characteristics of CAL is its ability to provide students with immediate feedback to their responses. Feedback is an important part of the interaction between the student and the computer because it lets the student know how well he/she is doing (Maul & Spotts, 1993:24). Feedback not only informs students about their progress and competency levels, but also increases their level of confidence and decreases their level of anxiety. The reinforcement provided for correct responses motivates students to continue with the programme, and their ability to immediately discover the correct answer to an incorrect response, is an effective method of not only learning information, but also retaining it (Maul & Spotts, 1993:25). Within the realm of visual feedback, there are guidelines for providing feedback for correct and incorrect responses. The feedback offered should be brief, such as using the word Good or Correct for the right answer. Feedback for incorrect responses should begin with the word No or Incorrect, followed by a sentence containing the correct response, and perhaps a reason why this particular answer is considered to be correct. It is important, for the sake of consistency, that feedback be displayed in the same location on every screen. The font type size, style, and colour used to display feedback should also be consistent (Andrisani *et al.*, 2001:322).
- ☞ Effective CAL programmes will provide students with a variety of hands-on exercises and tutorials (Weidner, 1999:52).
- ☞ In addition to immediate feedback, Weidner (1999:53) asserts that the CAL programme should also be able to present a student with a report, indicating his/her progress.

- ☞ CAL programmes should be graphically rich, combining audio, animation, video, line art and icons all accompanied by the appropriate use of colour (Weidner, 1999:52).
- ☞ Weidner (1999:53) furthermore suggests that CAL programmes should have a brief tutorial that will show students how to access and use different segments of the course material. A reference manual should be available, either as a hard copy, or in electronic format on the CD.

Despite the extensive list of advantages of CAL, researchers have identified some disadvantages of using CAL programmes:

- ☞ According to McKethan and Everhart (2001:4), studies on the effectiveness of CAL have shown inconsistent results. The effectiveness of CAL appears to be dependent upon its purpose, the context of its use and the design of the software.
- ☞ Although research supports the use of CAL as a supplementary tool to instructor-provided information, its effectiveness as an independent instructional tool is not conclusive. Three investigations show no favourable results when studying CAL as a sole instructional method as compared to traditional instructional methods (LaBonty, 1989, Morrell, 1992, Ruff & Layne, 1990 as cited in McKethan & Everhart, 2001:4). Gardner (as cited in McKethan & Everhart, 2001:4) studied the effects of hands-on activities in science versus using a combination of hands-on activities, CAL, as well as text-based activities. He concludes that the combination of methods produced higher achievement.
- ☞ Another concern is product quality. Some developers may understand the programming aspects of formulating a CAL course, yet have no real expertise in learning pedagogy (Lawson, 1999:33). As a result, learning goals and objectives are not clearly defined, which leads to confusion on the part of the student.
- ☞ Using CAL, implies that a student will, to a large extent, do self-study. This requires certain skills and a high level of self-discipline, and not all students cope with these demands.

- ☞ Weidner (1999:53) asserts that CAL does not work well for discussion-oriented subjects requiring vigorous interactions within the class itself.
- ☞ CAL requires students to have access to special equipment - often the latest in computer technology - to be able to accommodate the graphics, sound, animation and video clips.

Perry (1994:3) asserts that the decision whether to use classroom or CAL methods for a learning programme, depends on both the audience and the course content. Some of the specific factors that must be taken into consideration are:

- ☞ the target audience, including their educational level and computer literacy;
- ☞ course content, including whether it will be presented in linear or free-form;
- ☞ how the programme will be used (e.g., will students take the material home to study or will it only be used in a class situation?);
- ☞ the computers that will be available;
- ☞ the availability of talented instructional designers and experts to render technical support, and
- ☞ budget and time lines.

Dvorak (1999:73) is one of many researchers that holds the opinion that CAL can never be a complete replacement for instructor-led classes. Trepper (1999:4) reiterates that although CAL is often used as self-paced learning, it can best be used in a facilitated approach. The facilitated approach combines the benefits of CAL with the advantages of having an instructor in the classroom to help students as needed. In the facilitated CAL approach, students learn through discovery while also setting the pace of their learning. To facilitate learning, instructors coach students while the students develop new skills. This approach creates an environment in which knowledge is shared through the collaboration of individuals while under the guidance of instructors.

The instructor's role in this approach is to facilitate maximum sharing of information and knowledge among students rather than control the delivery and pace of the course. The instructor therefore provides direct feedback to students while creating an environment to generate peer discussion. The instructor acts as a problem solver when mistakes are made or technology glitches occur.

Facilitated CAL can also take the form of combining CAL with video-conferencing technology. Feldman (2002:37) asserts that KnowledgeNet, one of the fastest-growing e-learning companies, uses Internet groupware in conjunction with traditional conference-call technology, and found that this produced highly effective learning results.

In conclusion it can be noted that the many advantages of CAL make it a versatile method of delivering training. However, an instructor should take into consideration the wide range of factors mentioned in this section to ensure that an appropriate CAL programme be selected for the specific needs of the students.

2.4.6 Computer communication technology

This section continues to investigate possible elements that can form part of a blended learning programme.

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. Online communication is typically described as being either synchronous or asynchronous (Wills 2001:Online).

☞ Synchronous technologies facilitate real-time interaction. This means that students from a variety of locations communicate online during the same period of time. This type of conferencing session may be a simple "chat" session in which participants communicate via a series of text-based

messages, or involve participants meeting online at a specified time to watch presentations or share software applications. Commonly used synchronous technologies are audio-conferencing by phone and computer-conferencing (*cf.* 2.4.6).

☞ Asynchronous discussions are unbounded by both time and place. That means that students can be on or off campus and participate online at a time that is convenient to them. In education settings, an asynchronous discussion on a topic might take place over a number of weeks. For example, an instructor might set up a discussion group as part of a course Web site. Students are assigned to one or more discussion groups. Typically a discussion question or topic is posed to guide the discussion. Students post text-based messages related to the topic over a number of days. Through a series of typed messages, students can debate issues, answer questions, interview guests, and even participate in role plays.

Computer communication technology opens up a number of e-learning possibilities. 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:Online) indicates that the Internet is an enormously popular medium of communication that has developed its own norms of interaction, and expected and accepted behaviours of participants. Students participating in e-mail discussion groups learn to present themselves socially through a particular conversational style and learn to use Internet etiquette. Furthermore, they learn to think critically by interacting with text and with one another, thereby developing a multiple-way dialogue.

◆ ***List serves***

List serves stands for “list server” and works like an electronic mailing list, sending e-mail messages to students whose names are on the list (Hofstetter, 1998:6). Whenever someone sends e-mail to the list serve, every member of

the list will receive a copy. A list serve is thus a simple way for groups of students 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. List serves can be used to facilitate discussions where more than 20 students are enrolled in a class (Scarce, 1997:Online).

♦ ***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 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 or Web)* is a networked hypertext system that allows documents to be shared over the Internet (Hofstetter, 1998:10). As the Web'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:Online). 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 way to incorporate the Web in a programme, is to use it as an electronic reserve shelf. 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:Online). 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.

2.4.7 Web-based instruction (WBI)

Another important element that can be included in a blended learning programme is WBI. 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 Web 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.

All advantages of CAL (*cf.* 2.4.5) are inherent in a properly designed and delivered web-based programme. The following additional advantages can also be identified (Weidner, 1999:53; Vogeler, 1997:Online):

- ☞ 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 website. Content can be updated anytime.
- ☞ Software used specifically to administer web-based programmes, allows instruction management, i.e. monitoring and control of students' access to content, monitoring students' class time and recording scores and other student data.
- ☞ If required, live data can be used in student exercises. This capability is especially valuable when it involves large amounts of information from enterprise databases.
- ☞ WBI can approximate some of the unique elements of group activities in face-to-face classroom training. Depending on the speed of the Internet

connection, capabilities range from web-type keyboard discussion groups to live audio and video communication.

- ☞ Flexibility of WBI allows for various types of modular construction. Illustrative materials, animations, simulations, or even whole segments of content can be inventoried, and the student can decide in which order to complete the modules.

As in the case of advantages of using WBI the disadvantages are very similar to those of CAL. The one added disadvantage of WBI, is the bandwidth restrictions. This determines the speed with which material is accessed on the Internet, and could lead to frustration if the interaction with the material is slow.

Research on the effectiveness of WBI has shown mixed results:

- ☞ Dominguez and Ridley (1999:72) compared the effect of web courses with that of traditional training on student learning. They found no significant differences in grades between the online and offline students of the same course.
- ☞ Selwyn, Marriot and Marriot (2000:170) found that students' attitudes towards the Web courses, though generally positive, were influenced by their initial introduction to the Web. Extended introductions tended to lead to more positive feelings associated with the Web.
- ☞ Web courses have shown that greater human interaction has been associated with greater problem-solving capabilities (Jareka, Bonk & Lehtinen, 1999:370). Furthermore, greater interaction with the instructor and fellow students has been associated with improved student attitudes to WBI (Ryan, Carlton and Ali, 1999:274). The lack of direct physical connection between the student and the instructor may be a significant barrier to a student's developing a positive attitude to computers.

The research results mentioned in the previous paragraph indicate that WBI may well deliver more effective results in a blended learning environment.

2.5 INSTRUCTIONAL DESIGN FOR BLENDED LEARNING

After looking at the different elements available for presenting blended learning programmes, the researcher will now explore instructional design guidelines.

According to Treat (1999:Online), 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. Literature reveals a range of different ID models that exist for developing learning programmes. However, the researcher concludes that most models consist of a combination of the phases as portrayed in *Fig 2.1*. This specific ID model for developing a blended learning programme is proposed by the staff of the University of Alberta (2002a:Online).

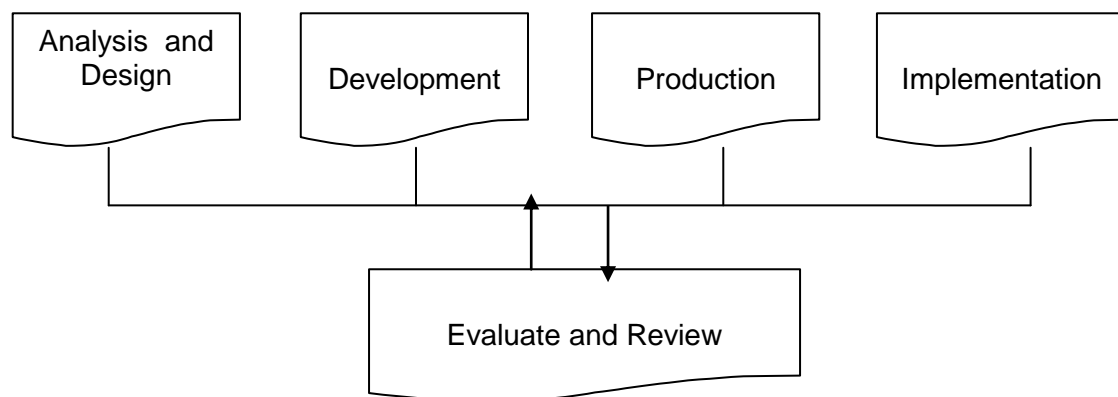


Fig. 2.1 Phases of instructional design (University of Alberta 2002a:Online)

An important fact is that developing a programme is an iterative process in which the developers must move flexibly back and forth between the phases.

Although ID can be done by a team, where each of the different phases is handled by experts, programmes are often developed by the instructors. In this study the researcher refers to the developer of the programme as the instructor.

The following section aims to elaborate on the phases of ID as portrayed in Fig 2.1.

2.5.1 Analysis and design phase

One of the most important aspects of the analysis and design stage is to analyse the target population of students. Sound instruction requires considering the characteristics of students, and some aspects to consider are (University of Alberta, 2002b:Online):

- ☞ What are the prospective students' learning needs?
- ☞ What prior experiences are they likely to have?
- ☞ What factors might affect their success in the programme?
- ☞ What type of materials and technical support will students need to be successful?

Careful consideration should be given in selecting an instructional strategy. Questions to be answered include:

- ☞ What teaching strategies have been found effective for the specific content?
- ☞ Which strategies will be most effective with the specific target population?
- ☞ How will students be engaged to keep them motivated?
- ☞ Which instructional strategies take best advantage of the opportunities offered by new media?
- ☞ What administrative support will be required?

Singh and Reed (2001:4) indicate that a financial analysis should be done, looking at the cost of content development as well as the delivery costs. This could play a significant role in deciding on the delivery options.

The following worksheet, given as table 2.1, can be completed to assist the instructor in finalising the analysis and design phase (Reigeluth, 1999:Online):

Instructional Design Worksheet

Name of project lead:

Date:

Discipline focus:

Department/Institution:

Course title(s):

Date course(s) will be offered:

Names and responsibilities of project team members:

Is this project part of a larger programme of study? If so, indicate the name of the programme and the relationship of this project to it.

Describe existing resources related to this course.

Identify the instructional strategies that will be used for the different levels of learning in the following matrix:

Kinds of learning	Presenta- tion	Tutorial	Drill	Independent study	Discussion	Game	Lab
Invariant tasks							
Concept classification							
Procedure using							
Understanding							
Generic skills							

Where will your students be located? (Note: you may check one or more categories.)

Location of students	
Students will meet regularly on campus	
Students will meet occasionally	
Students will participate from a distance	
Students will be located in several time-zones	

Describe the characteristics of the prospective students including the following information: programme(s) of study, age range, educational backgrounds, work experience, access to technology, and comfort with technology-mediated learning. Identify appropriate delivery methods and media. (Note: you can select more than one option.)

Delivery methods	Yes	No	Maybe
Web			
Videoconference			
CD-ROM			
Print Materials			
Videotape			
Audiotape			
Face-to-face instruction			

Media to be developed	Yes	No	Maybe
Audio			
Video			
Graphics			
Animation			
Text-based content			

What campus facilities will be required to support the students?

Campus facilities	
Library	
Computer help desk	
Computer lab	
Classroom	

Table 2.1 Instructional design worksheet (Reigeluth, 1999:Online)

Once the analysis and design phase has been completed, the instructor can proceed to the development phase.

2.5.2 Development phase

In the induction pack for writers by the Open Training and Education Network (OTEN, 1994:11), instructional designers are informed to start the development phase by constructing an instructional plan. This plan should include detailed information about the layout of the programme, learning objectives, assessment methods, and the media and instructional technologies that will be used. The instructor should create a curriculum plan for the programme (University of Alberta, 2002a:Online). This plan must include all the elements as listed by OTEN, as well as student activities. A brief overview of each of these now follows:

◆ *Learning outcomes*

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. 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. Treat (1999:Online) suggests that learning 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. Outcomes in the context of the South African OBE approach is discussed in sub-section 3.3.3.

◆ *Framework and content outline*

Melton (1997:51) states that a framework for the programme 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:Online) proposes that in selecting the content, factors like the students' 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 and instructional technologies***

The media and instructional technologies which will be used to deliver the content should be selected. As stated previously (*cf.* 2.4), media and instructional technologies for a blended learning programme could include printed material, face-to-face lectures, ITV, as well as a wide range of teleconferencing or computer-related communication techniques. Selecting the right blend of technologies has been discussed (*cf.* 2.3). The challenge here is to integrate delivery components, based on identifiable student needs, content requirements and technological constraints.

♦ ***Assessment methods***

Deciding on assessment procedures and the timing thereof forms an integral part of the development phase (Treat, 1999:Online). 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. 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 they are spread evenly throughout the programme schedule to generate regular feedback to and from students. According to a document produced by the Maricopa Centre for Learning and Instruction (2000:Online) assessment is effective when it:

- ☞ is student centered;
- ☞ is congruent with instructional objectives;
- ☞ is relevant;
- ☞ is comprehensive;

- ☞ is clear in purpose, directions, and expectations;
- ☞ is objective and fair;
- ☞ simulates end behaviour/product /performance;
- ☞ incites active responses, and
- ☞ shows student progress and development over time.

Thorpe (1993:67) asserts that apart from formal assessment, student self-evaluation should form an important part of blended learning 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.

◆ **Activities**

According to Reigeluth (1999:Online) the following kinds of learning can be identified:

- ☞ *Invariant tasks* require memorizing factual information or routine procedures. They do not require any understanding, nor do they require learning how to deal with variation.
- ☞ A *procedural task* involves performing a procedure, which is a sequence of activities to achieve a goal. Synonyms include method, technique, skill, and rule. A procedure can be either a physical procedure, which entails the execution of physical movements, a mental procedure, which entails the execution of mental operations or a combination of physical and mental activities.
- ☞ *Concept classification* is a mental skill which requires a student to classify instances as being examples or non-examples of a concept. It is considered to be the building blocks for most of the cognitive capabilities a person possesses. Procedures, for instance, describe how to change things or to achieve a goal. Those "things" are concepts which are simpler components of the procedure and must be mastered before the procedure can be learned.

- ☞ *Understanding* is meaningful learning. It is usually contrasted with rote learning (memorisation), although it is also distinct from specific and generic skill application.
- ☞ A *generic skill* is a skill which can be applied across a variety of subject domains, and usually takes longer to acquire than domain-dependent (subject-area) skills. The major kinds of generic skills include thinking skills (such as problem solving techniques), learning strategies (such as creating mnemonics to help you remember things), and metacognitive skills (such as monitoring and revising your problem solving techniques or mnemonic-creating techniques).

The type of learning that is required will determine the type of activities that are selected. Involving students in activities deepens their understanding and enables them to readily transfer what they have learned to new situations (University of Alberta, 2002a:Online).The following are some guidelines that can be followed in planning activities:

- ☞ Provide assignments that simulate in some way the real world application of the course content.
- ☞ Engage students in meaningful activities throughout the instruction and not just at the end of a module or unit.
- ☞ Require students to generate meaning for themselves by asking them to analyse, compare, evaluate, and synthesise the concepts, principles, and procedures.
- ☞ Provide opportunities for interaction and collaboration amongst students.

This section gave a brief overview of aspects to consider in developing a blended learning programme. It is the view of the researcher that sound pedagogical principles should be applied in considering each of these aspects. It was therefore decided to further investigate such principles (*cf.* 3.4).

2.5.3 Production phase

This is the phase in which the instructor actually creates (or selects) the educational resources, i.e. the media elements (e.g. video tapes, CDs, web sites) and other instructional materials (e.g. study guides, activities, assessment and on-line resources).

Some of the design principles appropriate to educational technology are discussed in this section.

◆ **Instructional multimedia**

Instructional multimedia can include, amongst others, CDs and videos. Dowie and Campbell (2002:Online) provide the following principles for the design and production of instructional multimedia applications (*cf. table 2.2*).

Principle	Examples of applying the principle
The programme is compelling for students	<ul style="list-style-type: none"> ☞ novelty, surprise, or humour is used to enhance motivation ☞ students are shown how what they learn will help them solve problems or perform tasks in the real world ☞ anecdotes and case studies breathe life into the content
The programme is academically credible	<ul style="list-style-type: none"> ☞ information contained in the programme is current and accurate ☞ pertinent theories, principles, and procedures are represented
Students know what to expect	<ul style="list-style-type: none"> ☞ learning objectives are stated as part of each major unit of instruction
The navigation system is efficient and well planned	<ul style="list-style-type: none"> ☞ on-line help is available at all times ☞ menus, buttons, and other controls are used consistently throughout the programme ☞ directions and overt signals let students know what they are supposed to do ☞ users are informed of their location in the programme through the use of titles, frame numbers, and other indicators ☞ students can select study and practice sequences that are best for them

The visual layout promotes learning	<ul style="list-style-type: none"> ☞ content is broken into units that are small enough to be readily learned ☞ long, linear sequences of screens are avoided ☞ the text is organized into short, easy-to-read paragraphs
Media elements are used wisely	<ul style="list-style-type: none"> ☞ a variety of media is used to effectively illustrate facts, concepts, principles, and procedures ☞ the various media employed complement rather than compete with each other ☞ graphics, fonts, and other visual elements are legible, functional, and attractive
The application supports active learning	<ul style="list-style-type: none"> ☞ learning objectives are matched with appropriate learning activities ☞ the unique capabilities of the computer provide meaningful interactivity and feedback ☞ students are provided with opportunities to check their level of understanding ☞ explanatory feedback is provided for both correct and incorrect responses ☞ students are able to develop an in-depth understanding applying their skills and knowledge in complex, real-life context.

Table 2.2 Principles for the design and production of instructional multimedia (Dowie & Campbell, 2002:Online)

◆ **Online resources**

Instructors are now in the fortunate position of having an increasingly abundant range of high quality resources freely available on the Internet. According to Dowie and Campbell (2002:Online), the following aspects should be considered in evaluating a particular online resource:

- ☞ Does the resource provide alternative explanations or examples that will be valuable for your students?
- ☞ Does the resource include demonstrations or simulations that extend what you are able to do in your classroom?

- ☞ Are learning activities that involve case studies, problem scenarios, or topics for discussion included in the resource?
- ☞ Is the content authentic, current, and relevant?
- ☞ Are there multiple paths through the content, so that students have flexibility in modes of learning, difficulty levels, and opportunities for review or enhancement? Will students know what they are expected to do, where they are, and where they have been? Is there a search feature?
- ☞ Is the resource engaging and interactive, i.e. will the students be actively involved?
- ☞ Do the students have the time to make effective use of the resource? Too often instructors pile additional activities on top of pre-existing lesson plans. The resource should add value, not just "add on".
- ☞ Does the resource meet high standards of access and equity? If the resource or activity is required, all students should be able to access it in a reasonable time frame without going to extraordinary effort.

◆ **Web sites**

A web site contains the following basic elements: a *home page*, graphic or text *menus*, *information screens*, and *hyperlinks* to other sites. The following basic design fundamentals should be considered (University of Alberta, 2002a:Online):

- ☞ Divide written information into logical units. Discrete, succinct “chunks” of information are easier to read on a computer screen than long chapters. Limit each unit that contains printed information to no more than the equivalent of three pages of typed text.
- ☞ Break up large blocks of text. Minimize large grey masses of print. Most web pages contain lines of text which are too long to be easily read. A reader's comfortable eye span is 40 to 60 characters per line on a computer screen. One of the easiest ways to control the format of text passages is to place the text within tables on your web pages.

- ☞ Organize the content on the page so that it is logical and predictable. Place elements such as headings consistently from one page to the next.
- ☞ To ensure a uniform, professional look to the courses within a programme, it is essential to establish a set of parameters for the visual elements in both the online and print materials. These guidelines should include information about the font, size, and colour of the normal type, headings, subheading(s) and how emphasis will be added. In general, use 10 to 12 pt. Times or Arial font for the normal text within the site.
- ☞ Build clear navigation aids. Incorporate easily understood icons, headings, and menus. As well, the page layout and overall visual style should be consistent throughout the site. Aim for a functional elegance while providing cues so that users know where they are within the site at all times.
- ☞ Graphics add interest and breathe life into text presentations, but be aware of download speeds especially for those users with slower modem connections. People find it frustrating when it takes longer than 10 or 15 seconds to view an image. In general, it is recommended that online graphics are no larger than 20K.
- ☞ Use colours with restraint. Keep colours and layout conservative, conventional, and simple. Be aware not to create a page which is overdone in which everything is garish and nothing in particular is emphasized. When selecting a background colour, subtle pastel shades are a good choice. Ensure that the font type contrasts sharply with the background, and avoid using background images as they obscure text.

◆ ***Printed material***

Because print is largely a one-way communication medium, the challenge is to design instruction to maximize the amount of interaction in print materials that will be used in a blended learning programme (Wills, 2001:Online).

Misanchuk (1994:111) 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. Hodgkinson (1994:63) agrees that one of the central concepts regarding printed material 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.

Misanchuk (1994:113) suggests using active voice instead of passive voice sentences, making writing personal by using words like “you” and “me”, keeping 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 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 study material should be that it is self-instructional. The OTEN guide (1994:16) describes self-instructional material as study material that is specially written with particular programme objectives in mind. Furthermore, it is 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 he/she 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. Activities help students to practise 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 dialogue with their tutors and focus on key areas of learning.

2.5.4 Implementation phase

Once the instructor has completed the production phase, the programme can be implemented.

A number of administrative issues have to be resolved in order to effectively implement a new programme. At this stage, most of the instructional design work has been completed and the implementation issues often relate more to project management than to educational theories. As the focus of this study is didactics, the researcher will not expand too much on this specific phase. However, the following decision matrix given by the University of Alberta (2002a:Online) gives a comprehensive overview of the administrative and management issues to be considered in ensuring the long-term success of technologically enhanced courses. The matrix outlines the policy areas and key issues which must be addressed when implementing a blended learning programme. It is provided to help the instructor keep track of the many administrative tasks involved in managing the implementation of a blended learning environment. The instructor can indicate the status of each policy area by ticking the *resolved*, *in progress* or *not an issue* column on the right-hand side. A matrix sheet can be completed at the end of every week of implementation, and in this way the instructor can ensure that no issues are left behind or stay unresolved.

The matrix is based on the strategic management decision zones as described by King (2000:Online).

	Key Issues		
	Resolved	In progress	Not an issue
Academic			
Course integrity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Transferability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Student/course evaluation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Admission standards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Curriculum/course approval	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Accreditation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recruiting/marketing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Governance and fiscal administration			
Tuition fee	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technology fee	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FTE's	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Administration Cost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Staffing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Faculty			
Compensation and workload	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Development incentives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Faculty training	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Congruence with union contracts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Faculty support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Faculty evaluation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Legal			
Intellectual property	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compliance with the Freedom of Information and Protection of Privacy Act (FOIPP)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Faculty, student, and institutional liability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Student support services			
Advisement & counselling	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Library access	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Materials delivery	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Student training	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Test proctoring	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Computer accounts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Registration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Financial aid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Labs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Technical			
Systems reliability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Connectivity/access	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hardware/software	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Setup concerns	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Infrastructure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technical support (staffing)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scheduling	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Costs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Labs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Cultural			
Adoption of innovations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Organizational values	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Table 2.3 Matrix outlining the policy areas and key issues which must be addressed when implementing a blended learning programme (University of Alberta, 2002a:Online)

2.5.5 Evaluation and review phase

Once the programme has been implemented, the next phase is to evaluate it. According to Reeves (2002:Online), the term evaluation refers to the process of researching the quality of the outcomes achieved by a programme, course, or other educational activity. The objective of this research is to assess the strengths and weaknesses of the learning activity and determine if and how it might be improved.

The diagram in fig. 2.1, indicates that evaluation is not a separate phase in instructional design, but that it is an ongoing process that should take place throughout the life of an instructional project, from its initial conception to project completion.

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 the instructional design process. 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. The purpose of a summative evaluation is to assess whether the project met its initial goals. If initial goals were not met, the summative evaluation can be used in a formative manner, to advance the next iteration of the project (University of Alberta, 2002a:Online).

In this study both formative and summative evaluation will be used to evaluate the programme through action research (*cf.* 4.2.2).

In the view of Wills (2001:Online) the following factors relating to a 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.

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

- ☞ In evaluating the quantity of learning 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 blended learning approach 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-effective to be presented in blended learning mode as opposed to being presented as a contact tuition programme.

In this study the researcher is concerned with developing a programme based on sound educational principles. It has therefore been decided to extensively evaluate the programme against the principles of good practice as set out in Chapter Three.

2.6 CONCLUSION

It is the opinion of the researcher that the content of the current status of blended learning can be summarised by the view of Ward and LaBranche (2003:23). Their observation is that over the past few years, there has been much discussion about the emergence of online learning. Some speculated that e-learning would lead to the reduction, if not the demise, of face-to-face lectures. However, the way things are actually developing, is that what was once seen as an "either-or" proposition is quickly becoming an "also-and" situation. Blended learning, the convergence of e-learning and traditionally-delivered learning, is one of the fastest growing trends in education, and is definitely here to stay. It provides a deeper, broader and more flexible platform for knowledge transfer, as it extends the learning experience outside the classroom and helps to create learning communities. Ultimately, blended learning provides a way to overcome one of the limitations to face-to-face style learning: that learning has to take place largely in the room, at the time when the presenter is available. Blended learning is a student-centered strategy. Students have more options, more time and more freedom to explore learning. It extends learning before or after the physical learning experience, and enhances learning by taking the student outside of the traditional classroom to take advantage of the power and depth of modern technology.

Modern technology provides a variety of elements that can be used to form part of a blended learning programme. Examples range from more traditional elements like printed material and face-to-face lectures, to modern technology like web-based instruction, video conferencing and a variety of computer-facilitated teaching methods (*cf.* 2.4). The success of a blended learning programme is, to a large extent, determined by selecting the right blend. As Bersin (2003:Online) states: "*The key to blended learning seems to be selecting the right combination of media that will drive the highest learning impact for the lowest possible cost.*" There is no simple way in finding the right blend, however, literature revealed sound instructional design principles as well as guidelines for developing good instructional media (*cf.* 2.5). The

researcher concludes that by following the phases of instructional design and adhering to the development guidelines it will be possible to develop an effective blended learning programme.

CHAPTER THREE

BLENDING PRINCIPLES OF GOOD PRACTICE, COMPUTER LITERACY AND OUTCOMES-BASED EDUCATION

3.1 INTRODUCTION

As indicated in the title of this thesis, the aim of the research is to develop an outcomes-based computer literacy programme that will be presented in blended learning mode to South African students. Literature on blended learning was reviewed in Chapter Two. In this chapter the researcher continues by reviewing literature related to principles of computer literacy, outcomes-based education and good teaching methods. The aim is to establish a framework for developing the envisaged programme.

3.2 COMPUTER LITERACY

This sub-section aims to describe the concept of computer literacy (CL) and determine the content to be included in a CL programme.

3.2.1 Definition of computer literacy

In 1976 Nevison coined the term CL and unwittingly sparked a long, complex debate when he wrote: *"Because of the widespread use of elementary computing skills, there should be an appropriate term for 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 programme 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. 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 passé 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:Online) 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:Online) states 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 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 do the requirements for being computer literate. Kim and Keith (1994:Online) 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. Ross (2001:Online) explains CL 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:Online) 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.

3.2.2 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 modules’ 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 operating system 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 should 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 should understand and be able to accomplish basic operations associated with creating, formatting and finishing a word processing document ready for distribution. The student should 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 should understand and be able to accomplish basic operations associated with developing, formatting and using a spreadsheet. The student should 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. Furthermore, the student should 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 should 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:Online) introduced this programme in February 2002 in the United States of America. It was designed for individuals who were qualified as instructors or trainers of basic computing and Internet literacy skills and was developed in response to a certification gap identified through extensive nationwide academic programmes administered by Certiport. The certification programme is comprised of three modules, i.e. Computing fundamentals, Key applications and Living online.

The syllabi of the different modules in the IC3 certification programme 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, and identify the factors that go into a decision on how to select or purchase a computer or select a computer for work, school, or home. Students should be able to identify how software works and how software and hardware work together to perform computing tasks, identify different types of software, and 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 ICDL and IC3 programmes, it could be deduced that a CL programme should include the following:

- ☞ A theory section which covers 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.

Having established the elements of a CL programme, the researcher continues in the next section by looking into the principles of OBE.

3.3 OUTCOMES-BASED EDUCATION

The programme that will be developed through this research should be implemented in higher education institutions in South Africa. As South Africa has adopted an outcomes-based education system (Department of Education, South Africa, 1998:2) it is imperative that the programme be developed on outcomes-based principles as applied in the South African context. This section aims to investigate these principles.

3.3.1 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 resources”.

Spady's view (1994:1) 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.

3.3.2 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.
- ☞ In an OBE system it is expected of students to collaborate in learning rather than to compete with one another (Centre for Community Development, 2002:115).

3.3.3 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. This implies that students must be actively involved in the learning process.

Spady (1994:49) 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 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*”.

To determine whether a student has achieved the desired outcomes, he/she must be assessed. Assessment strategies in OBE are discussed in the next section.

3.3.4 Assessment in OBE

The purpose of assessment is to provide information on student achievement and progress (Australian National Training Authority, 2003b:9). This section aims to establish how assessment should be applied in OBE.

3.3.4.1 Overview of important terminology

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 the following assessment-related terminology:

♦ *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 ;
- ☞ 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 a 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) explain that formative assessment builds up a system of feedback which forms and shapes the appropriate learning experience to the optimal benefit of students.

♦ **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.

3.3.4.2 Defining OBE assessment

The Department of Education (1998:2) in South Africa 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.

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.

3.3.4.3 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, 1997:10) 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. (Van der Horst & 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 a 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 assessment**

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.

3.3.5 OBE in the South African context

As mentioned, South Africa adopted an outcomes-based education system when Curriculum 2005 was introduced into schools in 1998 (Department of Education, South Africa, 1998:2). The new Curriculum 2005 and its implementation were reviewed by a Ministerial Committee in 2000. The Review Committee recommended that strengthening the curriculum required streamlining its design features and simplifying its language through the production of an amended National Curriculum Statement (Department of Education, South Africa, 2002:5). It further recommended that this Revised National Curriculum Statement should reduce the curriculum design features from eight to three:

- ☞ critical and developmental outcomes
- ☞ learning outcomes, and
- ☞ assessment standards.

✦ **Critical and developmental outcomes**

Critical outcomes are general outcomes and apply to all learning areas. The South African Qualifications Authority (SAQA) selected seven critical outcomes which should serve as guidelines for all other outcomes defined for South African students. The critical outcomes envisage students who will be able to (Department of Education, South Africa, 2002:11):

- ☞ Identify and solve problems and make decisions using critical and creative thinking.
- ☞ Work effectively with others as members of a team, group, organisation and community.
- ☞ Organise and manage themselves and their activities responsibly and effectively.
- ☞ Collect, analyse, organise and critically evaluate information.
- ☞ Communicate effectively using visual, symbolic and/or language skills in various modes.
- ☞ Use Science and Technology effectively and critically showing responsibility towards the environment and the health of others.
- ☞ Demonstrate an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation.

The developmental outcomes envisage learners who are also able to:

- ☞ Reflect on and explore a variety of strategies to learn more effectively.
- ☞ Participate as responsible citizens in the life of local, national, and global communities.
- ☞ Be culturally and aesthetically sensitive across a range of social contexts.
- ☞ Explore education and career opportunities.
- ☞ Develop entrepreneurial opportunities.

◆ **Learning outcomes**

In the South African context a learning outcome is derived from the critical and developmental outcomes (Department of Education, South Africa, 2003:14). It is a description of what (knowledge, skills and values) learners should know, demonstrate and be able to do after completing a Learning Area (subject). As this study is concerned with CL, the learning outcomes for the subject Computer Applications Technology (CAT), which deals with computer literacy, are listed here (Department of Education, South Africa, 2003:14-18):

- ☞ Learning outcome 1: The learner is able to demonstrate operational knowledge of information and communication technologies and the environments in which they operate.
- ☞ Learning outcome 2: The learner is able to apply and integrate end-user computer applications skills and knowledge to solve problems related to the processing, presentation and communication of information.
- ☞ Learning outcome 3: The learner is able to apply information management processes and skills using end-user computer applications.

◆ **Assessment standards**

Assessment standards describe the level at which learners should demonstrate their achievement of the learning outcome(s) and the ways of demonstrating their achievement (Department of Education, South Africa, 2003:15). They embody the knowledge, skills and values required to achieve learning outcomes. The learning outcomes describe what learners should know and be able to do, whilst the assessment standards describe the minimum level, depth and breadth of what is to be learnt. In practical terms this means that learning outcomes can and will, in most cases, remain the same from grade to grade while assessment standards change from grade to grade. Table 3.1 displays the relation between the learning outcomes and assessment standards for the subject Computer Applications Technology in grade 10 (Department of Education, South Africa, 2003:40).

<p>Learning outcomes:</p>	<p>Learning Outcome 1 Operational knowledge of Information and Communication Technologies</p> <p>The learner is able to demonstrate operational knowledge of information and communication technologies and the environments in which they operate.</p>	<p>Learning Outcome 2 Integrated end-user computer applications skills and knowledge in problem-solving</p> <p>The learner is able to apply and integrate end-user computer applications skills and knowledge to solve problems related to the processing, presentation and communication of information.</p>	<p>Learning Outcome 3 Information management</p> <p>The learner is able to apply information management processes and skills using end-user computer applications.</p>
<p>Assessment Standards for Grade 10:</p>	<p>We know this when the learner:</p> <ul style="list-style-type: none"> ☞ describes and explains the basic concepts of computer hardware, software and information technology including networked environments ☞ identifies and uses available input and output devices appropriately ☞ develops an organisational structure to manage different types of files ☞ identifies legal, ethical and security issues related to information technology ☞ describes and evaluates the local impact of information technology on the environment, community and personal health ☞ states and discusses how developments in information and communication technologies affect and facilitate human interaction 	<p>We know this when the learner:</p> <ul style="list-style-type: none"> ☞ achieves a basic level of competence in the use of input devices ☞ enters, edits and processes text, numerical data and graphics using basic techniques in a word processing program ☞ enters, edits and processes text and numerical data using basic functions and formulae in a spreadsheet program by applying correct techniques ☞ solves problems by using a word processing and/or a spreadsheet program ☞ interprets simple layout and editing instructions to produce accurate output of text, numerical data and graphics ☞ demonstrates an understanding of a variety of communication modes and tools 	<p>We know this when the learner:</p> <ul style="list-style-type: none"> ☞ uses available technologies to locate data from different sources and resources and collects it using relevant methods ☞ extracts and processes relevant information and records it in useful electronic formats ☞ presents and communicates information in text and/or numerical formats

Table 3.1 Learning outcomes and assessment standards for the subject Computer Applications Technology in grade 10 (Department of Education, South Africa, 2003:40).

The principles of OBE assessment (*cf.*3.3.4) should be applied to assess students and provide indications of their achievements.

Section 3.3 describes a number of OBE-related principles that will have to be taken into consideration when designing the envisaged programme (*cf.* 4.4.2). The following section aims to broaden this framework by looking at principles of good teaching practice.

3.4 PRINCIPLES OF GOOD TEACHING PRACTICE

Several advantages of using a blended learning approach have been discussed in Chapter Two (*cf.* 2.2). However, it is clear that simply blending face-to-face instruction with any technology does not necessarily result in an effective instructional programme. Ehrmann (1995:23) asserts that what matters most is not the technology *per se*, but how it is used, and not so much what happens in the moments when the student is using the technology, but more how those uses promote larger improvements in the fabric of the student's education.

The “Seven principles of good practice for undergraduate education” were developed by Chickering and Gamson (1987:Online). As distilled findings from decades of research, the principles provide a solid basis for good pedagogy in traditional education. Since published, educators embraced the principles and they have continued to be refined and used in a variety of ways (Chickering & Ehrmann, 1996:3).

The seven principles are:

- ☞ Principle 1: Encourage contact between students and instructor
- ☞ Principle 2: Develop reciprocity and co-operation among students

- ☞ Principle 3: Encourage active learning
- ☞ Principle 4: Provide prompt feedback
- ☞ Principle 5: Emphasize time on task
- ☞ Principle 6: Communicate high expectations
- ☞ Principle 7: Respect diverse talents and ways of learning

In an interactive-style workshop delivered at the Telelearning '97 Conference Spear and Bruce (1997:1-5) led participants in an examination of distance learning pedagogy and explored ways to outline and implement good teaching principles as standards for delivering quality distance learning courses. As a result of the discussion that followed their presentation the authors added an eighth principle: “Making effective use of technology”.

In studying the principles of good practice, the researcher came to the conclusion that these same principles can be applied in a blended learning environment to ensure good teaching practice. However, it is the view of the researcher that, in using computer-mediated instruction, principles 3 and 4 are so closely related that they should be seen as one. Thus for the purpose of this study principle 3 and 4 will be combined to: *Encourage active learning and provide prompt feedback*.

It is the aim of the following sub-sections to describe principles of good practice, and strategies to implement these principles in a blended learning environment.

3.4.1 Encourage contact between students and instructor

Frequent student-instructor contact in and out of classes is the most important factor in student motivation, intellectual commitment and personal development. Concerned instructors can help students get through rough times so they will keep working toward their goals. Students describe good instructors as approachable, interested, easy to talk to, inviting of student

views, concerned about student progress, and open to helping students with problems (Chickering & Gamson, 1991:15).

Communication technologies that increase access to instructors can strengthen instructor interactions with all students, but especially with shy students who are reluctant to ask questions or challenge the instructor directly (Chickering & Ehrmann, 1996:3). It is often easier to discuss values and personal concerns in writing than orally, since inadvertent or ambiguous nonverbal signals are not so dominant. E-mail, computer conferencing, and the World Wide Web increase opportunities for students and instructor to converse and exchange work much more speedily than before, and more thoughtfully and “safely” than when confronting each other in a classroom or instructor’s office. Total communication increases and, for many students, the result seems more intimate, protected, and convenient than the more intimidating demands of face-to-face communication. Communication is eased when student or instructor (or both) is not an English first language speaker; each party can take a bit more time to interpret what has been said and compose a response. With the new media, participation and contribution from diverse students become more equitable and widespread.

Instructors can use the following guidelines to implement the principle of student-instructor contact in a blended learning environment (Spear, 2003:4; Schlebusch & Oosthuizen, 2003:5):

- ☞ Offer various forms of contact, e.g. e-mail, phone calls, fax, and face-to-face appointments.
- ☞ Inform students of the expected time in which the instructor will respond to e-mail or voicemail messages (e.g. within 24 hrs).
- ☞ Outline the rules students should follow when communicating via e-mail, voicemail, or other modes of communication.
- ☞ Establish face-to-face as well as virtual office hours, i.e. times when the instructor will be available for online chats, phone calls, or immediate e-mail response.

- ☞ Acknowledge initial receipt of students' e-mail with an automatic e-mail reply.
- ☞ Inform students that infrastructure problems (e.g. a problem with the server) are beyond the control of the instructor and have an impact on response time.
- ☞ Regularly send general messages to the whole class.
- ☞ If possible, contact students before the start of the course. Let them know where to find the class (either the face-to-face class or the online class), and when the formal classes will start. Advise students to get course materials before the start of classes, and let them know what to expect during the first week of class.
- ☞ Hold an orientation session at the beginning of the course.
- ☞ Get to know students as individuals.
- ☞ Refer to students by name.
- ☞ Follow-up on students who are not participating.
- ☞ Establish replies and responses as important values of online discussions, through tone, modelling, and marks allocated for assignments.
- ☞ Encourage student questions, input, and feedback. Clearly state that all points of view are welcome and respected.
- ☞ Become involved in online class discussions.

As blended learning implies the convergence of face-to-face learning with e-learning, it is a given that the students will have direct contact with the instructor. The instructor should, however, carefully consider how the face-to-face contact will be blended into the programme (Ward & LaBranche, 2003:23). It is possible that face-to-face lectures form the major part of instruction and that learning is enhanced by e-resources, like web-access, CAL or e-communication. Another scenario is to have a “digital sandwich” where a face-to-face class is first preceded and afterwards followed-up by an e-learning experience. This provides the students with the chance to continue

dialogue with each other and the instructor, ask follow-up questions, and continue to learn.

A definite way of enhancing student-instructor contact, is to hold an orientation session right at the beginning of the course (Australian National Training Authority, 2003a:9). This session usually involves talk about what is required, followed by some work directly on computer. During the orientation session the instructor should provide students with guidelines to organise and manage their time, introduce them to the online or CAL platform, and sort out security issues such as passwords needed to log into the system and practise. The orientation session may also be an important social occasion where the instructor and the students get to know each other, and the ideal time for putting people into groups and assigning group tasks. As blended learning is a fairly new methodology, the orientation session can be used to introduce students to this concept, indicating to them exactly how they can benefit by combining traditional and e-learning aspects.

3.4.2 Develop reciprocity and co-operation among students

is the process of getting two or more students to work together to learn (Illinois Online Network, 2003c:Online). Students work in small teams composed of participants with, preferably, differing ability levels and using a variety of learning activities to master material. Each member of a team is responsible for learning what is taught and for helping teammates learn. Research has indicated that co-operative learning can be more effective than interpersonal competitive and individualistic efforts in promoting cognitive development, self-esteem, and positive student-student relationships.

Online learning models are natural environments for getting students to work together, however, learning activities have to be specifically and carefully designed to work effectively (Illinois Online Network, 2003c:Online). According to Chickering and Ehrmann (1996:4), one of the earliest surprises about computers is the extent to which computer-based tools encourage spontaneous student collaboration. A clear advantage, for instance, of e-mail,

is that it opens up communication among classmates even when they are not physically together.

In order for effective learning to occur, the instructor should create a sense of community in the virtual classroom (Illinois Online Network, 2003a:Online). The discussion element of an online course is seen to play a critical role in creating and sustaining this sense of community. The synergy of the discussion is probably the most important learning tool of online courses. Learning teams should bond and thus make each student in the group want to do his or her share.

Successful instructors use strategies to help create an environment in which participants feel eager to contribute and comfortable with the demands and pace of the discussion - both in face-to-face and online classes (Illinois Online Network, 2003d:Online). To enhance co-operative learning the instructor can (Spear, 2003:4; Schlebusch & Oosthuizen, 2003:5):

- ☞ request students to complete a personality questionnaire for the formation of compatible and effective learning work groups;
- ☞ either assign students to groups or request students to form their own groups;
- ☞ assign student forum moderators and summarisers;
- ☞ encourage links between students, e.g. exchange of phone numbers and e-mail addresses;
- ☞ design activities that promote co-operation;
- ☞ structure the content of the programme in such a way that it encourages co-operation;
- ☞ use techniques for fostering student co-operation, e.g. peer reviews, chats, bulletin boards, and discussion forums, and
- ☞ request students to e-mail a list of group goals, and assigned responsibilities mid-way through a group assignment;

To promote co-operation, group members should:

- ☞ provide each other with mutual support and advice on a variety of topics, including test preparation and administrative matters;
- ☞ critique each other's written work, e.g. term papers, and
- ☞ work together on group projects, e.g. develop a team presentation or report on a specific topic, collaborate to produce a group answer to an open-ended discussion question, develop an analysis of a case study or write a joint research paper.

Discussion forums can be used to get students to participate in online programmes. In this case the focus shifts from the instructor and the course materials as the source of knowledge, to students as an important source of knowledge (Australian National Training Authority, 2003a:22). For example, if a student e-mails the instructor with a query that is relevant to the group, the query can be posted to the forum, and all students can then reply. The instructor has to monitor the discussions and intervene, if necessary, or close the discussion by providing the correct answer.

A student should be able to obtain a grade for participation and a *minimum* number of weekly contributions to discussions (Illinois Online Network, 2003a:Online). This will motivate shy students to participate in online discussions. At first, students may submit short, superficial responses but in time their responses and contributions will show more depth and insight.

3.4.3 Encourage active learning and provide prompt feedback

To maximise learning, students must interact with the material they are learning, write about it, relate it to past experiences and incorporate what they are learning into their world view. They must be able to make what they learn an indispensable part of them to take valuable skills and knowledge into the workplace and career pursuits. Research indicates that teaching methods that encourage student activity and involvement are likely to be superior to more passive methods when higher-level cognitive or affective learning is the goal (Chickering & Gamson, 1991:4). Felder (1992:Online) asserts that actively

involving students in learning, instead of simply lecturing to them, leads to improved attendance, deeper questioning, higher grades, and greater lasting interest in the subject.

Active learning strategies may be implemented in the face-to-face classroom as well as the online classroom (University of Alberta, 2002a:Online). Interaction takes different forms: between a student and course materials; between student and learning activities; between student and instructor; among students; and, in a computer-mediated environment, between the student and the technology. Gilbert and Moore (1998:30) note that interactivity in computer-mediated instruction is defined as a reciprocal exchange between the technology and the student. Interactivity includes the element of "feedback".

Getting prompt feedback from the instructor is as important as getting feedback from the computer. Students need appropriate and timely feedback on performance to get the maximum benefit from their education. They need frequent opportunities to perform and receive suggestions for improvement, and they need to learn how to assess and evaluate their own learning and competency progress.

Feedback consolidates a student's understanding, enables him or her to plan how to study, and allows the instructor to elaborate on the instruction (University of Alberta, 2002a:Online). Zirkin and Sumler (1995:101) found that interaction seemed to have an impact on student achievement, as well as satisfaction. *"The weight of evidence from the research reviewed, was that increased student involvement by immediate interaction, resulted in increased learning as reflected by test performance, grades, and student satisfaction."*

Although some text found in literature reveal deep doubts that e-learning methods can ever have the degree of interaction as is the case in a non-distance environment, studies such as one by Miller and Webster (cited in Roblyer & Ekhaml, 2000:Online) have found no significant difference in assessments of interaction between students in a face-to-face and online

programme. Hirumi and Bermudez (1996:6) are among those who find that, with proper instructional design, e-learning can actually be more interactive than traditional learning, providing more personal and timely feedback to meet students' needs than is possible in large, face-to-face classes.

Students need much more support and feedback in the online environment than in a traditional course (Illinois Online Network, 2003b:Online). This is because the potential threat that students feel alienated is quite high in the virtual classroom. Getting students actively involved and using effective feedback strategies will enable the instructor to identify and meet individual student needs as well as encourage students to participate and continue to participate at a high quality level.

As mentioned (*cf.* 3.4.2), there are activities that can be used to provide opportunities, and encourage students to interact and collaborate with one another.

The following activities can be considered to increase the active involvement of students and promote higher-order learning:

- ☞ Provide assignments that simulate in some way the real world application of the course content.
- ☞ Engage students in meaningful activities throughout the instruction not just at the end of a module or unit.
- ☞ Require students to generate meaning for themselves by asking them to analyse, compare, evaluate, and synthesise the concepts, principles, and procedures.

The following guidelines to create a dynamic, active and intellectually stimulating environment for students in blended learning, reflect some of the principles mentioned in this section (Spear, 2003:6; Schlebusch & Oosthuizen, 2003:6):

- ☞ Ask students to state what they expect to learn in the class.

- ☞ Ask students to provide and critique web sites that enhance learning.
- ☞ Pose online discussion questions that foster critical thinking and problem solving.
- ☞ Use open-ended questions to encourage extended and wide-ranging online dialogue.
- ☞ Instruct students to review the content by taking computer-based quizzes that are automatically graded.
- ☞ Ask students to teach or help their classmates.
- ☞ Encourage students to, not only give facts, but express their opinions.
- ☞ Follow-up reading assignments with online discussions, simulations, or applications to case studies/scenarios.
- ☞ Ask students to critique other students' work.
- ☞ Ask students to reflect on their learning, e.g. *“In your own words, describe what you have learned”*.
- ☞ Provide unexpected, small assignments for which students can get bonus credits.

Strategies for providing feedback in the blended learning environment classroom include (Spear, 2003:5; University of Alberta, 2002a:Online):

- ☞ Respond with frequent e-mail: with answers to questions, comments about lesson/unit content, giving directions and information.
- ☞ Return tests, papers, and assignments within one week, i.e. make results available on a regularly basis. It is important that students have ongoing information about their progress. Feedback on grades must be private communication.
- ☞ Provide substantive critique, comment, and/or evaluation for work submitted by individual students or groups, referring to additional sources for supplementary information where appropriate.
- ☞ Hold virtual office hours for students to discuss their graded work. During these hours the instructor must be available for immediate feedback.

- ☞ Acknowledge all student questions. If it is not possible to answer a question immediately, inform the student of the expected delay in getting the right answer.
- ☞ Link feedback to associated reference materials for enrichment or remedial support.
- ☞ Take note of students who don't participate during the first session, and contact them individually after class. They may have technological difficulties, and it is critical to get them resolved as soon as possible. If students are focusing on the medium of delivery, they cannot focus on the course content.
- ☞ Thank students publicly for comments submitted to the virtual classroom showing insight or depth. This will serve to model the types of responses and critical thinking skills expected from other participants as well as give positive reinforcement to the student who contributed the message.
- ☞ Irrespective of the specific learning activity, the instructor should recognise quality work and intervene as the work is being developed to steer students in the right direction. When the instructor participates in an online conference providing extensive critique, feedback, and encouragement, students cannot help but become more involved.

Roblyer and Ekhaml (2000:Online) designed the rubric given in Table 3.3 that can be used for evaluating interactive qualities of distance learning programmes. As many of the techniques used in distance learning are applicable to blended learning it is the view of the researcher that this rubric can successfully be used to evaluate a blended learning programme.

The rubric has four separate elements that contribute to a programme's level of interaction and interactivity, namely:

1. Social rapport-building activities created by the instructor;
2. Instructional designs for learning created by the instructor;
3. Levels of interactivity of technology resources, and
4. Impact of interactive qualities as reflected in student response.

A programme is evaluated by circling a description for each of these four elements that applies best to the programme. After reviewing all elements and circling the appropriate level, the points should be totalled to determine the programme's level of interactive qualities (e.g., low, moderate or high).

Low interactive qualities	1 - 7 points
Moderate interactive qualities	8 -14 points
High interactive qualities	15-20 points

Scale (see points below)	Element #1 Social Rapport- building Activities Created by the Instructor	Element #2 Instructional Designs for Learning Created by the Instructor	Element #3 Levels of Interactivity of Technology Resources	Element #4 Impact of Interactive Qualities as Reflected in Student Response
Few interactive qualities (1 point)	The instructor does not encourage students to get to know one another on a personal basis. No activities require social interaction, or are limited to brief introductions at the beginning of the course.	Instructional activities do not require two-way interaction between instructor and students; they call for one-way delivery of information (e. g., instructor lectures, text delivery).	Fax, web, or other technology resource allows one-way (instructor to student) delivery of information (text and/or graphics).	By the end of the course, all students in the class are interacting with instructor and other students <i>only</i> when required.
Minimum interactive qualities (2 points each)	In addition to brief introductions, the instructor provides for one other exchange of personal information among students, e.g., written bio of personal background and	Instructional activities require students to communicate with the instructor on an individual basis only (e. g., asking/responding to instructor questions).	E-mail, listserv, bulletin board or other technology resource allows two-way, asynchronous exchanges of information (text and/or graphics).	By the end of the course, between 20-25% of students in the class are initiating interaction with the instructor and other students on a voluntary basis (i.e., other than when required).

	experiences.			
Moderate interactive qualities (3 points each)	In addition to providing for exchanges of personal information among students, the instructor provides at least one other in-class activity designed to increase social rapport among students.	In addition to requiring students to communicate with the instructor, instructional activities require students to work with one another (e. g., in pairs or small groups) and share results within their pairs/groups.	In addition to technologies used for two-way asynchronous exchanges of text information, chat room or other technology allows synchronous exchanges of written information.	By the end of the course, between 25-50% of students in the class are initiating interaction with the instructor and other students on a voluntary basis (i.e., other than when required).
Above average interactive qualities (4 points each)	In addition to providing for exchanges of personal information among students, the instructor provides several other in-class activities designed to increase social rapport among students.	In addition to the requiring students to communicate with the instructor, instructional activities require students to work with one another (e. g., in pairs or small groups) and share results with one another and the rest of the class.	In addition to technologies used for two-way, asynchronous exchanges of text information, additional technologies (e. g., teleconferencing) allow one-way visual and two-way voice communications between instructor and students.	By the end of the course, between 50-75% of students in the class are initiating interaction with the instructor and other students on a voluntary basis (i.e., other than when required).
High level of interactive qualities (5 points each)	In addition to providing for exchanges of personal information among students, the instructor provides a variety of in-class and outside-class activities designed to increase social rapport among students.	In addition to the requiring students to communicate with the instructor, instructional activities require students to work with one another (e. g., in pairs or small groups) and outside experts and share results with one another and the rest of the class.	In addition to technologies to allow two-way exchanges of text information, visual technologies such as two-way video or videoconferencing technologies allow synchronous voice & visual communications between instructor and students and among students.	By the end of the course, over 75% of students in the class are initiating interaction with the instructor and other students on a voluntary basis (i.e., other than when required).
Total for each:	----- pts.	----- pts.	----- pts.	----- pts.
Total overall:	----- pts.			

Table 3.2 Rubric to be used for evaluating interactive qualities of distance learning programmes (Roblyer and Ekhaml, 2000:Online)

3.4.4 Emphasize time on task

Chickering and Ehrmann (1996:6) assert that “*Time plus energy equals learning*”. Learning to use one’s time well is critical for students and professionals alike. Allocating realistic amounts of time means effective learning for students and effective teaching for instructors. To survive in a demanding academic world, students have to be pragmatic about how they spend their time (Wlodkowski, 1993:Online).

New technologies can dramatically improve time on task for students by making studying more efficient. Teaching strategies that help students learn at home or work can save hours otherwise spent commuting to face-to-face classes. Time efficiency is dramatically increased as a result of modern-day e-communication. Furthermore, students and instructors alike make better use of time when they can get access to important resources for learning online, instead of spending hours in a library (Chickering & Gamson, 1987:Online).

The following guidelines can be followed to emphasise time on task (Spear, 2003:4; Schlebusch & Oosthuizen, 2003:5):

- ☞ Provide an orientation session or a programme overview which indicates total time students should expect to expend each week. Inform students about the importance of time on task, and time management skills.
- ☞ Provide learning objectives for each module, lesson, unit or chapter.
- ☞ Indicate suggested time-on-task for each task.
- ☞ Post notes from assignments and ask each student to respond within a certain time frame.
- ☞ Require online discussions, e.g. use open-ended question to encourage extended and wide-ranging dialogue.
- ☞ Build in a reward system of points for all student work – even for simply participating.

- ☞ Make assignments enjoyable for students to encourage increased time-on-task.
- ☞ Make students aware of time that would have been spent sitting in a face-to-face class and travelling to class in comparison to time expended on computer-mediated classes.

3.4.5 Communicate high expectations

Expecting students to perform well becomes a self-fulfilling prophecy when instructors and institutions hold high expectations of themselves and embark in extra efforts. Setting reachable goals contributes to successful learning for the poorly prepared, as well as for the bright and well motivated. Instructors and students alike must constantly focus on the importance of a high quality education through continual high expectations (Chickering & Gamson, 1987:Online).

The most important factor in communicating high expectations is to ensure that the students are fully informed about what is expected of them. Students are often unsure of performance expectations in Web-based courses and in particular with discussion groups. Unclear and ill-defined evaluation standards lead to student stress and avoidance (Illinois Online Network, 2003a:Online). Students should be provided with a policy on expected participation and a description of grading criteria. The instructor should clearly state expectations regarding (University of Alberta, 2002a:Online):

- ☞ quality, quantity, depth, breadth, and frequency of discussion participation and interaction;
- ☞ relative emphasis on facts, concepts, critical thinking, analysis, writing, format, and quantitative reasoning;
- ☞ deadlines;
- ☞ etiquette;
- ☞ internet usage;
- ☞ frequency of check-ins and

☞ how to effectively participate.

In addition to the above-mentioned, the instructor should do the following (Spear, 2003:4; Schlebusch & Oosthuizen, 2003:5):

- ☞ set high standards for him/herself;
- ☞ model high standards and quality through example;
- ☞ include course goals, performance objectives, and examples of good student work either online or in the study guide;
- ☞ post outstanding, average, and poor student work online, and
- ☞ convey enthusiasm and passion for the subject.

3.4.6 Respect diverse talents and ways of learning

Students need the opportunity to showcase their talents and learn in ways that work for them. They also need to be nudged into learning new ways that might not come so easily, and expand their learning style inventory to include experimenting with different methods.

As mentioned (*cf.* 2.4) a blended learning environment may incorporate a variety of instructional technologies such as electronic presentations, a course Web site, CD-ROMs, videotapes, and printed materials. The term environment is used as a conceptual shell for learning experiences that are no longer constrained by the boundaries of location and time (University of Alberta, 2002a:Online). The freedom to combine more than one method of teaching leads to multiple options, e.g. the following examples given by Singh (2003:52): blending offline and online learning, blending self-paced and live, collaborative learning, blending structured and unstructured learning, and blending custom content with off-the-shelf content.

By its very nature, blended learning thus provides the perfect opportunity to offer students different ways of learning. However, the focus must remain on integration, where everything complements everything else to form a neat

whole, rather than on simply providing multiple options (Australian National Training Authority, 2003a:11).

Instructors can take student characteristics into consideration by doing the following (Spear, 2003:9; Schlebusch & Oosthuizen, 2003:7):

- ☞ Ask students to complete a learning style assessment questionnaire.
- ☞ At the beginning of the programme, try not to rely on own assumptions about what students know, but give them a small task, e.g. sending an e-mail, to try and establish the level of their computer skills.
- ☞ Allow students who are not confident with computers plenty of time to work face-to-face until they have picked up on the basic skills.
- ☞ Design materials in a flexible way to accommodate different student groups. Well-designed modules allow the instructor to tailor assessment tasks and timing to the group.
- ☞ Build in tasks and options that cater for different learning styles, e.g. include both chats and formal written tasks.
- ☞ Design more than one method of assessment and demonstration of student achievement.
- ☞ Understand and allow for different pacing (keeping in mind the time-on-task principle).
- ☞ Recognise, respect, and reward creativity.
- ☞ Allow students to choose from different possible modes of project presentation which were established up-front in a learning agreement between instructor and student.
- ☞ Make students aware of other resources (e.g. web resources) and alternative media (e.g. videos) to master course content.
- ☞ Design course materials to encourage analysis, synthesis, application, and evaluation.
- ☞ Recognise that some students will derive more benefits from the face-to-face sessions and others more from the e-learning component.

- ☞ Be sensitive to possible cultural differences.
- ☞ Understand and appreciate possible problems that students may encounter with the e-learning component, e.g. technical problems.

3.4.7 Making effective use of technology

Modern technology provides the possibility to present particular objects or events in a variety of ways. Media integration may, however, not be taken lightly but must be preceded by systematic planning. The instructor must make sure that optimal learning gain is obtained (Steyn, 1993:1).

There is a strong temptation to introduce fancy technology just because it is available (Wills, 2001:Online). 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?*” 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 (The Pennsylvania State University, 1997:Online), 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 student should drive the media selection and application process. The report indicates that the following should be taken into consideration in selecting media for distance learning programmes. It is the view of the researcher that the factors are equally applicable to blended learning programmes:

- ☞ 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 learning 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 online 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 learning 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 instructor should take into consideration what influence the students' age, maturity and 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 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, 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 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 been 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*”.

However, the researcher asserts that the ACTION model of decision-making criteria by Bates (1995:35-40) outlines a good practical strategy for selecting instructional technologies. ACTION is an acronym derived from the words: Accessibility, Cost, Teaching, Interactivity, Organisation and Novelty. These decision-making steps involve asking questions about each of these aspects, e.g.

- ☞ Accessibility: will students be able to easily access and use the media?
- ☞ Cost: how cost effective is the technology?
- ☞ Teaching: is the technology a viable way for achieving the learning objectives?
- ☞ Interactivity: does the technology support interactive activities for students?
- ☞ Organisation: is the institution organised to support the use of the technology?
- ☞ Novelty: will the technology interest students or be overwhelming to use?

The following table can be used as a guideline to link the type of learning with the best media (University of Alberta, 2002a:Online). In the left-most column the type of learning is indicated, the second column lists examples and in the column on the right, the appropriate media is suggested.

Type of Learning	Examples	Media
Memorization	learning definitions dates & events	text pages slide presentations interactive drill & practice
Conceptual understanding	classifying and organizing information/objects	listserv/text page slide presentation online discussion groups
Casual understanding	make predictions develop solutions	listserv/text page slide presentation
Skill application	apply skills to diverse situations	tutorial practice exercises
Higher-order skill application	flexibly combine and apply a variety of skills in complex, novel situations	student group projects online discussion groups document sharing
Interpersonal skills	ability to relate effectively to others	video examples problems with feedback online role-playing activities online discussion groups
Affective (attitudes & values)	facilitate the development attitudes and values	video examples problems with feedback online discussion groups

Table 3.3 Guidelines to link the type of learning with the best media (University of Alberta, 2002a:Online)

It is the view of the researcher that using the guidelines indicated in the above-mentioned table and combining it with the ACTION model of decision-making (Bates 1995:35-40), an instructor will be able to, successfully, select the most effective technology for a specific programme.

3.5 CONCLUSION

The aim of Chapter Three was to blend the principles of computer literacy, outcome based education and good teaching practice.

Through this literature study the researcher concludes that, although there is no specific definition for computer literacy, the content of a CL programme should preferably include teaching students about basic theoretical concepts of computer hardware and software, as well as word processing, spreadsheet, database, presentations, Internet and e-mail skills (*cf.* 3.2.1, 3.2.2).

In researching the principles of OBE and good teaching practice, the researcher came to the conclusion that many of these principles complement one another and they can, with ease, be applied in a blended learning

environment. In this regard it was noted that the principle to encourage active learning (*cf. 3.4.3*) blends in with the very important principle that OBE is driven by the vision of what students should be able to *do* and not merely what they *know* (*cf. 3.3.2*). Indeed if an outcome is anything that a student can show that (s)he knows and can do, it is imperative for students to be actively involved in the learning process (*cf. 3.3.3*). The principle of promoting co-operative learning (*cf. 3.4.2*) is in line with one of the critical outcomes of the South African OBE system, i.e. that “students should be able to work effectively with others as a member of a team, group, organisation or community” (*cf.3.3.3*). Likewise the critical outcome stating that students should be able to use science and technology effectively (*cf. 3.3.3*), underlines the principle of making effective use of technology (*cf.3.4.7*).

The researcher noted with interest how many of the principles of OBE assessment relate to the principles of good practise. The fact that OBE assessment criteria are clearly defined at the beginning of an activity (*cf. 3.3.4.1*) is in accordance with the principle of communicating high expectations (*cf. 3.4.5*). Furthermore OBE suggests that competencies are acquired through interaction with the mediator (*cf. 3.3.4.1*) which compliments the principle of prompt feedback (*cf. 3.4.3*). Performance-based assessment, which expects students to engage in activities that require them to demonstrate specific skills (*cf. 3.3.4.1*), is in accordance with the principle of encouraging active learning (*cf.3.4.3*), and the notion of formative assessment that builds up a system of feedback to form the appropriate learning experience to the benefit of the student (*cf.3.3.4.1*) blends in with the principle of prompt feedback. The variety of methods and strategies that can be used to perform OBE assessment (*cf. 3.3.4.3*) indicates that an OBE programme will be able to accommodate the principle of taking diverse talents and ways of learning (*cf. 3.4.6*) into consideration.

The researcher concludes by stating that the literature content of this chapter provides a sound framework for developing an outcomes-based computer literacy programme based on principles of good teaching practice.

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 to be presented in blended 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 blended learning in education by researching the different methodologies that can be used in presenting blended learning programmes;
- ☞ determine how the principles of good practice and OBE influence the development of a blended learning computer literacy programme, by researching the core elements of good practice, OBE and computer literacy;
- ☞ investigate the most appropriate way to go about developing a blended learning computer literacy programme in the South African context, and
- ☞ establish how a blended learning computer literacy programme can be implemented to enable more productive computer training, implement such a programme and evaluate the outcomes of the programme.

A review of literature in Chapter Two revealed that blended learning is set to play an increasingly important role in future education systems and that there are various techniques of implementing blended learning programmes. It

further indicated instructional design guidelines that could be followed in designing a blended learning programme.

In Chapter Three a literature overview of the principles of CL, OBE and good teaching practice, provided a framework for developing an effective CL learning programme.

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

4.2 RESEARCH METHODS IMPLEMENTED IN DATA COLLECTION

4.2.1 Selecting the research methodology

Hummelvoll and da Silva (1998:465) state that qualitative researchers accumulate data by interacting with selected individuals in their settings and by acquiring documents relevant to the study.

Gerdes and Conn (2001:184) indicate 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. Qualitative research 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).

Devers, Kelly, Frankel and Richard (2000:254) list the following important characteristics of qualitative research:

- ☞ The logic of qualitative research is inductive, rather than deductive, and consists of describing people and groups' particular situations, meanings and experiences.
- ☞ Qualitative research designs are emergent and flexible, and the research itself is quite dynamic, i.e. the researcher, research subjects, their relationship, and the research setting are all subject to development and change.
- ☞ The qualitative research process is non-linear and non-sequential. Data collection and analysis often proceed simultaneously.

Although qualitative research will be the primary methodology implemented, the researcher will also, to a limited extent, employ a quantitative research strategy. Quantitative research deals with quantifying relationships between variables (Hopkins, 2000:Online). Quantitative studies can either be descriptive or experimental. In a descriptive study, no attempt is made to change behaviour or conditions - things are measured as they are. The two methodologies are often seen in opposition; however, an either/or position is viewed to be misleading and the two methodologies should rather be used simultaneously to compensate for each other's weaknesses and supplement the strengths. In this study the researcher will use an aspect of the quantitative method to build a profile of prospective students (*cf.* 4.3.3).

Patton (2002:231) defines programme evaluation research as “the systematic collection of information about the activities, characteristics, and outcomes of a programme to make judgements about the programme and improve the programme's effectiveness”. He asserts that qualitative methods are often used in evaluations as they tell the programme's story by capturing and communicating the participants' stories.

A specific type of qualitative research - action research - is used to improve practice rather than to produce knowledge (Charles, 1995:220). This kind of research is frequently done by instructors in graduate studies programmes.

The aim of this study is to develop, implement and evaluate a CL programme. Taking into consideration the factors mentioned in this section, the researcher came to the conclusion that action research, as a component of the qualitative research methodology, will be most suitable to use.

The following section describes the way action research was applied in this study.

4.2.2 Action research

According to Hitchcock and Hughes (1995:6), action research can be described as inquiry conducted on a particular issue of current concern, usually undertaken by those directly involved, with the aim of implementing a change in a specific situation.

Dick (1999:Online) notes that there are several varieties of action research; however, for the most part, they have in common that they are oriented towards achieving two sets of outcomes at the same time: action and research. The purpose is to research action, and to action (i.e. act on) research.

Schmuck (1997:29) asserts that action research is:

- ☞ practical, as insights from data lead to practical improvements in the classroom;
- ☞ participative, as action researchers are co-workers who 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), Lippert and Radke (1946), Elliot (1978), Ebbutt (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). These phases are initiation, detection and judgement (*cf.* 1.5.2). 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 (Schmuck, 1997:50). It was decided to combine some of the steps, as the programme will be evaluated during implementation and not at the end of the process (*cf.* Fig 4.1). The researcher correlated the steps of action research with the phases of instructional design (*cf.* 2.5).

The steps followed in this study were:

- ☞ Step 1: Collect and analyse data to diagnose the situation, i.e. collect data and use this data to design the new programme (*cf. 2.5.1 and 2.5.2*).
- ☞ Step 2: Distribute the data to others, i.e. develop the new programme (*cf. 2.5.3*).
- ☞ Step 3: Try a new practice, i.e. implement, and monitor the implementation of the programme (*cf. 2.5.4*).
- ☞ Collect and analyse data to diagnose the situation, i.e. evaluate the programme (*cf. 2.5.5*). At this stage 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 were 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 - 2 are classified as the initiation phase;
- ☞ step 3 is classified as the detection phase and
- ☞ step 4 is classified as the judgement phase.

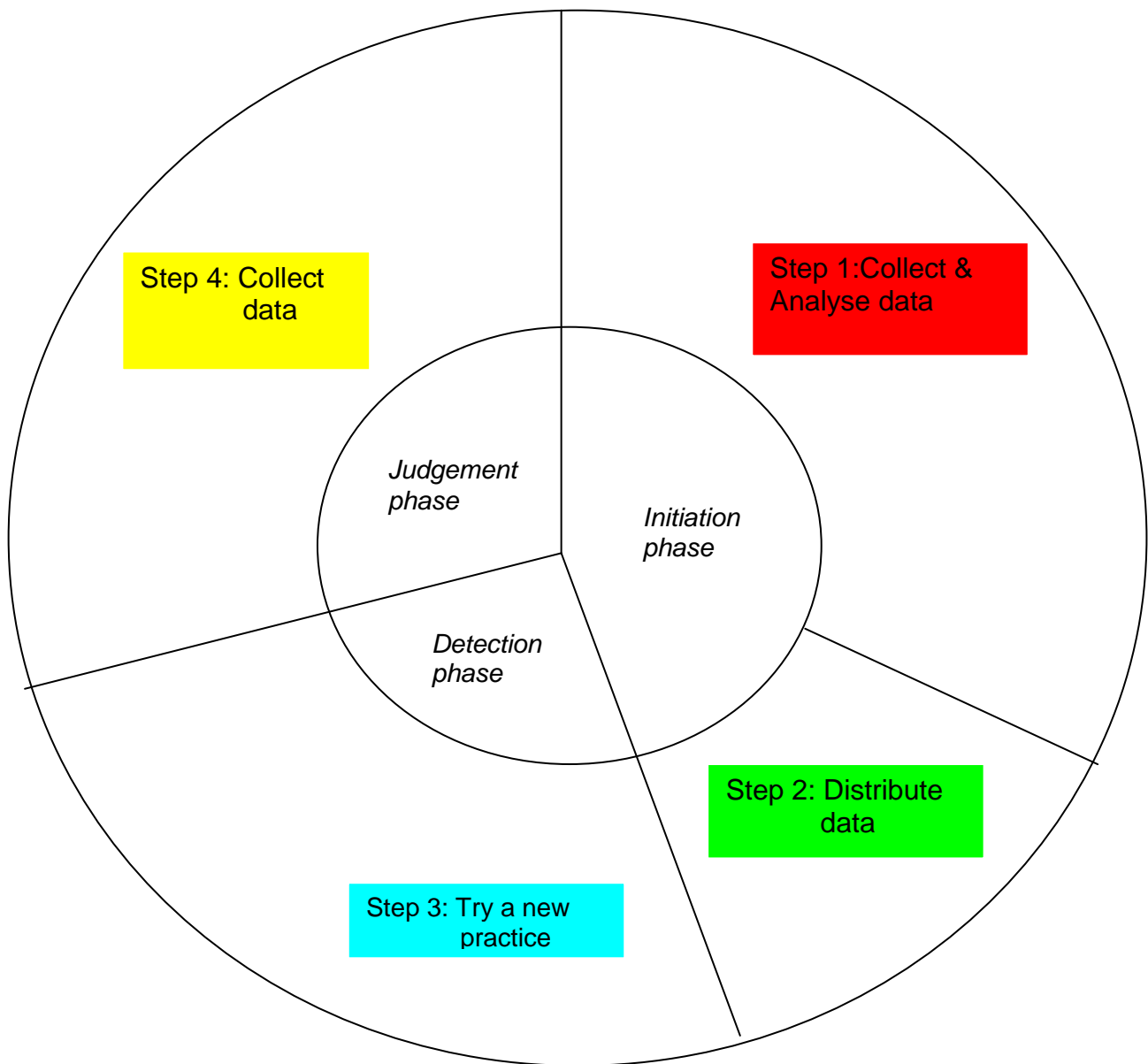


Fig. 4.1 Steps in action research (Schmuck, 1997:50)

The way data was collected and analysed correlates with the steps indicated in *Fig. 4.1*. The following table summarises the process as applied in this study:

CYCLE	STEP	Para-graph	ACTIONS TAKEN
Cycle 1	Step 1	4.4.1	Collect data by doing a thorough literature review and obtaining quantitative information about the background of prospective students. Analyse the data and design the programme.
	Step 2	4.4.2	Distribute data: develop the programme.
	Step 3	4.4.3	Try a new practice: implement the programme at one site of instruction (round 1).
Cycle 2	Step 1	4.4.4	Collect and analyse data from the students and instructor involved in round 1 of implementation.
	Step 2	4.4.5	Distribute data: if necessary, change the programme to improve it.
	Step 3	4.4.6	Try a new practice: implement the changed programme at more than one site of instruction (round 2).
Cycle 3	Step 1	4.4.7	Collect and analyse data from the students and instructors involved in round 2 of implementation.
	Step 2	4.4.8	Distribute data: if necessary, change the programme to improve it.
	Step 3	4.4.9	Try a new practice: implement the changed programme (round 3).
Cycle 4	Step 1	4.4.10	Collect and analyse data from the students and instructors involved in round 3 of implementation.
	Step 2	Chapter Five	Distribute data: present the final programme.

Table 4.1 Cycles of action research as applied in this study

4.3 ASPECTS OF DATA COLLECTION

In this section the researcher describes the validity, population and sampling, and methods used in data collection for this research.

4.3.1 Validity

The most essential attribute of a research instrument is the existence of validity (Frankel & Devers, 2000:253).

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 (1997:404) 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 (1997:405-406) 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.
- ☞ Data was recorded mechanically. A tape recorder was used 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 direct quotations from the data to illustrate participants' views.
- ☞ 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*". This strategy is referred to as member checking.
- ☞ The strategy of participant review was applied by asking participants to review the researcher's synthesis of interviews for accuracy of representation.

The researcher has no doubt that the strategies followed in this study ensured the validity of the research.

4.3.2 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, 2000:255). 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, purposeful sampling is often employed (Frankel & Devers, 2000:264). Purposeful 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 (1997:397) assert that purposeful sampling strategies differ from probability (or random) sampling strategies in that it 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 purposeful 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.*"

In correlation with the first step of responsive action research (*cf. 4.4.4*) - which indicates data collection before action - the researcher intended to interview instructors who have already been using the methodology of blended learning in a particular programme. However, as this is such a new phenomenon in the field of didactics, it became clear that most information on blended learning were to be found from sources on the Internet, and that there were no experts in South Africa in this specific field. The initial data collection for developing the programme was thus done by an extensive literature review (*cf. Chapter Two and Chapter Three*).

As the researcher was an instructor at Vista University for the duration of this study, the programme was implemented at various campuses of Vista University. The students and instructors involved in the implementation of the programme were the key role players in the cycles of action research. It should be mentioned that it was initially intended to implement the programme on six different campuses, however, due to technical problems (e.g. problems

with sound cards) experienced, the programme was only implemented at three sites: the Welkom, Port Elizabeth and East Rand campuses of Vista University. The duration of the programme is six months. A total of 496 students enrolled over a period of eighteen months, i.e. the three rounds of implementation and testing (*cf. Table 4.2*). Three instructors at the different campuses were involved in implementing and evaluating the programme. The following table summarises the number of students per campus:

Period of implementation	Campus	Number of students	Number of instructors
FIRST ROUND OF IMPLEMENTATION			
Jan 2003 – June 2003	Welkom	69	1
SECOND ROUND OF IMPLEMENTATION			
July 2003 – Nov 2003	Welkom	73	1
July 2003 – Nov 2003	Port Elizabeth	187	1
July 2003 – Nov 2003	East Rand	66	1
THIRD ROUND OF IMPLEMENTATION			
Jan 2004 – June 2004	Welkom	101	1

Table 4.2 Summary of population and sampling

For the first round of implementation and data collection, the programme was piloted only at one campus, i.e. the Welkom campus. This is the campus where the researcher is based, and it provided an opportunity to closely observe the process of implementation, and collecting data on a day-to-day basis as the programme progressed. It was seen as a pilot implementation (*cf. 4.4.3*).

For the second round, the programme was introduced at two other campuses of Vista University, i.e. Port Elizabeth and East Rand. This provided the

opportunity to test the programme with student from two other provinces of South Africa, i.e. the Eastern Cape and Gauteng.

For the third and final round of implementation, it was envisaged that the programme should be presented at the campuses of Vista University. However, as a result of the restructuring of higher education in South Africa (South Africa, 1997:Section 24), each of the campuses of Vista University merged with a different higher education institution in 2004. As a result of these mergers the continuation of the research had to be confined to the campus where the researcher was based, i.e. the Welkom campus. The final, revised programme was thus implemented in July 2004 at the Welkom campus, which was merged with the Technikon Free State, to form the Central University of Technology, Free State (CUT,FS).

4.3.3 Methods employed in data collection

✦ *Literature review*

An interpretative literature review is a summary and synthesis of relevant literature on a research problem (McMillan & Schumacher, 1997:119). According to Devers *et al.* (2000:255) no matter what the discipline, research cannot be undertaken without a thorough review of the literature. They assert that the outcomes of a literature review are the following:

- ☞ Sharing the results of other studies that are closely related to the research.
- ☞ Relating the study to a larger, ongoing dialogue amongst professionals in the field of research.
- ☞ Providing a framework for establishing the importance of the study, as well as a benchmark for comparing the results of the study with other findings.

In this study the researcher performed a thorough literature review to create a contextual framework for developing the envisaged programme. The findings are summarised in paragraph 4.4.4.1.

◆ **Interviews**

“If you want to know how people understand their world and their life, why not talk to them?” (Kvale, 1996:1). The qualitative research interview attempts to understand the world from the subjects’ point of view, and to unfold the meaning of peoples’ experiences.

McMillan and Schumacher (1997:447) assert that qualitative interviews may take several forms:

- ☞ In the informal conversational interview, the questions emerge from the immediate context and are asked in the natural course of events; there is no predetermination of question topics.
- ☞ In the interview guide approach, topics are selected in advance but the researcher decides the sequence and wording of questions during the interviews.
- ☞ In the standardised open-ended interview, participants are asked the same questions in the same order, thus reducing interviewer effects and bias.

According to Patton (2002:341), programme evaluation interviews aim to capture the perspectives of programme participants. Questions to be answered include: *“What does the programme look and feel like to the people involved?”*; *“What are their experiences of the programme?”*; *“What are their expectations?”* It is the responsibility of the researcher to provide a framework within which interviewees can respond comfortably, accurately and honestly.

In this study the researcher conducted personal interviews with the instructors involved in implementing the programme. To keep the interview conversational and collect as much information as possible, the interview guide approach was followed (*cf. Table 4.5*)

The researcher also conducted interviews with students participating in the programme. However, as so many students enrolled, it was impossible to interview everyone individually, and therefore students were interviewed in groups. Focus group interviews are effective, as the interaction among the

interviewees often leads to spontaneous statements about the topic under discussion (Kvale 1996:101). In the view of McMillan and Schumacher (1997:453), a focus group interview is a strategy for obtaining a better understanding of a programme by interviewing a purposefully sampled group of people. The fact that group members are stimulated by the perceptions and ideas of one another, increases the quality and richness of data through a more efficient strategy than one-on-one interviewing. Standardised open-ended interviews were conducted in this case (*cf. Table 4.6*). This ensured that participants were asked the same questions, but still permitted interaction among the interviewees.

The interviews are discussed in detail in paragraph 4.4.4.

♦ **Questionnaire**

Questionnaires are the most widely used technique for obtaining information from participants, and are mostly associated with the quantitative method of research (McMillan & Schumacher, 1997:252). Although this study primarily used the qualitative method of research, a questionnaire was used to help build a profile of prospective students (*cf. Table 4.3*). Students were requested to complete a questionnaire to determine how many have computer access at home and had prior experience of working on a computer. As the researcher did not intend to perform any statistical analysis on the quantitative data, but to portrait a fact, the questions were simple closed factual questions, i.e. the assumption was made that respondents would give a yes or no answer (Scott & Usher, 1999:68).

The findings of the questionnaires, presented in pie charts (*cf. 4.4.1.2*) constituted an important part of the analyses, as they played a concluding role in selecting the media to be used in the programme (*cf. Table 4.4*).

◆ **Other**

In addition to the more traditional methods of data collection (i.e. the literature review, interviews and questionnaires), the following methods, specifically related to action research, were also employed (McKernan, 1996:81-91).

- ☞ The researcher kept a journal and made cryptic notes of events. These notes were used to report the proceedings in detail (*cf. 4.4.3, 4.4.6, 4.4.9*).
- ☞ A profile of the envisaged programme was set up by completing an instructional design worksheet (*cf. Table 4.4*). This profile provided a structure for the programme and enabled the researcher to identify key elements that should be evaluated during implementation. It included evaluating the contents of the programme, the manual that was developed, the media or technology that was used and the implementation strategies that were followed.
- ☞ The researcher used a checklist as proposed by the University of Alberta (2002a:Online) to evaluate the process of implementation (*cf. Table 2.3*).
- ☞ Document analysis was done involving all documentation relevant to the programme, e.g. the study guide, curriculum, tests, examination papers, examination results and student assignments.

4.4 DATA COLLECTION AND ANALYSIS

As previously explained this study was done following the steps of responsive action research (*cf. fig. 4.1*). This section aims to describe in detail how data was collected and analysed during each of the cycles.

4.4.1 Cycle 1, Step 1: Collect and analyse data to diagnose the situation (*cf. table 4.1*)

4.4.1.1 Literature review

During the first cycle of data collection, the researcher performed an extensive literature review of the principles of blended learning, computer literacy,

outcomes-based education and good teaching practice. The aim was to contextualise a framework for developing an effective outcomes-based CL programme. Furthermore, the literature review included a review of instructional design principles related to blended learning (*cf.* 2.5). The aim was to find the best way to follow in developing the envisaged programme.

This section gives an overview of the most important aspects that emerged from the literature review.

- ☞ Blended learning is a powerful strategy that expands and enhances the learning experience by combining the strengths of both e-learning and face-to-face instruction. It has become all pervasive in the training industry, and it is said to be applied increasingly in the search for delivering effective education (*cf.* 2.2).
- ☞ There is a vast number of different elements that can be used in blended learning, e.g. printed material, face-to-face instruction, instructional television, video-conferencing, CAL, computer communication technology, and WBI. Each one of these elements has advantages and disadvantages and should be considered in the context of the learning outcomes of the programme and the profile of the students (*cf.* 2.4).
- ☞ The most important aspect of developing a blended learning programme, is to apply the “right” learning technologies to match the “right” personal learning style to transfer the “right” skills to the “right” person at the “right” time. There is a number of strategies that can be followed to select the “right” blend (*cf.* 2.3).
- ☞ There exist well-developed instructional design models that can assist in developing an effective blended learning programme. The phases include analysis and design, development, implementation and evaluation (*cf.* 2.5). The researcher correlated each of the phases in the instructional design model with different steps in the action research cycle (*cf.* table 4.1).
- ☞ Literature reveals design principles that can be applied to ensure the effectiveness of a blended learning programme. The researcher followed

these guidelines in the different phases of the instructional design process (cf. 4.4.2, 4.4.3, 4.4.4, 4.4.5).

- ☞ Although there is no universal definition for computer literacy, two standards set in different countries indicate that a computer literacy programme should preferably consist of basic computer-related theory, word processing, spreadsheet, databases, operating system, as well as Internet and e-mail literacy. This fact laid the foundation for selecting the content of the envisaged programme (cf. 3.5).
- ☞ Many of the principles of good teaching practice correlate with those of outcomes-based education, and can, with ease be applied in a blended learning environment (cf. 3.5).

After the literature review, the researcher decided to develop the envisaged programme by following the phases of the instructional design model, and taking into consideration the principles of OBE and good teaching practice.

The first phase in instructional design suggested that one of the most important aspects of the analysis and design stage is to analyse the target population of learners. Sound instruction requires considering the characteristics of students. The aspects that the researcher found necessary to look into in this regard were the availability of computers at home, and the extent to which students had experience of using computers before enrolling for the programme. Students were requested to complete a questionnaire (cf. Table 4.3).

4.4.1.2 Questionnaire

The questionnaire is the only part of this qualitative research where quantitative data is used. To be able to determine the type of e-learning component that should be included in the blended learning programme, the researcher had to establish whether students had access to computers at home and to what extent have they been using computers before enrolling for the programme. An important criteria for selecting the e-learning component of the programme, is that the media should be accessible to students (cf.

3.4.7), e.g. there would be no use in selecting web-based instruction, if most students do not have computers and Internet connectivity at home. As the researcher, from experience, knows that the students of Vista University typically come from a disadvantaged background, it was predicted that prospective students would have very little prior experience of working on a computer and might probably not have a computer at home. However, this fact had to be substantiated by statistics, and therefore students in the first group were requested to complete the questionnaire in table 4.3

Questionnaire

Indicate your selection with an X.

1a	At which Vista campus are you a student?	Mamelodi	Soweto	East Rand	Sebokeng
		Welkom	Bloemfontein	Port Elizabeth	VUDEC
1b	How many times have you worked on a computer before you enrolled for this End user Computing course?	0 times	Less than 10	Weekly	Daily
1c	Do you have a computer at home?	Yes	No		
1d	Have you ever taken a formal computer literacy course before?	Yes	No		
1e	Specify what course if you answered "Yes" in 1d.				

Table 4.3 Questionnaire

The results of the questionnaire confirmed what the researcher had predicted, i.e. that by far the majority of students did not have computers at home and had never worked on a computer before enrolling for the programme. The results are summarised in the following pie charts:

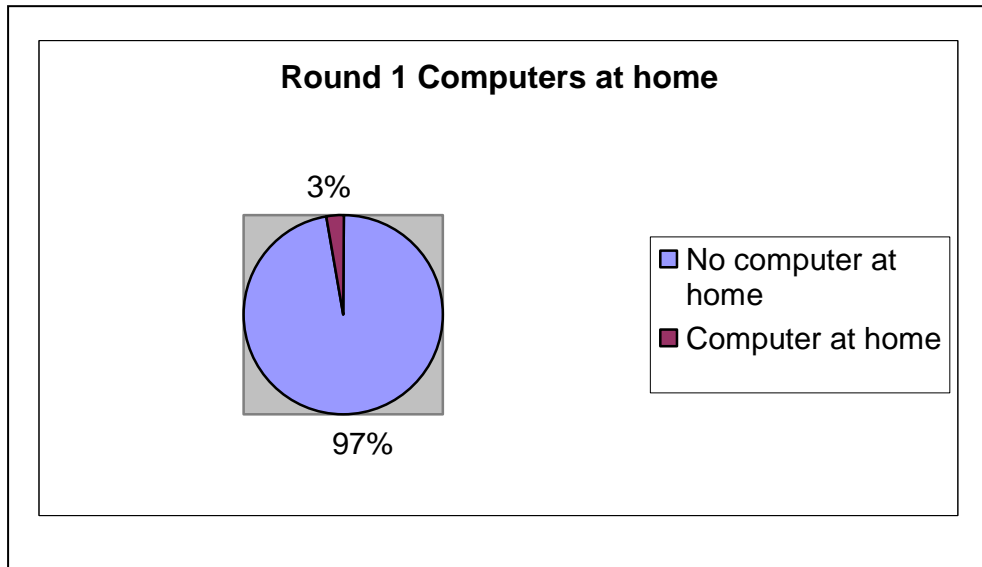


Fig. 4.2 Percentage of students with computers at home

The chart in *fig 4.2* indicates that only 3% of the students had a computer at home.

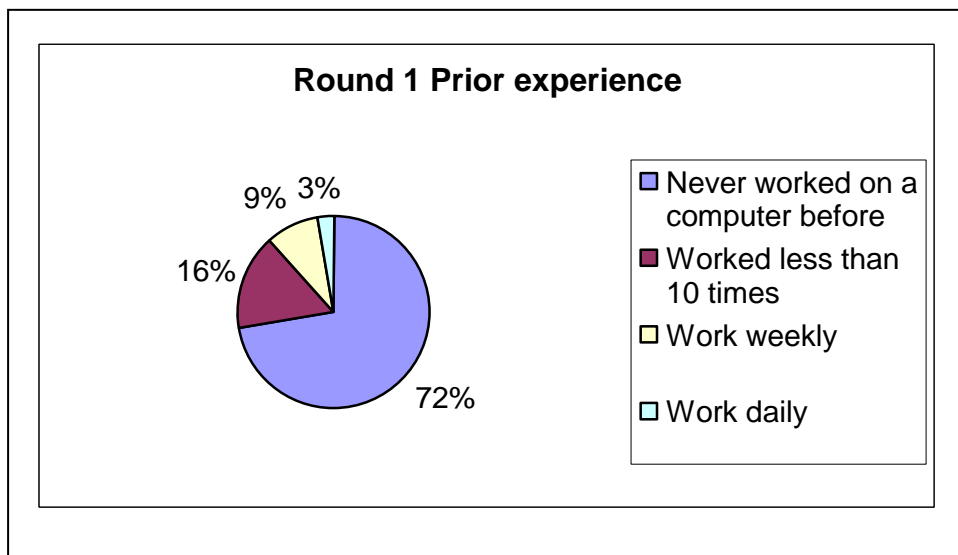


Fig. 4.3 Percentages indicating prior experience working with computers

The chart in fig 4.3 indicates that 72% of the students had never worked on a computer before enrolling for the programme; 16% had used a computer less than 10 times; 9% used a computer on a weekly basis and only 3% made use of a computer on a daily basis.

The statistics portrayed by these charts gave a clear indication that the researcher could not consider WBI as part of the envisaged blended learning programme, but that the e-learning part of the programme should preferably take place in the computer laboratories on campus.

4.4.1.3 Design the programme

The researcher proceeded by designing the programme, following the guidelines as set out in Chapter Two. The following instructional aspects as proposed by OTEN and Reigeluth (*cf.* 2.5.2) were addressed in designing the programme:

♦ Learning outcomes

One of the themes derived in sub-section 3.2.2 is that a CL programme should consist of a theory as well as a practical component. Furthermore, the specific outcomes for the subject Computer Applications Technology are listed in sub-section 3.3.5. 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 Windows 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 Internet 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 are listed at the beginning of each unit in the study guide (*cf Chapter Five*).

♦ **Content outline**

From the questionnaires (*cf. Table 4.3*), it became clear that most Vista students have no, or very little, experience working on computers before they enroll for the CL programme. In light of this fact the content of this programme is selected in a way to accommodate such inexperienced students. (Note that, at the time the study manual was developed, the computers laboratories of Vista University utilised the out-dated Windows 95 operating system.)

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 developments 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 and 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 and 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**

An important theme that emerged in sub-section 2.4.1 is that printed material is the basis for any educational delivery. As Vista University students received self-contained study manuals for most of their programmes, it was decided to develop a complete manual for this programme. The researcher believes that any computer user should be able to teach him/herself new techniques by following instructions from a manual, and therefore decided to develop the manual according to the guidelines for self-instructional study material (*cf.* 2.5.2). To supplement instruction, the researcher decided to include CAL, where learning is delivered via self-instructional CDs. The reason for selecting CAL as part of the blended learning programme is that students can come to the laboratories on campus and, in their own time, work through the CAL CDs. The researcher could not consider any of the online media options listed in sub-section 2.2. as questionnaires indicated that the majority of students did not have computers and/or Internet connectivity at home.

◆ **Teaching strategies**

The programme will be presented over the course of one academic semester, i.e. 6 months. There will be two registration periods per year, i.e. January and July. Students will receive the manual and CAL CDs at the beginning of the semester. During the first face-to-face class, called an orientation session (*cf.*

3.4.1), students will be informed about the methodology of blended learning and the advantages that it holds for them. Furthermore, they will receive a complete work schedule indicating the activities, assignments and the timeframes within which different activities should be completed. This concurs with the principle of time on task (*cf.* 3.4.4).

Students will meet in face-to-face classes (one hour each) twice weekly, and will be expected to supplement the face-to-face classes with spending at least one hour per week working on the CDs. As very few students have prior experience of working on a computer, the researcher decided that the CAL part of the programme should not be introduced from the first week, but that students should be guided in face-to-face classes for at least two weeks, before they are requested to use the CDs. Furthermore, they will be requested to work in groups when using the CAL CDs. The reason for this is to encourage interaction between students and provide opportunities to help each other (*cf.* 3.4.2). Apart from attending face-to-face lectures and using the CDs to review work already done, students should spend at least two hours per week in the laboratory working on practical assignments.

◆ ***Activities and assessment strategies***

According to the principles for good teaching practice, students learn better when they are actively involved in the learning process, and when they work in groups (*cf.* 3.4.2 & 3.4.3).

As the content of this programme is of a practical nature, the activities and assessment are closely linked. The main focus will be to assess whether students can perform activities, as this is the essence of OBE assessment (*cf.* 3.3.4).

A number of assessment strategies will be used according to guidelines set out in sub-sections 2.5.2 and 3.3.4:

- ☞ 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.
- ☞ Requiring students to use the CAL CDs plays an important role in getting them actively involved. Students will work through self-guided lessons, and take computer-based tests. These tests are scored by the computer, and the marks are immediately available. This concurs with the principle of prompt feedback (*cf.* 3.4.3), and helps students to improve their performance.
- ☞ Students will be requested to hand in a practical assignment on MSWord midway through the semester, and an Excel assignment close to the end of the semester. These assignments will be used as continuous assessment and will contribute 66.67% towards the term mark. The assignments can be classified as formative assessment (*cf.* 3.3.4.1). Students will do a final practical examination as well as write a final theory examination at the end of the semester. The theory exam will mainly consist of multiple choice and other short-type questions. The final examination at the end of the programme is a form of summative assessment (*cf.* 3.3.4.1).

As suggested by Reigeluth (*cf.* 2.5.2), the researcher completed the worksheet listed as Table 4.4 to conclude the design phase. The completed worksheet served as a profile of the programme.

Instructional Design Worksheet

Course title(s): EUC5001

Identify the instructional strategies that will be used for the different levels of learning in the following matrix.

Kinds of learning	Presentation	Tutorial	Drill	Independent study	Discussion	Game	Lab
Invariant tasks				X	X		
Concept classification					X		
Procedure using		X	X				X
Understanding	X						
Generic skills		X	X				X

Where will your students be located? (Note: you may check one or more categories.)

Location of students	
Students will meet regularly on campus	X
Students will meet occasionally	
Students will participate from a distance	
Students will be located in several time-zones	

Describe the characteristics of the prospective students including the following information: programme(s) of study, age range, educational backgrounds, work experience, access to technology, and comfort with technology-mediated learning.

Characteristics of students
Prospective students will probably not have access to a computer at home, and very few students will have prior experience of working with computers (<i>cf. 4.4.1.2</i>).

Identify appropriate delivery methods and media.

Delivery methods	Yes	No	Maybe
Web		X	
Videoconference		X	
CD-ROM	X		
Print Materials	X		
Videotape	X		
Audiotape		X	
Face-to-face instruction	X		

Media to be developed	Yes	No	Maybe
Audio		X	
Video		X	
Graphics		X	
Animation		X	
Text-based content	X		

What campus facilities will be required to support the students?

Campus facilities	
Library	X
Computer help desk	
Computer lab	X
Classroom	X

Table 4.4 Instructional design worksheet as applied in this study to build a profile

Once the programme was designed, the instructor proceeded to the development phase.

4.4.2 Cycle 1, Step 2: Distribute the information, i.e. develop the programme (cf. table 4.1)

This is the phase in which the instructor actually creates (or selects) the media elements (e.g. video tapes, CDs, web sites) and other instructional materials (e.g. study guides, activities, assessment and on-line resources) for the programme. The researcher followed the guidelines as set out in subsection 2.5.3.

The media identified for this programme is a self-contained, self-instructional study manual as well as CAL CDs.

In compiling the manual, the researcher paid specific attention to the following guidelines (cf. 2.5.3):

- ☞ 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 uncomplicated grammar as, for most Vista University 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 could 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 were not grouped at the end of a section, but were interspersed with content.

It should be noted that the researcher did not write the content of the theory section of this programme, but paid a copyright fee to use text from an existing textbook: *Exploring Computers:Theory* (Oosthuizen, de Bruyn & Zeelie, 1999:1-40).

In selecting the CAL CDs, the researcher evaluated a range of different CDs according to the guidelines set out in sub-section 2.5.3. The VTC training CDs

were selected because they specifically complied with the following guidelines:

- ☞ The navigation system is efficient and well-planned, i.e. on-line help is available at all times; menus, buttons, and other controls are used consistently throughout the programme; directions and overt signals let learners know what they are supposed to do, and users are informed of their location in the programme through the use of titles, frame numbers, and other indicators.
- ☞ The visual layout promotes learning, i.e. the content is broken into units that are small enough to be readily learned; long, linear sequences of screens are avoided; the text is organized into short, easy-to read paragraphs, and students can select study and practice sequences that are best for them.
- ☞ Media elements are used wisely, i.e. graphics, fonts, and other visual elements are legible, functional and attractive.
- ☞ The application supports active learning: the unique capabilities of the computer provide meaningful interactivity and feedback; learners are provided with opportunities to check their level of understanding, and explanatory feedback is provided for both correct and incorrect responses.

After developing the manual and selecting the CAL CDs, the researcher continued with implementing the programme for the first time.

4.4.3 Cycle 1, Step 3: Try a new practice, i.e. implement and monitor the implementation of the programme (cf. table 4.1)

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. 2.5.5).

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 as well as 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 they happen and not necessarily on a day-to-day basis. This section elaborates on the cryptic notes that were made about the events in this specific cycle.

The researcher started the implementation process by giving informal training to the instructor at the Welkom campus where the programme was introduced for the first time. The instructor was informed about the main aspects of blended learning, as well as the principles of OBE and good teaching practice that should be applied to enhance learning. He was requested to work through some of the CAL lessons to acquaint himself with the operational functioning and content of the CDs.

Two weeks before the start of the semester, the instructor was requested to install the initialising programme to all computers in the laboratory and ensure that the CDs will be working. At this stage it came to light that the computers in the laboratory scheduled for the use of this programme, did not have sound cards. This posed a serious problem, as the CDs used audio instructions to guide students through the lessons. The researcher had to re-arrange the timetable to enable students to move to a different laboratory where computers had sound cards.

Another technical problem that was encountered is that the lessons had to be viewed in Netscape Navigator. Netscape Navigator was not pre-loaded on all computers in the laboratory, which meant that the instructor first had to install it.

The researcher came to the conclusion that preparing the computer laboratory took much more time than originally anticipated. This factor had to be taken into account when planning implementation at the other sites. It is suggested

that the educator should start preparing the laboratory at least four weeks before the first class is scheduled.

As indicated in the design phase, during the orientation session held at the beginning of the semester, students were enlightened about the blended learning strategy. They were presented with the manual, CDs, assignments and timeframes for the rest of the semester.

After having face-to-face classes for two weeks, students were introduced to working with the CAL CDs. From then onwards, they were expected to use the CDs for revision purposes and to teach themselves some new concepts of the application packages. The researcher observed that, at first, students were reluctant to use the CDs. It was as if they perceived it as being an unnecessary activity and did not realise the possible advantages that it held for them. Students were encouraged to spend more time in the laboratory using the CDs, however, only a small number of students participated, and midway through the semester, the researcher decided to set up an assignment that involved using the CDs. In this way, students were "gently forced" to explore the benefits of using the CDs.

The remainder of the semester went according to plan, and at the end of the semester, the instructor and students were interviewed to find out how they perceived the programme. These interviews are discussed in the following sub-section.

4.4.4 Cycle 2, Step 1 Collect data and analyse to diagnose the situation - determine how students are reacting to the new programme (cf. *table 4.1*).

This phase of the research process could be classified as summative evaluation (cf. 2.5.5). In this step the researcher conducted interviews with the instructor and students involved in the first round of programme implementation (cf. *Table 4.5 and 4.6*).

The instructor's views on the programme were obtained by a personal interview. The following interview guide was used:

1	Comment on any problems (if any) that you encountered in the process of implementing the use of the CDs.
2	Describe any positive or negative results that you observed in the process of using the CDs.
3	Describe the role that using the CDs played in teaching the students new skills.
4	Describe the role that using the CDs played in assisting the students with revising and practising the computer skills that you have already taught them in class.
5	How, in your opinion, does the frequency of using the CDs relate to the effective mastering of computer skills by students?
6	Comment on the ease-of-use of the CDs – both from the perspective as lecturer as well as what you observed from the students.
7	Comment on the audio instructions given as part of the lessons on the CDs.
8	How do you feel about the following statement: <i>“A student will be able to teach himself by using the CDs and not having a lecturer at all.”</i>
9	What is your perception on the usefulness of the manual in learning the computer skills? Give a reason for your answer.
10	In your opinion, is there anything that should be done to improve the EUC course? Explain.

Table 4.5 Core questions used for interviewing instructors

The following became clear from the interviews:

- ☞ In cases where technical problems were encountered, students were reluctant to use the CDs. It was of vital importance that the software be installed and tested before the start of the programme.
- ☞ As most students have not worked on computers before, the instructor had to spend a considerable amount of time showing them how to use the CDs.
- ☞ Initially students were requested to use the CDs for revision and enhancing their own skills, however, they perceived the CDs to be an unnecessary activity and very few of them used the CDs of their own free

will. It was only after they were given an assignment which included using the CDs that they started to explore the CDs.

- ☞ Students found it difficult to understand the audio instructions on the CDs, as the instructor spoke with an American accent, which they found difficult to follow. Using headphones and controlling the volume also gave problems in some instances, because students did not know how to control the sound settings on the computer.
- ☞ As the semester progressed and students became used to the CDs, the instructor found that they could gradually learn more on their own, and relied less on the face-to-face lessons.
- ☞ The overall impression of the instructor was that the blended way of presenting the programme would pay off, if students used the CDs more often and if the technical problems encountered could be solved.

To continue the process of evaluation, students were interviewed in groups. Two groups of ten students each were randomly selected from the students that enrolled for the programme at the Welkom campus. 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 structured interviewing. In this study the researcher set up a number of core questions to guide the interview (*cf. Table 4.6*), but as a result of the interaction in the groups, students were prompted with follow-up questions to ensure that their answers were interpreted correctly and their true feelings understood. The questions were set up along the guidelines for evaluation as given by Wills (2001:Online). It has to be mentioned that the first question is not a typical question that would usually be asked in a qualitative interview, as it does not deal with establishing the views or feelings of the students. However, the researcher deemed it necessary to have an indication of how many times students used the CDs, as this had an impact on the answers to the rest of the questions (e.g. if most students used the CDs only once, they would not be able to respond effectively to the rest of the questions).

Table 4.6 lists the core questions that were used as basis for the interviews with students.

1	Approximately how many times did you use the CDs during the semester – not even once, less than 5 times, more than 5 times, on a weekly basis, or on a daily basis?
2	If you haven't used the CDs more than 5 times, please explain why not.
3	Describe the role that using the CDs played in assisting you to obtain new computer skills – if any.
4	Describe the role that using the CDs played in revising and practising the computer skills that you have already learned in class.
5	How, in your opinion, does the frequency of using the CDs relate to the effective mastering of computer skills?
6	Comment on the ease-of-use of the CDs.
7	Comment on the audio instructions given as part of the lessons on the CDs.
8	How do you feel about the following statement: " <i>A student will be able to teach himself by using the CDs and not having a lecturer at all.</i> "
9	What is your perception on the usefulness of the manual in learning the computer skills? Give a reason for your answer.
10	In your opinion, is there anything that should be done to improve the EUC course? Explain.

Table 4.6 Core questions used for focus group interviews

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 responses received from the interviewees. The results were then analysed and cross-referenced. The following emerging themes were identified from the interviews with students:

- ☞ Most students used the CDs more than 5 times during the 16 weeks of the academic programme. A small number of students used the CDs on a weekly basis, but very few used it on a daily basis. A very small number of students opted to use the CDs less than 5 times.
- ☞ The reasons given by those students who used the CDs less than 5 times were that the computer labs were overcrowded and that often students would get to the lab and find no computer available. Another reason would be that, at first, students thought the CDs to be “extra” work, and they did not believe that it was to their benefit to work through the lessons. Furthermore, some students were uncertain about the technical details of using the CDs, as this quote indicates: *“At first I didn’t know how to use the CD, but when I started, I find it very easy and helpful. I should have started earlier.”*
- ☞ By far most students were of the opinion that the CDs were most helpful in teaching themselves new skills. Some remarks received: *“The CDs helped a lot, because the CD can clarify what I did not understand in a lecture lesson.”* *“The more you use the CD the better new skills you provide yourself.”*
- ☞ Students agreed that the CDs were helpful in doing revision of what has been taught in class. The following remarks underline their views: *“It helps a lot because the lesson can be repeated as many times as one can.”* *“It accommodates everyone – unlike the lecturer who does one thing only once and you might get lost.”* *“If a student is slow to understand what the lecturer said in class, they can use the CD. The CD is not too tired to teach or to repeat.”*
- ☞ The interviewees were unanimous in feeling that students will learn better by using the CDs more frequently. The fact that students can work at their own pace seemed important to them. *“The CDs are helpful because you*

are able to pace yourself in learning through them.” Another important factor that students realised is that they can learn even when the lecturer is not available. *“CDs can be used at any time, even on Sundays or holidays when lecturers are unavailable.”* *“One can use the CDs at a convenient time, unlike depending on the lecturer whose time is inflexible and rigid.”* Students were of the opinion that some people learn better by working and practising alone. The CDs provided an opportunity for these students.

- ☞ Most students felt that once they have been shown how to work with the CDs, it became easy to use them. *“It was not easy at first, but after using it 2 times, I was able to use it alone.”* *“Because it was my first time dealing with computers, it took me a while to know how to use the CDs.”*
- ☞ On the question whether students understood the audio instructions, students had different opinions. Some felt that the instructions were clear and precise, whilst others indicated that they had difficulty in following the explanations. *“The instructor spoke quickly and not clearly. I could not hear and understand.”* *“She does not speak clearly and some people can’t understand the language – her pronunciation was not good enough.”* *“I didn’t understand the instructor, she is too fast.”* *“I had to rewind and listen again many times.”* The researcher came to the conclusion that students who are not first language speakers of English had problems understanding the accent of the voice giving instructions on the CDs. To determine how serious the impact of this problem would be, it was closely monitored during the second round of implementation at other sites.
- ☞ When students were asked whether they thought the CDs could be used alone, i.e. without the assistance of a lecturer, their answers revealed the importance of the blended learning methodology. All students agreed that both the CD and lecturer should be used for best teaching results. *“Lecturers are more easily understood so a CD can be used as revision.”* *“It is too complicated for some students, - better to first see it in class.”* *“Somebody who never had experience of computers would never be able to teach himself without help from a lecturer.”* *“Some of the things should be lectured before one can do it yourself.”* *“There are some questions a*

CD can't answer, so I think a student will always need a lecturer." "The students must have both CD and lecturer." "Both are needed to supplement each other." The researcher found the following remark received from one of the students particularly interesting: *"I think the CD and the lecturer must go hand in glove."*

☞ All students were convinced that the manual was most helpful. The responses indicated that the researcher's efforts to follow good development guidelines for printed material (cf. 2.5.3) were most successful. *"Yes, the step-by-step instructions provided you practice, practice, practice!" "The instructions are easy to follow." "The manual is very helpful, because if I don't understand then there is a picture demonstrating the information." "Everything was explained in simple terms and that made it easy to understand the computer skills." "The manual was very easy to read and very easy to understand – very helpful - clearly set out!"*

☞ Many students were of the opinion that the EUC programme was very successful. Remarks like *"The EUC course is perfect"* and *"The course is fine exactly the way it is"* were most encouraging to hear. However, some students felt that the programme could be improved by providing more computers in the laboratories and by extending the duration of the course. *"The classes should be extended to one year. We need more time for practicals, especially for those who do not have PCs at their homes." "The course must be improved by increasing the number of computers."* Some of the other remarks made by students are: *"In my opinion the EUC course is just perfect – we have all the privileges. All I can say is keep up the good work!" "Keep up the spirit of using CDs and encourage students to visit the labs regularly. The way it is utilising both the lecturer and CD was fine for me."* The researcher concluded that most students were satisfied and that the method of blending the CAL, self-instructional printed material and face-to-face lectures definitely had a positive impact on the learning programme.

After analysing the data collected from the interviews, the researcher was satisfied that most students felt positive about the programme. The complaints about not being able to understand the audio instructions raised some concern, however, it was decided to go ahead with implementing the programme at the East Rand and Port Elizabeth campuses to find out how students from other regions react to this specific problem.

4.4.5 Cycle 2, Step 2: Distribute the data to others, i.e. revise the programme (cf. table 4.1).

The only programmatic change requested by a consensus of students was that they wanted the programme to run over a full year instead of a semester. As the programme forms part of official qualifications at the university a change of this nature has to be approved by a series of different committees. The process could take up to 12 months. It was thus not possible to immediately adhere to students' requests, and the researcher decided to consider the possibility of changing the timeframe at a later stage.

Because it became clear that students initially did not use the CDs out of their own free will, the researcher added assignments which required students to access the CDs early in the semester. The purpose was to expose students to the CDs so that they could discover the benefits of using them.

There were no other reasons for changing the programme in a significant way, and therefore the researcher proceeded with implementing the programme at other sites of instruction.

4.4.6 Cycle 2, Step 3: Try a new practice, i.e. implement the revised programme and monitor the implementation thereof (cf. table 4.1).

In this step of the action research cycle, the programme was implemented at two additional sites, i.e. the East Rand and Port Elizabeth campuses of Vista University. There was also a new intake of students at the Welkom campus. No significant changes were made to the programme at this stage. However,

having experienced several technical problems during the first round of implementation, the researcher took steps to prepare the laboratories at all campuses well in advance (*cf.* 4.4.3). This was done to ensure that students do not encounter any unexpected technical problems. Furthermore, the researcher trained the lecturers involved in presenting the programme using the blended learning methodology. They were enlightened about the research project and knew exactly what was expected of them.

Students were requested to complete a questionnaire to establish whether the trend of prior experience and the availability of computers at home were similar to the findings of the first round at the Welkom campus (*cf.* Table 4.3). The data collected through the questionnaires is summarised in the following charts:

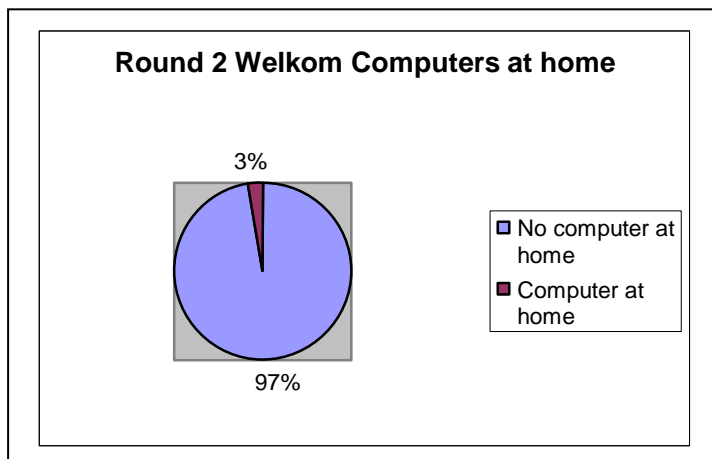


Fig. 4.4 Percentage of students from the Welkom campus with computers at home

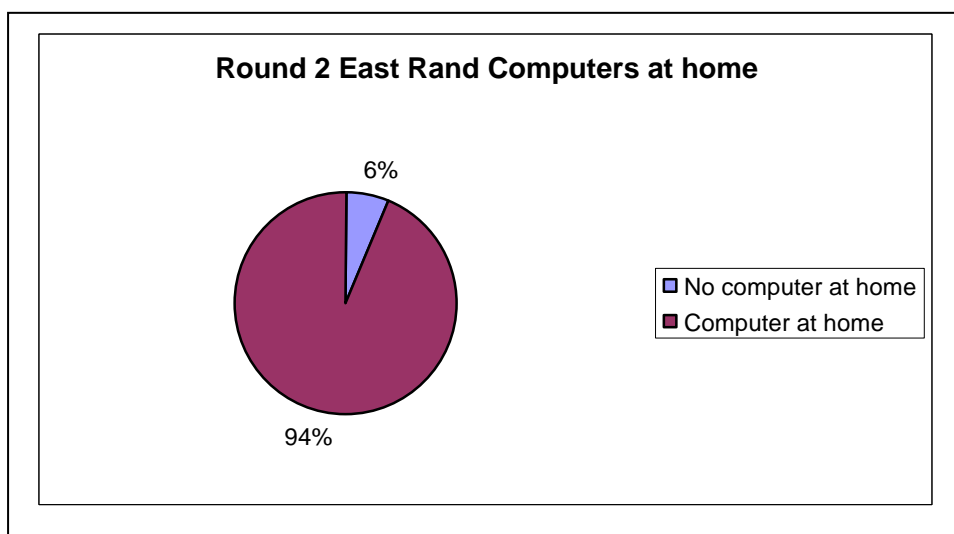


Fig. 4.5 Percentage of students from the East Rand campus with computers at home

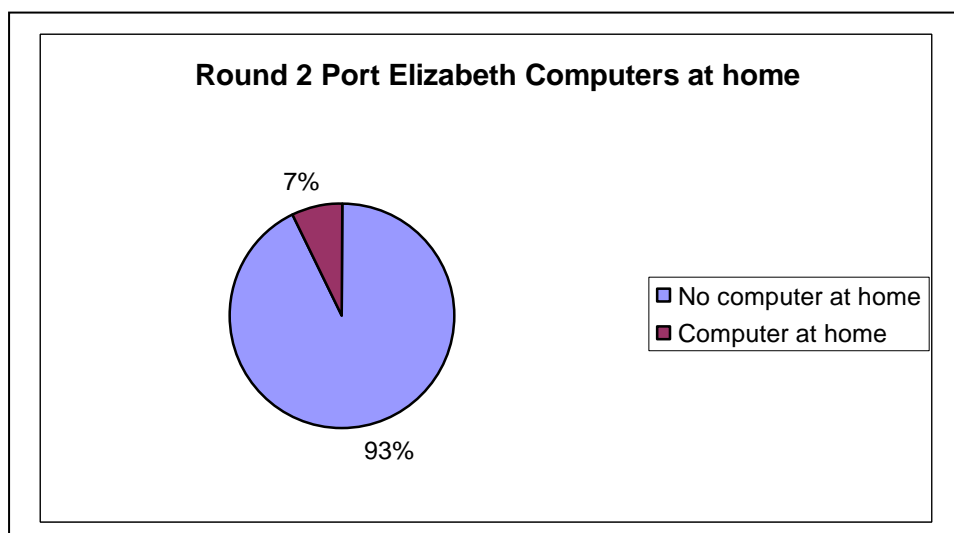


Fig. 4.6 Percentage of students from the Port Elizabeth campus with computers at home

The statistics clearly show that, at all sites, the majority of students do not have computers at home. This strengthens the decision made in the analysis phase that the blended programme should not include any form of web-based delivery, as students do not have access to computers outside the campus.

The second question of the questionnaire aimed to establish how many students had prior experience working on a computer (*cf. Table 4.3*). The data is presented as follows:

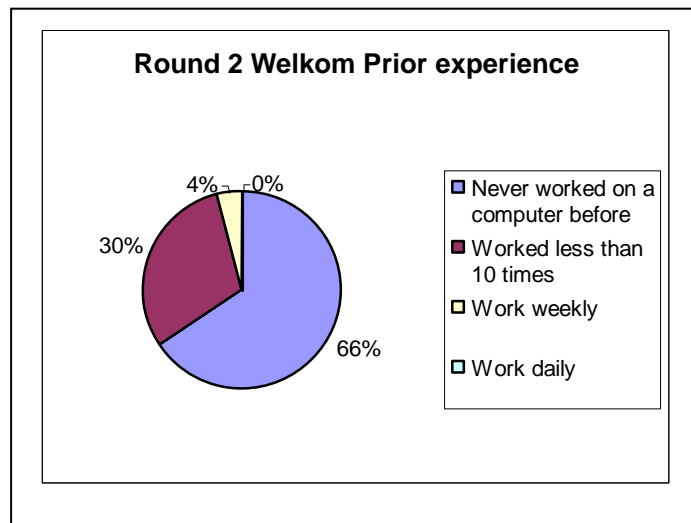


Fig. 4.7 Percentages indicating prior experience working with computers at the Welkom campus

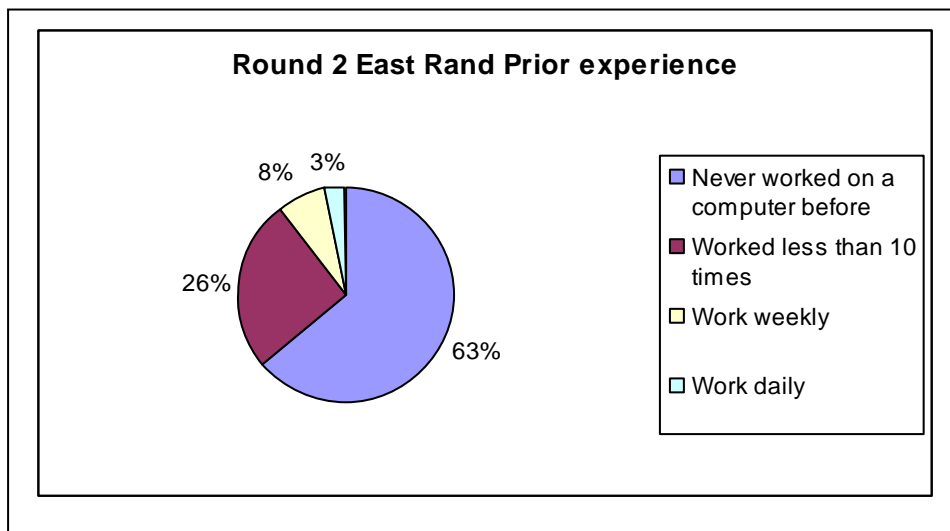


Fig. 4.8 Percentages indicating prior experience working with computers at the East Rand campus

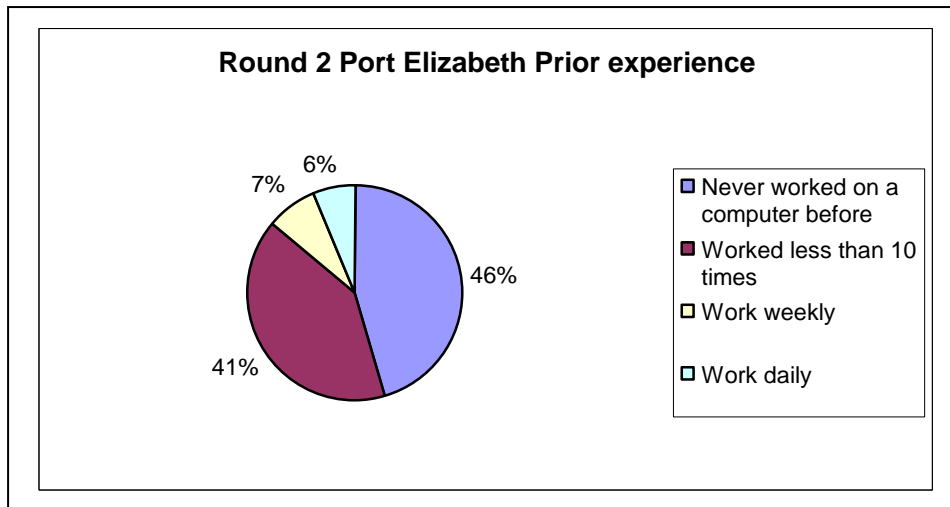


Fig. 4.9 Percentages indicating prior experience working with computers at the Port Elizabeth campus

From the data it is clear that, although fewer students in Port Elizabeth had never worked on a computer before, the number of students that used the computer on a daily or weekly basis are very low at all the sites. From these figures, the researcher deduced that most students will not be able to use the CDs without initial help from the lecturer. The decision to have face-to-face classes for the first two weeks and then introduce the CDs was upheld.

There were no significant problems experienced with implementing the programme at the new sites of instruction.

4.4.7 Cycle 3, Step 1: Collect and analyse data to diagnose the situation - determine how students are reacting to the new programme (cf. table 4.1).

At the end of the second round of implementation, the researcher interviewed the instructors involved in presenting the programme. Their responses are summarised as follows:

- ☞ Technical problems related to using the sound were encountered at all the sites. This was mainly due to the fact that there were specific settings in

the Windows operating system that had to be adjusted to enable the sound, and some students did not know how to do this. The fact that the lessons had to run through either Netscape or Internet Explorer was also seen as a problem. *“I do think the manufacturer should have used another method to simplify the way of presenting the lessons.”*

- ☞ The fact that students were learning in advance was seen as one of the positive outcomes of using the CDs. The instructors also felt that the CDs helped students to have a broader insight on the features of the application packages. *“We do not offer intermediate and advance computer literacy programmes at this university, and using the CDs provided students with the opportunity to go further than the curriculum we offer.”*
- ☞ *“A negative outcome of using the CDs is that some students did not attend classes with the hope that they will go through the CD on their own, and then only to find that they don't find the time to do so, or do not understand the work without the help of the lecturer. It was also noted that some students (the minority) were reluctant to use the CDs, and they had to continuously be shown how to start the process, and work through the lessons.”*
- ☞ All the instructors agreed that using the CDs definitely improved the students' skills. *“There is often more than one way of getting the same result in an application package. Only one method is explained in the manual. However, using the CDs, students could point out the difference between the study manual and the CD, and tried out some alternative ways of performing certain tasks.”*
- ☞ The instructors all felt that the contents of the lessons on the CDs are sufficient. *“Working through some of the sections myself, I found the CD to be very resourceful. I have used Word and Excel extensively and learnt a few more advanced features from the CD.”*
- ☞ The instructors agreed that the students did not find it difficult to work with the CDs. *“Students didn't take long to understand how to use the CD – it was really not that difficult.”*

- ☞ It was the view of all the instructors that using the CDs in conjunction with the face-to-face classes, enhanced the learning process considerably. “*I found that the students could do a lot of the basic steps quicker.*”
- ☞ When the instructors were requested to give recommendations on improving the programme, they indicated that more time is needed for students to master the skills. They proposed that the course be extended to a year and that some more advanced features of the word processor and spreadsheet packages should be included.

To determine how students perceived the programme, the researcher conducted focus group interviews, similar to the ones at the end of the first round of implementation (*cf. 4.4.1*). There were no major differences in the feedback from students from the different sites of instruction. Furthermore, the reactions of students were very similar to those from the first round of implementation. The following main themes transpired from the interviews (*cf. Table 4.6*):

- ☞ The strategy to set up an assignment that involved students using the CDs paid off, and there was a positive increase in the students that used the CDs on a weekly basis.
- ☞ Students felt that they have definitely benefited from using the CDs. Some reasons given were that they could go back after class and revise what the lecturer explained, and that they could use the CD to catch up on what they have missed in class.
- ☞ Students appreciated the fact that the CDs were “*patient*” and that it “*explains over and over*”.
- ☞ Some students indicated that the CDs challenged them to think as opposed to simply sitting in class and listening to the instructor.
- ☞ Most students found the CDs easy to use after the lecturer had shown them how to do it.
- ☞ The problem of not understanding the audio instructions was experienced by students at all the sites of instruction.

- ☞ Students strongly expressed the view that both the instructor and the CDs should be used in instruction as this enhanced their performance. The following comments strengthen the believe that blending media with face-to-face lessons is having a significant impact on the learning process: *“I think the instructor and CDs work hand in hand and to use the two will be beneficial to a learner.”* *“A lecturer’s role is still of paramount importance, but the CD is a wonderful complement to the lecture.”*
- ☞ The students involved in the second round of implementation agreed that the manual was well-structured and easy to understand. The following comment summarises the importance of the manual: *“I thought I understood the lecturer, but when I was alone with the computer, I forgot – then consulted the manual and that helped me to remember things.”*
- ☞ When students were asked what should be done to improve the programme, the researcher received the following responses: *“Honestly it is very exciting, except that we need more computers and more time to practise.”* *“No don’t change anything - because we have lecturers, manuals and CDs to help us – so perfect!! I think everything is 100%.”*

In analysing the responses the researcher came to the conclusion that overall the programme was well-accepted. The only problem identified was the fact that students found it difficult to understand the audio instructions. This fact could not be ignored and the researcher addressed it in the next step of the research cycle.

4.4.8 Cycle 3, Step 2: Distribute the data to others, i.e. revise the programme (cf. table 4.1).

In this step the researcher had to make final changes to the programme. As mentioned, the only serious problem that was identified, was the indication that students could not always understand the audio instructions. As most students are not first language speakers of English, they found it difficult to follow the pace at which instructions were given. Furthermore, the American accent was difficult for many South African students to understand.

To overcome this problem, the researcher selected alternative CAL CDs (Spear, 2004). The CAL material was evaluated according to the guidelines as set out in sub-section 2.4.5.

4.4.9 Cycle 3, Step 3: Try a new practice: implement the changed programme (cf. table 4.1).

As explained in sub-section 4.3.2 the intention was to implement the final programme at all the campuses of Vista University. However, due to the unbundling of Vista University and the subsequent mergers with other higher education institutions, the researcher could only obtain permission to implement the final programme at the Welkom campus, which now forms part of the Central University of Technology, Free State. Implementation continued without any problems. To determine how students reacted to the new CAL CDs, the researcher decided to conclude data collection by having one more round of interviews (cf. Table 4.6).

4.4.10 Cycle 4, Step 1: Collect and analyse data to diagnose the situation - determine how students are reacting to the new programme (cf. table 4.1).

In this final step of data collection, the instructor at the Welkom campus responded with the following comments:

- ☞ The new CAL CDs were easier to use and presented less technical problems. Students found it easy to access the training material.
- ☞ By using the CDs the students spent more time in the lab and this definitely had a positive impact on their skills. They mastered the required skills in a shorter time span than simply attending face-to-face classes.
- ☞ The instructor could not mention any negative effect from using the CDs, in fact he was sure that students benefited from using the CDs and that it should definitely be continued to form part of the programme.

- ☞ The content of the CAL CDs were up to standard and were presented in a way that was easy to understand.
- ☞ An interesting remark from the instructor was that different students preferred to learn in different ways. Some students needed one-on-one contact with the lecturer, some students preferred to study on their own, and some preferred to work in groups. The instructor observed that blending the CDs with face-to-face classes provided opportunities for the different needs of students. This underlines the fact that blended learning strengthens the principle of good teaching to respect diverse ways of learning (*cf.* 3.4.6).

The focus group interviews held with students at this stage produced results very similar to those of the previous rounds of implementation. The new CAL material was received well and students reacted very positively about the programme.

The final data collected indicated that the programme did not need any further changes. The research process was completed, and the final conclusions and recommendations are given in the following section.

4.5 CONCLUSIONS AND RECOMMENDATION

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.

4.5.1 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 blended learning in education?*

A study of literature in Chapter Two revealed that blended learning has a number of advantages (*cf.* 2.2) and is set to play an increasingly important role in future education systems. There exist a number of innovative ways to create blended learning programmes (*cf.* 2.4). The study further indicated instructional design guidelines that could be followed to design blended learning programmes (*cf.* 2.5). One of the phases of instructional design is evaluation and the literature study indicated a number of ways to evaluate a blended learning programme (*cf.* 2.5.5). These guidelines were followed in evaluating the programme developed in this study, through action research.

◆ *What influence do the principles of good teaching practice and OBE have on developing a blended learning, computer literacy programme?*

In Chapter Three a literature overview of the principles of OBE and good teaching practice were discussed. In studying these principles the researcher was able to construct a clear framework for developing an effective CL learning programme (*cf.* 3.4). Literature revealed standards set for CL programmes and indicated the content that should be covered by such a programme (*cf.* 3.2.2). The programme developed through this study reflects this content and is based on the principles of OBE and good teaching practice.

◆ *What factors should be taken into account in developing a blended learning computer literacy programme for South African students?*

As described in Chapter Four the researcher followed action research techniques to develop, evaluate and implement an OBE CL programme in blended learning mode for South African students (*cf.* 4.2.2). The first step in the research cycle was to collect data to be able to develop the programme. As blended learning is such a recent trend in education, the best way of collecting data, was to perform a literature review of content found on the Internet. The findings are summarised in sub-section 4.4.1.

- ✦ *Can a blended learning computer literacy programme be effectively implemented for South African students?*

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. 4.4.2 – 4.4.10*). The end-result of the research is a well-developed programme that proved to be successful in training the basic CL concepts, in blended learning mode, to South African students from a disadvantaged background. The complete programme is given in Chapter Five.

4.5.2 Problems encountered during the study

The study revealed a number of new, innovative technologies that can be used to develop a blended learning programme. However, in selecting the blended learning options, the researcher was limited by the following two factors:

- ☞ Most of Vista University's students are from a disadvantaged background and do not have computers at home (*cf. 4.4.1*).
- ☞ 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.
- ☞ Because of the unbundling of Vista University and the subsequent mergers, the final programme could only be implemented at one campus, instead of the seven different campuses, as initially intended.

The study revealed that, in selecting the blended learning options, the most important factor to consider is what do students have access to (*cf. 3.4.7*). The researcher was, in this case, restricted to selecting media that students could use in the computer laboratories on campus, and could not explore the advantages of using WBI.

4.5.3 Recommendation

It is recommended that students who have no prior experience in using computers enrol for the programme presented in Chapter Five. Although many computer literacy programmes are used in various institutions in South Africa, this is the first attempt to present CL in blended learning mode. Having gone through the cycles of action research, this programme can be recommended as being a well-designed, efficient learning tool through which students can learn to use the computer effectively. It was developed according to the principles of OBE and successfully addresses the principles of good teaching practices.

The programme and manual are 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 a CAL CD and a study guide which contains the assignments, and a detailed work scheme indicating the due dates for assignments. The complete programme is presented in Chapter Five.

4.5.4 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.
- ☞ Students who completed the programme could be observed to determine the long-term effects of the training on their careers.
- ☞ A quantitative study could be undertaken to statistically compare the results of a group of students that follow the blended learning programme as opposed to a group that follow the traditional face-to-face programme.

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

CHAPTER FIVE

A BLENDED LEARNING COMPUTER LITERACY PROGRAMME FOR SOUTH AFRICAN STUDENTS

TABLE OF CONTENTS

1. Workscheme

2. Manual

Section A Theory

Section B MS Word

Section C Windows 95

Section D Internet and E-mail

Section E Excel

3. CAL ¹CD

¹ Please note that the CD is copyrighted.

WORK SCHEME EUC 5001

WEEK	PRACTICAL COMPONENT	THEORY	REVISION & SUPPLEMENT LESSONS ON CD	DUE DATES (ASSIGNMENTS & EXERCISES)
Week 1	Orientation			
Week 2	Windows			
Week 3	MS Word Chapter B1	Chapter 1		
Week 4	MS Word Chapter B2 & B3	Chapter 2	Work through MSWord, Chapter 1, Lesson 1, 2, 3, 4, & 5	
Week 5	MS Word Chapter B4	Chapter 3	Teach yourself new concepts by working through Lessons 6, 7 and 8. Do the interactive Quizz	
Week 6	MS Word Chapter B5 & B6	Chapter 4	Work through MSWord Chapter 2, Lesson 1, 2, 3, 4, 8, 9.	
Week 7	MS Word Chapter B7	Chapter 5	Teach yourself new concepts by working through Lesson 10.	
Week 8	WORD PRACTICAL TEST Questionnaire 1			
	Student holidays			
Week 9	Internet/E-mail	THEORY TEST Monday @ 12:00		Hand in Word Assignment On Friday
Week 10	Excel Chapter E1		Work through Excel, Chapter 1, Lesson 1, 2, 3, & 5. Do the quizz.	
Week 11	Excel Chapter E2 & E3		Work through Excel, Chapter 2, Lesson 1, 2. Teach yourself new concepts by working through Lesson 3.	
Week 12	Excel Chapter E4		Work through Excel, Chapter 4, Lesson 1, 2 and 3.	Hand in Excel Assignment On Friday
Week 13	EXCEL PRACTICAL TEST			
Week 14	Practical exam			

Section A

Theory

Section A (Theory) was re-printed in the study manual with permission from the publisher Computer Forum (Oosthuizen *et al.*, 1999) and was not specifically developed for this study. It is therefore not presented as part of this study.

Section B

MSWord

Section C

Windows

Section D

Internet

Section E Excel

Bibliography

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.

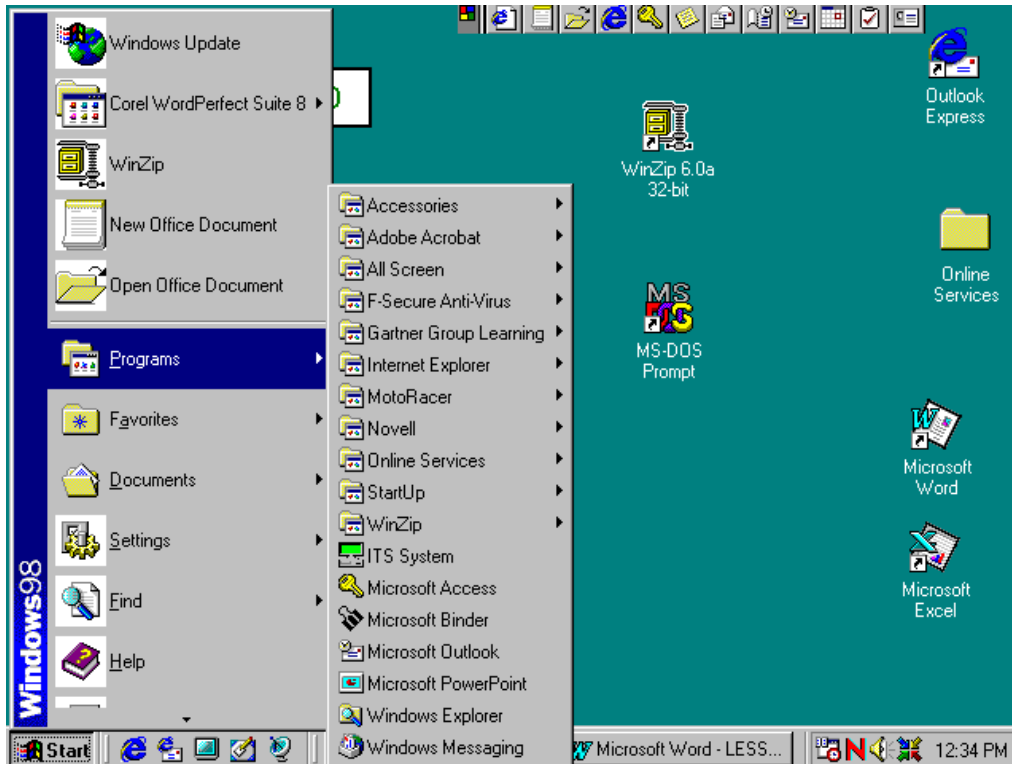
In word processing, document creation is separate from the printing process. This separation is what makes word processing software much more convenient than using a typewriter or traditional pen and paper.

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**.



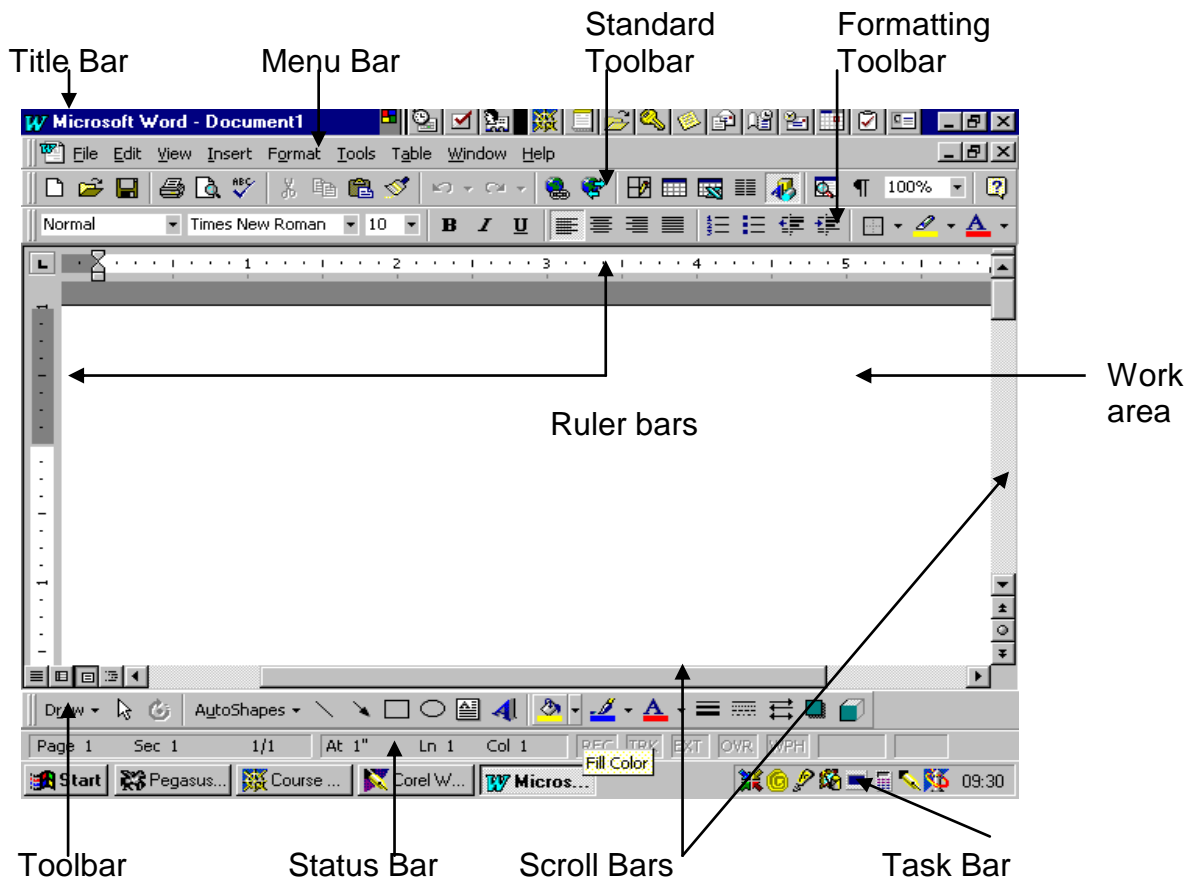
There are different ways to activate a program in Windows 95. Note that your screen may look different from the diagram shown above. If you have problems activating MSWord, consult the Windows notes. In any case you will find the following **MSWord-icon**:



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

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.

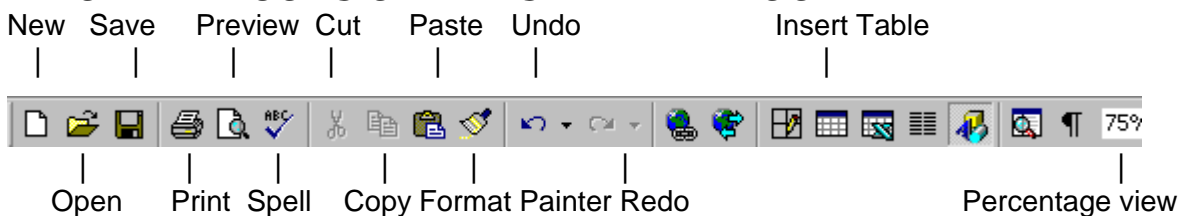
- **The Ruler Bar** is situated below the formatting toolbar and is used to set indents, tab settings and changing margins settings.
- **The Scroll Bars** appear at the right hand edge (vertical scroll bar) and at the bottom (horizontal scroll bar) of the screen. These are used to scroll through the 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

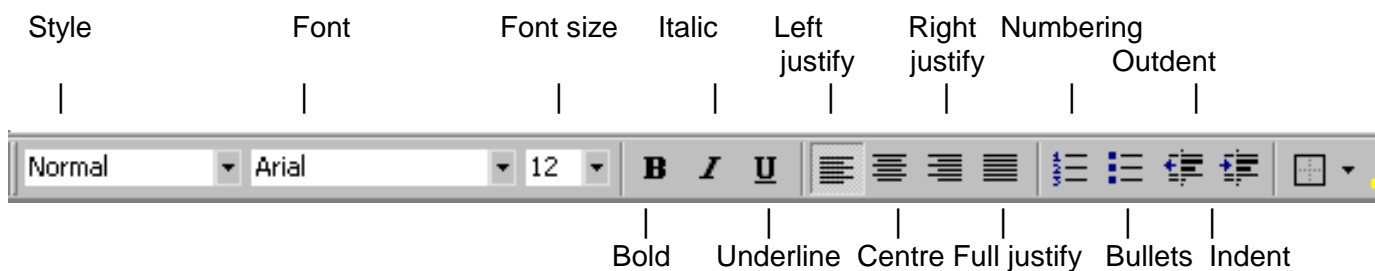


The following are the most important icons on the toolbars that will be used during this course:

- **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**, where 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.

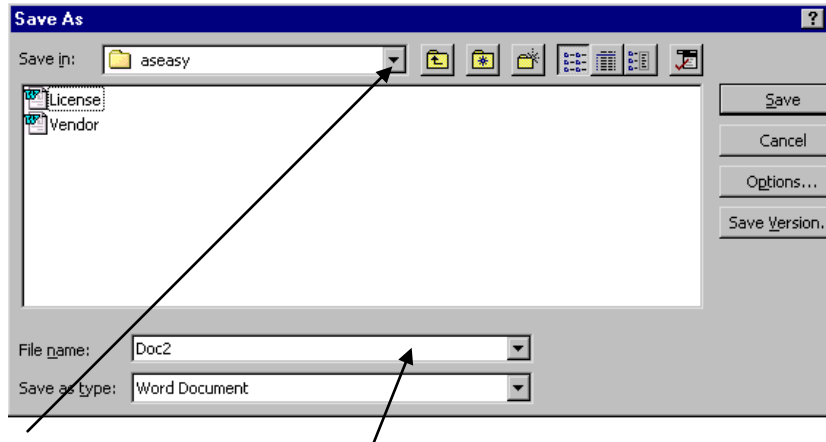
SAVING DOCUMENTS

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

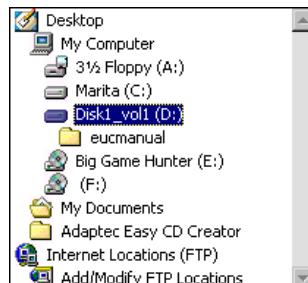
1. Click on the **File** menu.
2. Click on **Save As**. A dialog box will appear, giving you the option to assign a name to the document and choose a specific directory (e.g. H:) where you wish to save it.



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.
-

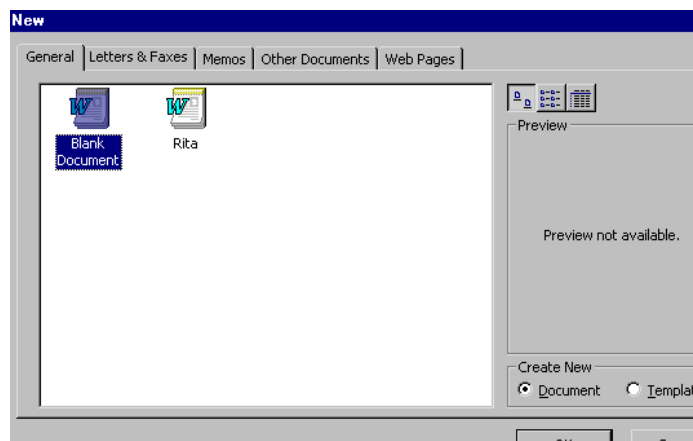
CREATING A NEW DOCUMENT

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:

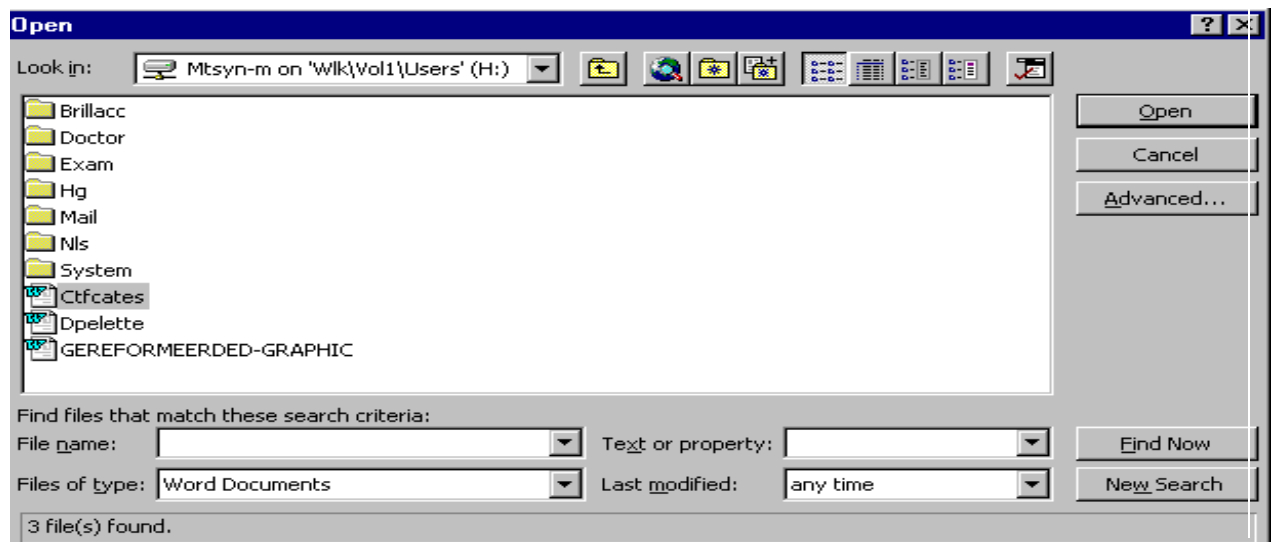
- ◆ Open a saved document
- ◆ Edit a document using
 - Various Selection Techniques
 - Cut, Copy & Paste
 - Undo/Redo
 - Editing text

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 REDO THE 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

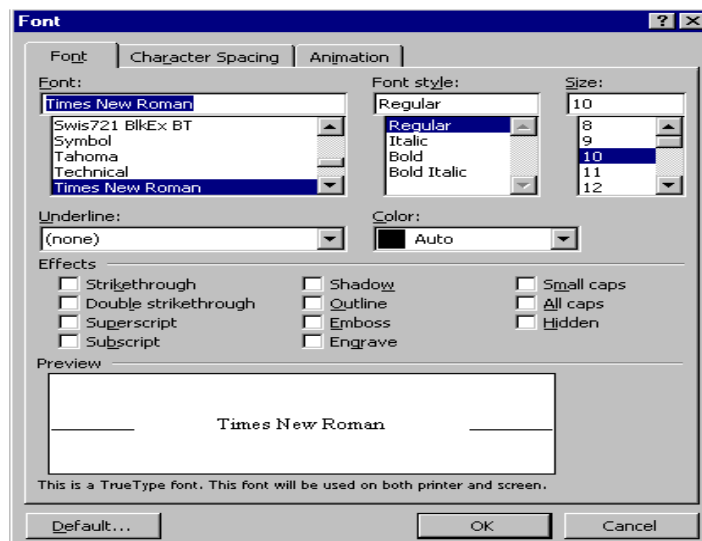
Formatting is the process of adjusting the appearance of a document. You can format an entire document, several paragraphs, one paragraph or a single word.

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:

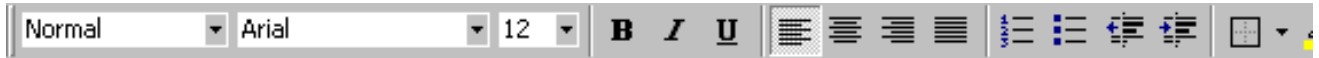


In the dialog box, one will see the different formatting options available:

- 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: H₂O)
- 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:

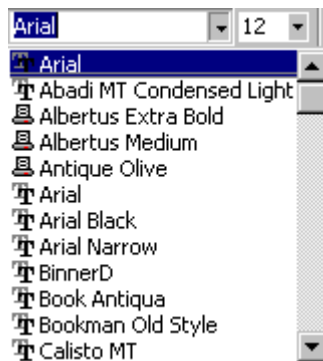
CHANGING FONTS USING THE *FORMATTING TOOLBAR*

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



Click here

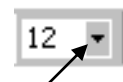
3. A **drop-down list** with a number of fonts appears:



4. Click on the font you want to select.

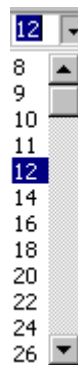
CHANGING THE SIZE OF FONTS USING THE *FORMATTING TOOLBAR*

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



Click here

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*

B *I* U
 | | |
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.

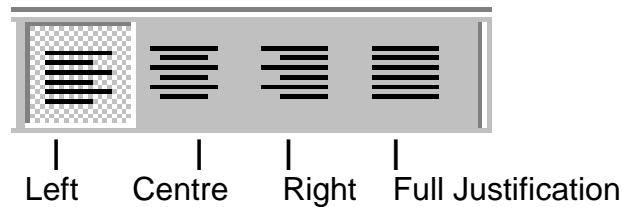


- **Centre Justification** centres the text between the left and right margins, with uneven left and right margins.



- **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*



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

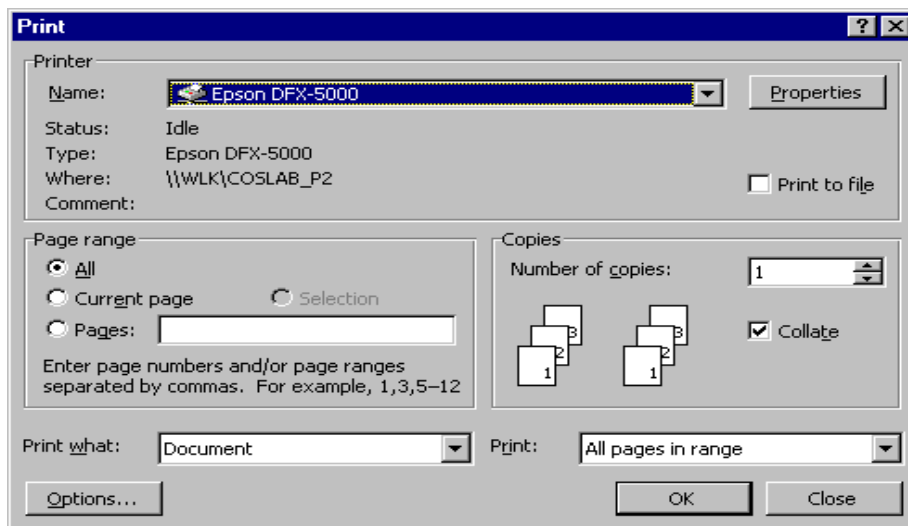
1. Open the file PARTY2 that was saved in CHAPTER B2.
2. Change the appearance of the word “Molehe” to a **Boldface**.
3. Change the appearance of the word “Mantsho” to *Italic*.
4. Underline the phrase “Liberty Center”.
5. Change the phrase “Traditional wear” to any other font.
6. Right justify the 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.

CHAPTER B4

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

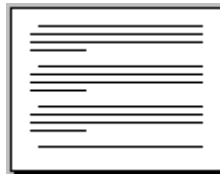
PAGE FORMATTING

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.



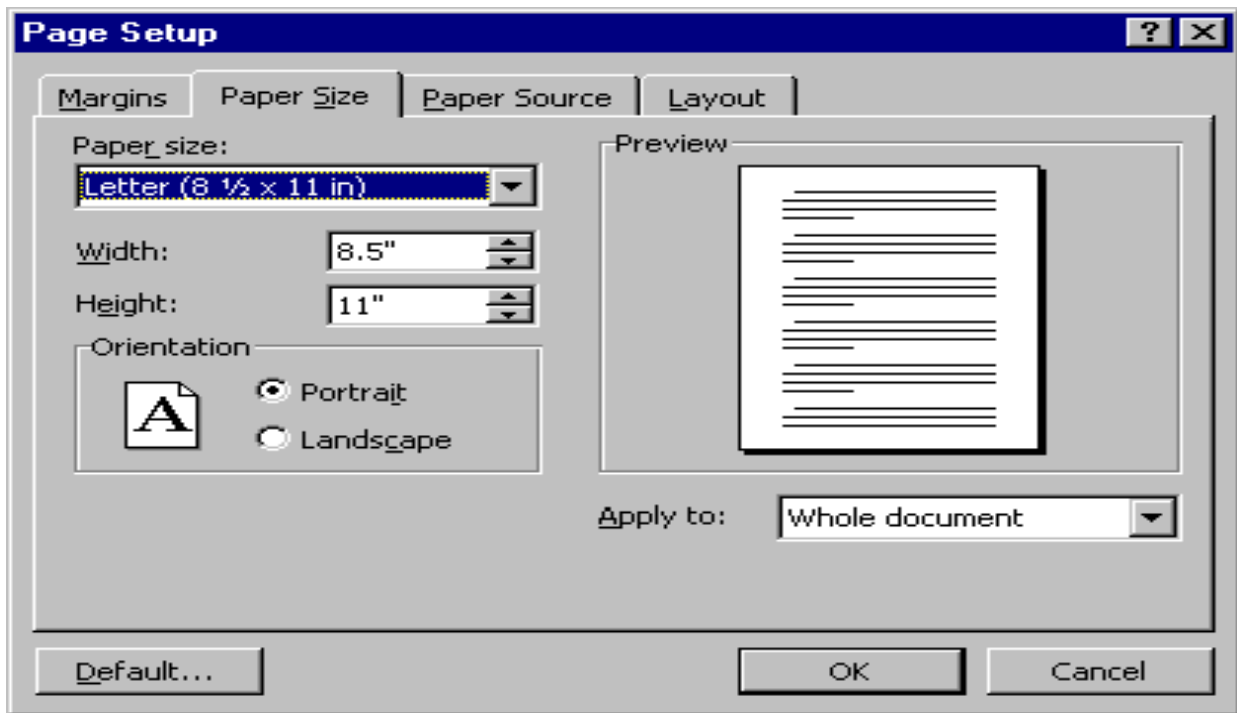
- Page view can also be changed to **Landscape**, depending on a need to do so. This orientation displays and prints text parallel to the long edge, making the printed page wider than long.



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:



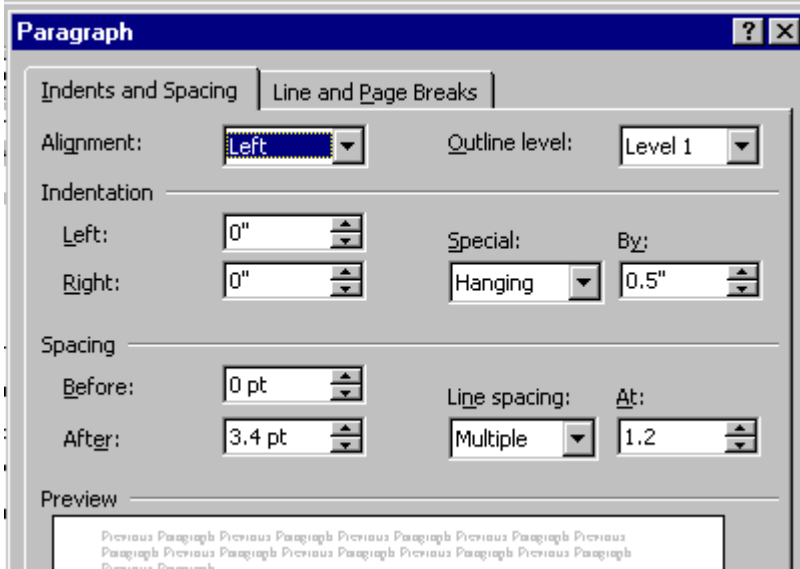
4. Leave the Paper Size as it is.
5. Click on **Landscape** under **Orientation** to select the new orientation.
6. Click on **OK**.

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:



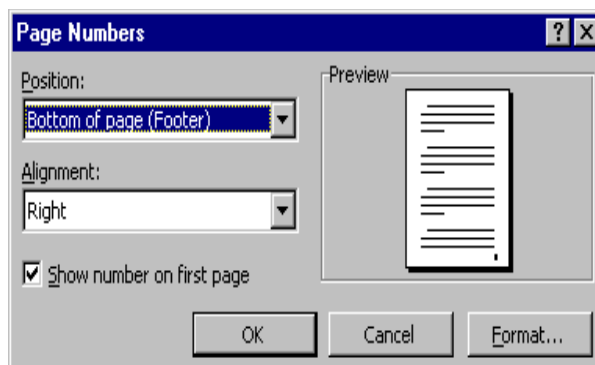
4. Click on **Indents and Spacing**.
5. Click on the **Line Spacing drop-down list** and select the desired line spacing.
6. Click **OK**.

PAGE NUMBERING

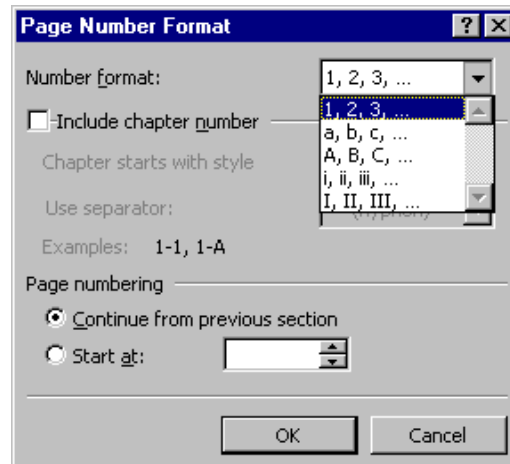
Page numbering allows a user to insert page numbers at different positions of a page. You can number your document from its very beginning or from a different position i.e. if necessary, make the second page Page 1.

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

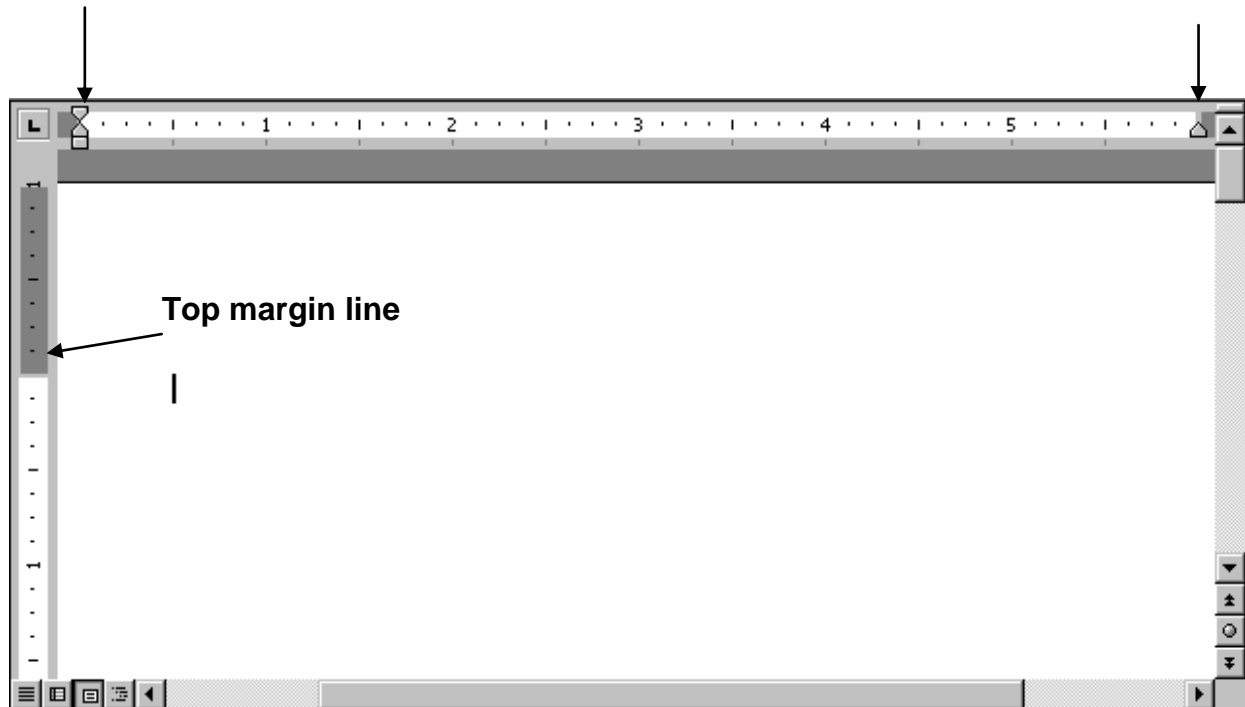
1. Click on the **File menu**.
2. Click on **Page Setup**.
3. Click on **Margins**.
4. In the *Top, Bottom, Left and Right* text boxes, enter the desired margin size or click the **increment arrows** to set the desired value.
5. Click on **OK**.

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.

Left margin line

Right margin line



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-headed 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 of 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.

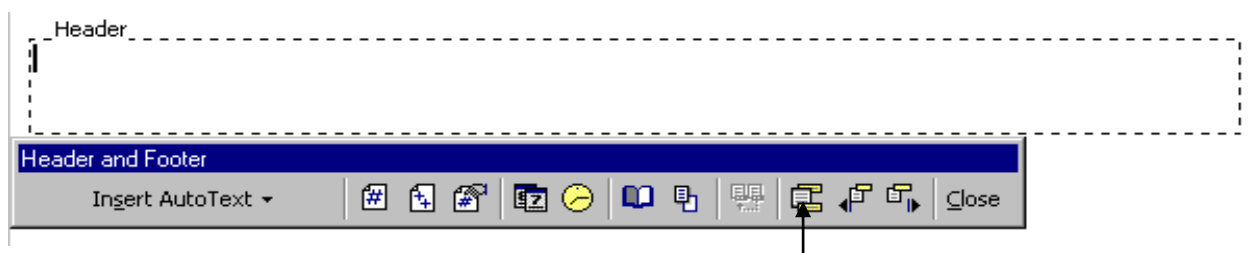
- A *Header* is text that is displayed and / or printed at the top of every page.
- A *Footer* is text that is displayed and / or printed at the bottom of every page.

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:

Switch button



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**.

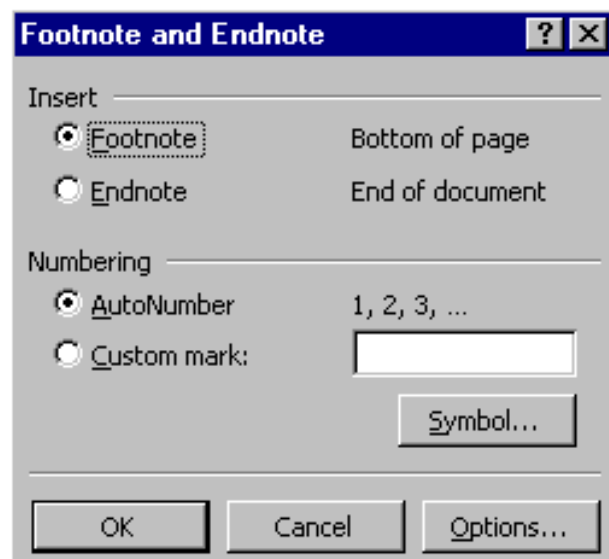
NOTE: To discontinue an already existing header or footer, you follow the above steps and instead of typing text at step 5, delete all information from the Header or Footer.

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 is¹.
- *Endnotes* are more or less the same as footnotes. Unlike footnotes which appear in a page where 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:



¹Example 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

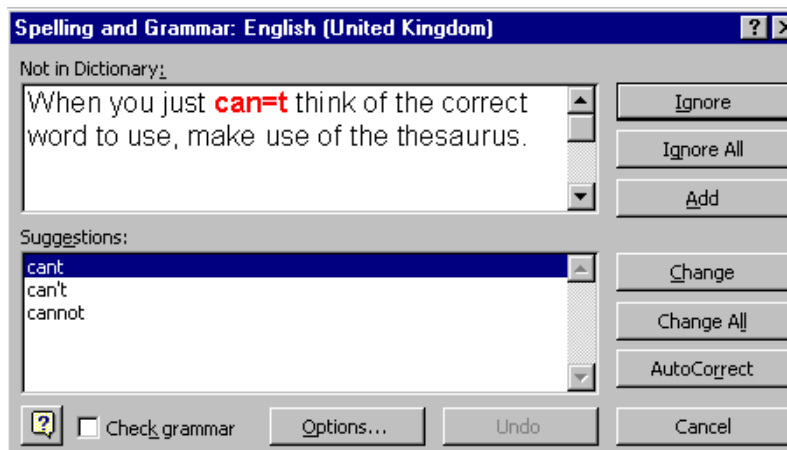
THE SPELL CHECKER

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.
-

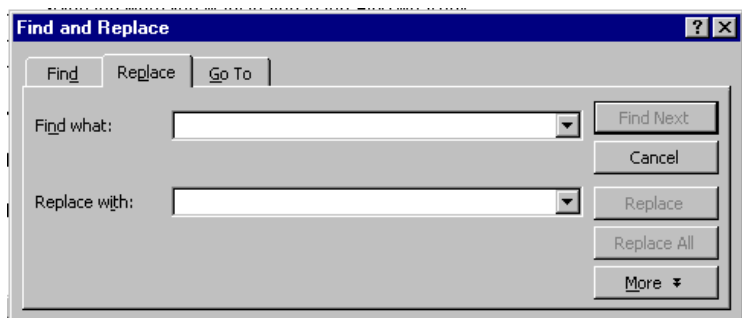
THE FIND-AND-REPLACE FEATURE

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

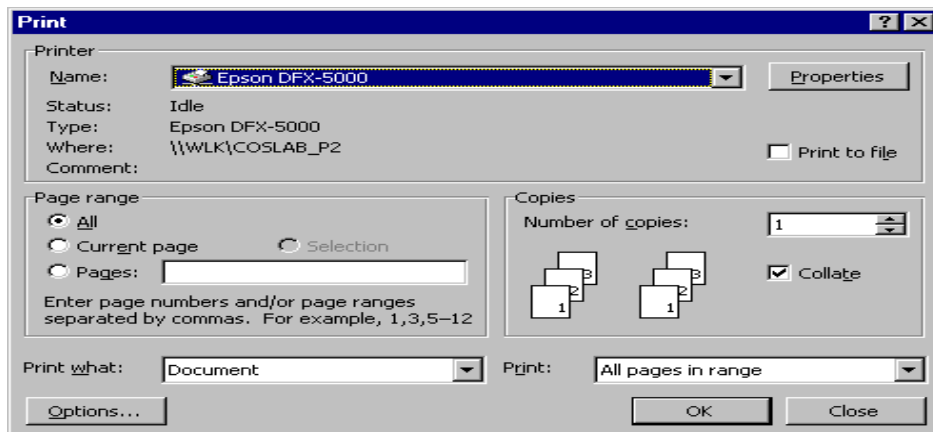
To print a document the user can simply click on the **Print icon** and press **Enter**.



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

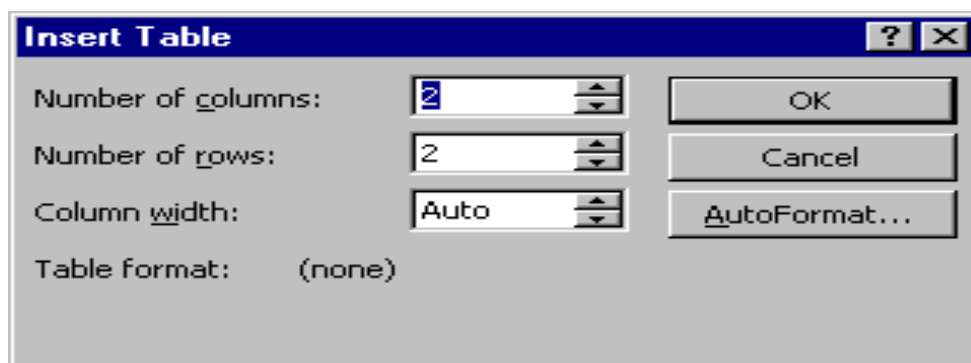
CREATING AND EDITING TABLES

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:

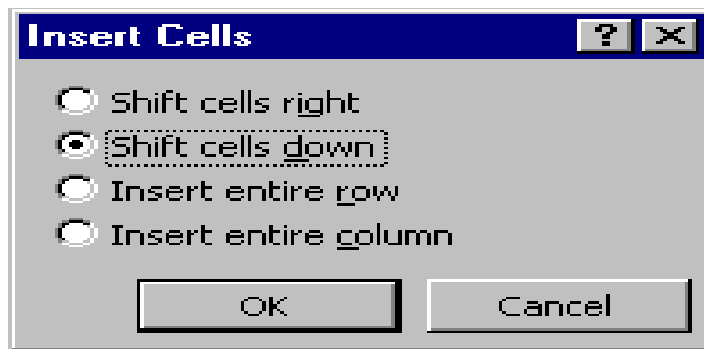


3. Click in the **Number of columns** box and type the required number of columns you want in the table.
4. Click in the **Number of rows** box and type the required number of rows you want in the table.
5. Click **OK**.

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:

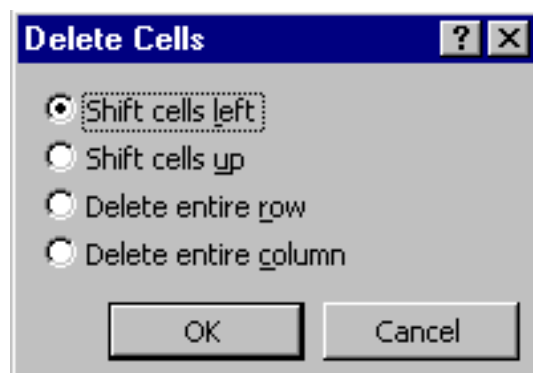


4. Click on
 - **Insert entire row** if you want to insert a rowOR
 - **Insert entire column** if you want to insert a column.
5. Click **OK**.

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 rowOR
 - **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.

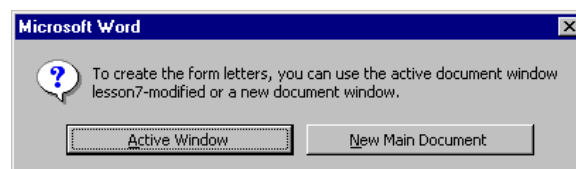
For example, to write the same letter to a number of people without typing the original letter more than once, you can create the main document (the letter) and a data source (address file). Then merge the two files to create multiple copies of the original letter. The text will be the same for each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

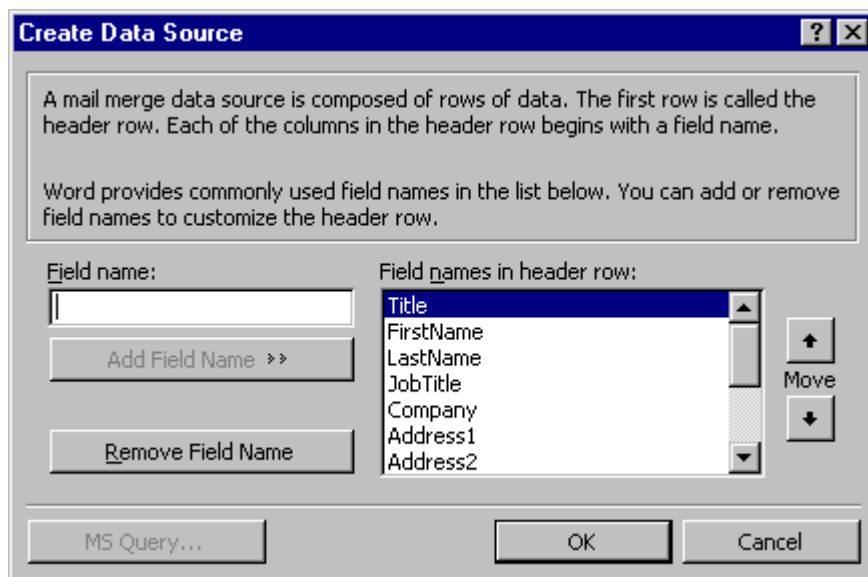
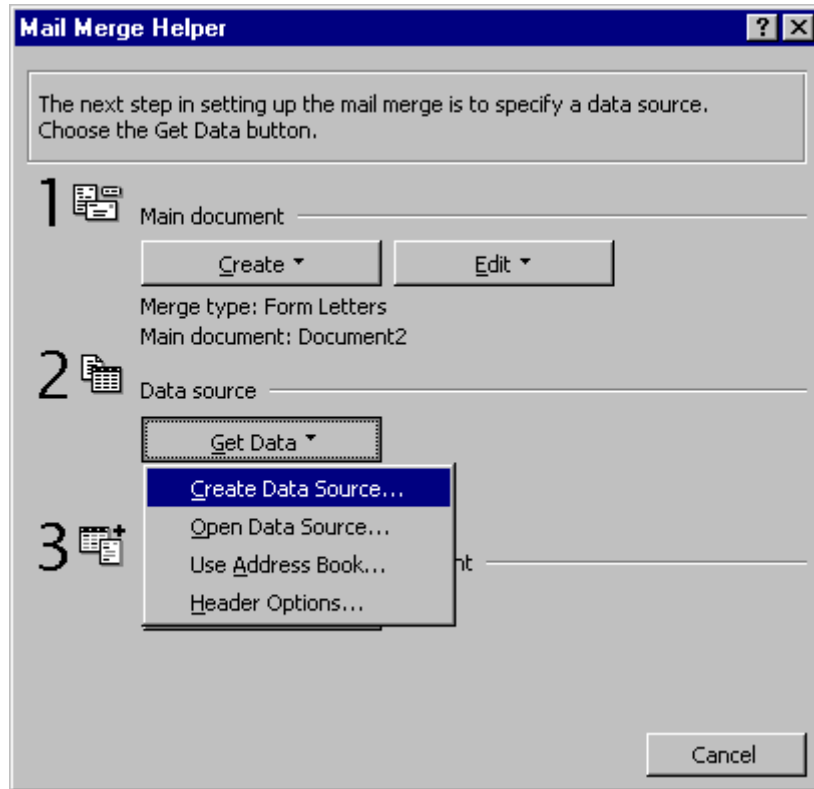
TO CREATE A MAIN DOCUMENT

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.



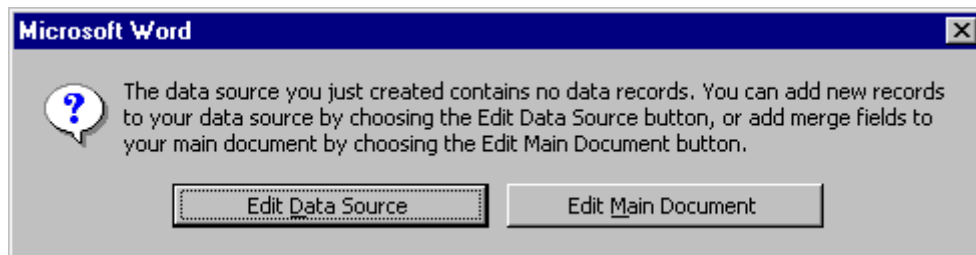
TO CREATE A DATA SOURCE DOCUMENT

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.

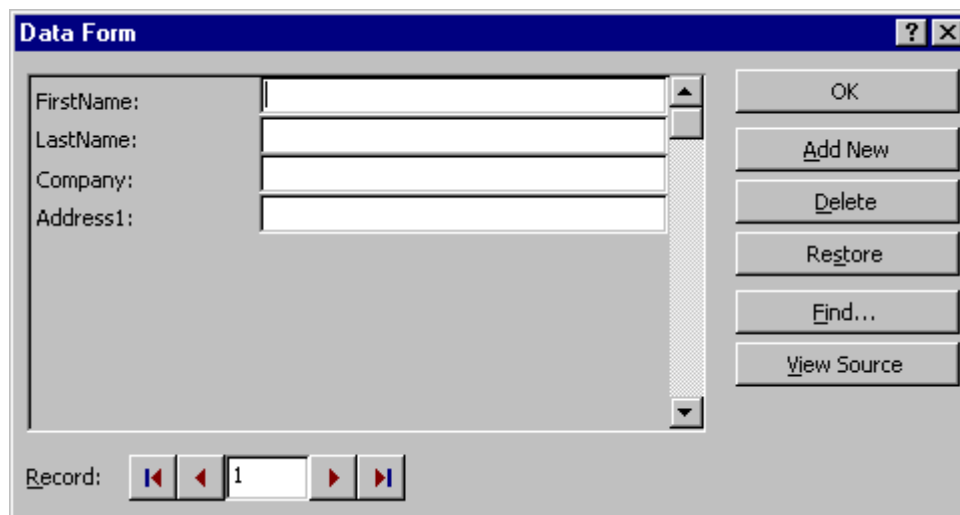


3. MSWord gives a list of fields commonly used when creating data records. The user can decide to use these fields as they are given or to remove the fields you don't want to include in your data.

- 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**.



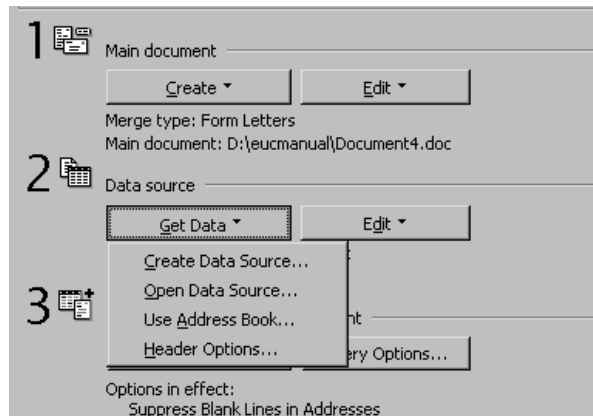
2. Click the **Merge To new Document button**. MSWord will open a new document window called *Form Letters 1* and then print all copies of the letters to that document. There will be a section break (page break) between each letter.
3. Now print the document **Form Letters 1**. Multiple copies of the 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

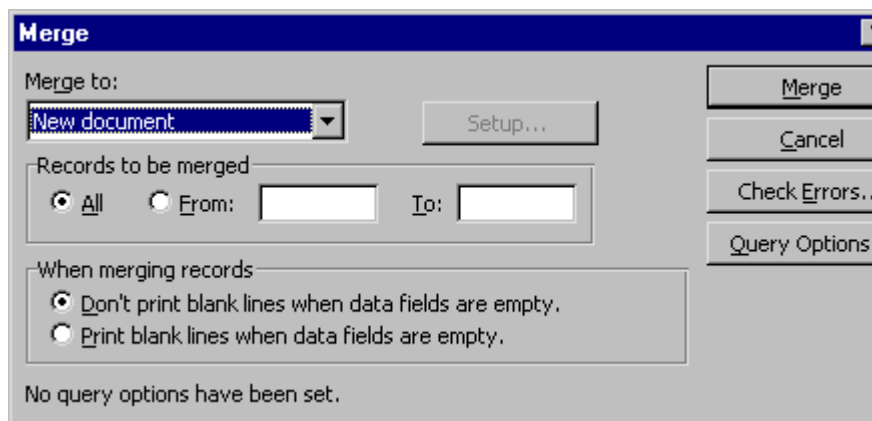
It is not always necessary to create completely new documents when performing a mail merge. The user can set up one data source document, create several different main documents and then merge data whenever required.

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

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 “goeey” the acronym stands for the most obvious part of Windows namely its **G**raphical **U**ser **I**nterface.

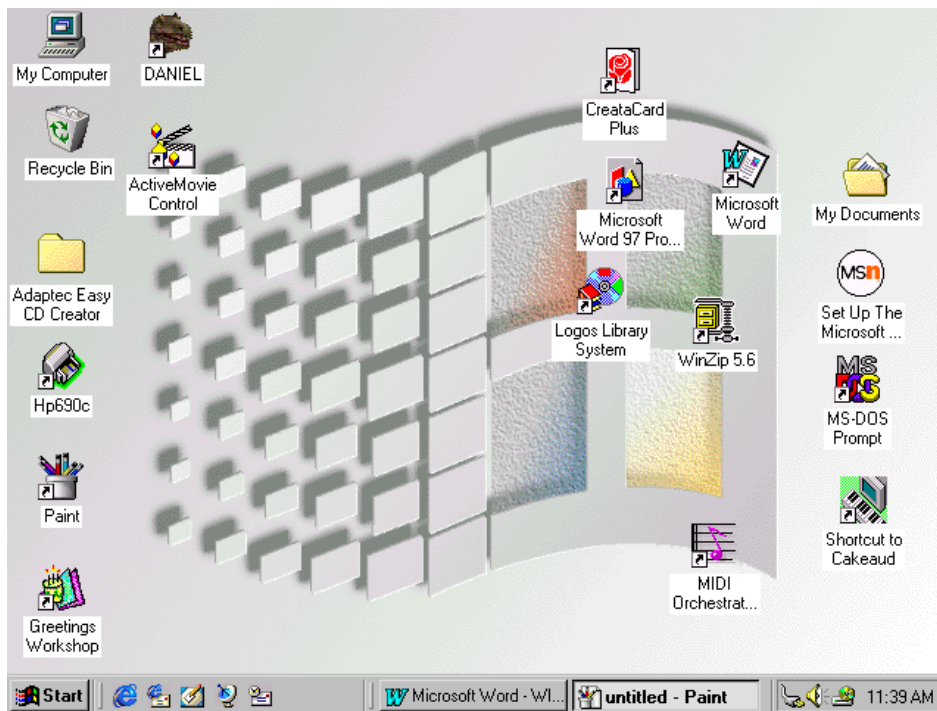
A user interface is simply the way that the user communicates with a machine. Most machines have some type of user interface i.e. a microwave oven’s control knobs, the 12 buttons on the telephone, etc. We need an interface because the user has to be able to tell the machine / computer to perform certain 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

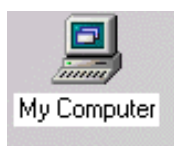


(Start button)

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

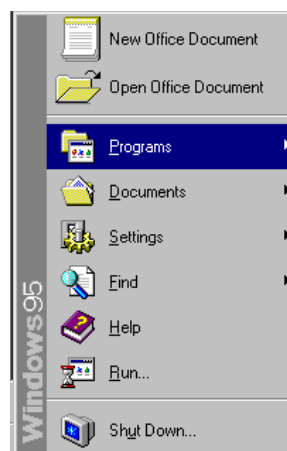


At the bottom of the Windows 95 screen you can see the *task bar*. At the far right of the bar you can see the current time. At the far left, you can see the START button. (This is where everything in Windows 95 starts.)

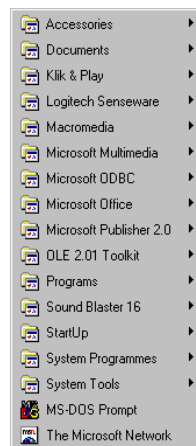
When an application has been activated in Windows, the program's name will appear in the Task Bar indicated by a small icon of the program. When more than one application is active, the user can click on the icon in the task bar to switch from one application to another.

TO ACTIVATE A PROGRAM

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

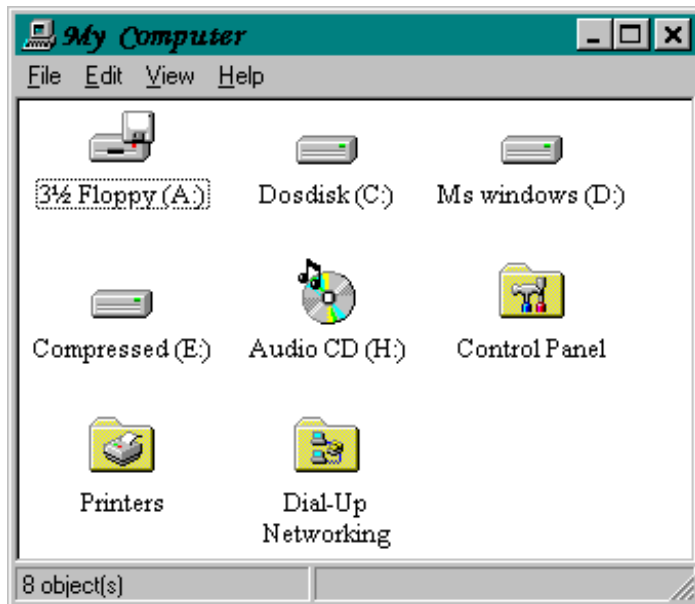
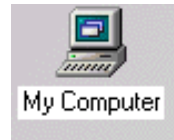


2. Move the mouse over **Programs**.



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

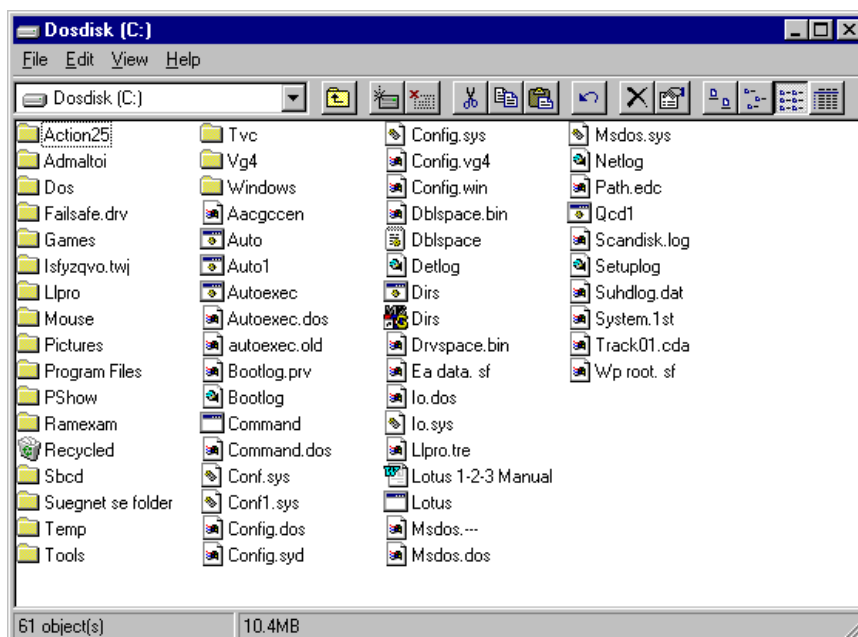
MY COMPUTER ICON



← 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

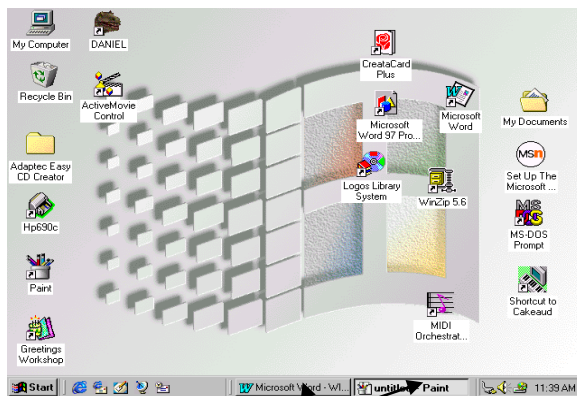
The following is a list of words that has to be understood when using windows and a mouse:

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

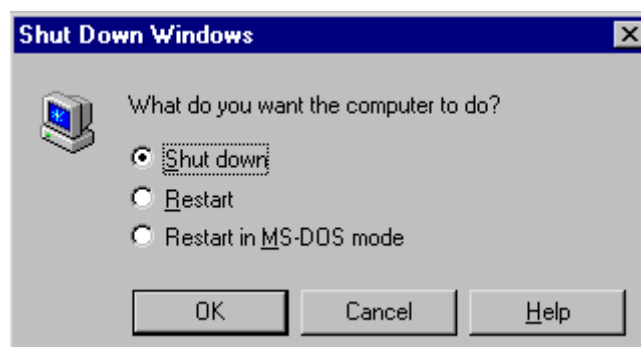
SHUTTING DOWN THE COMPUTER

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 lose 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 that the *Shut down* option is selected.

4. Click on **OK**.

WINDOWS EXPLORER

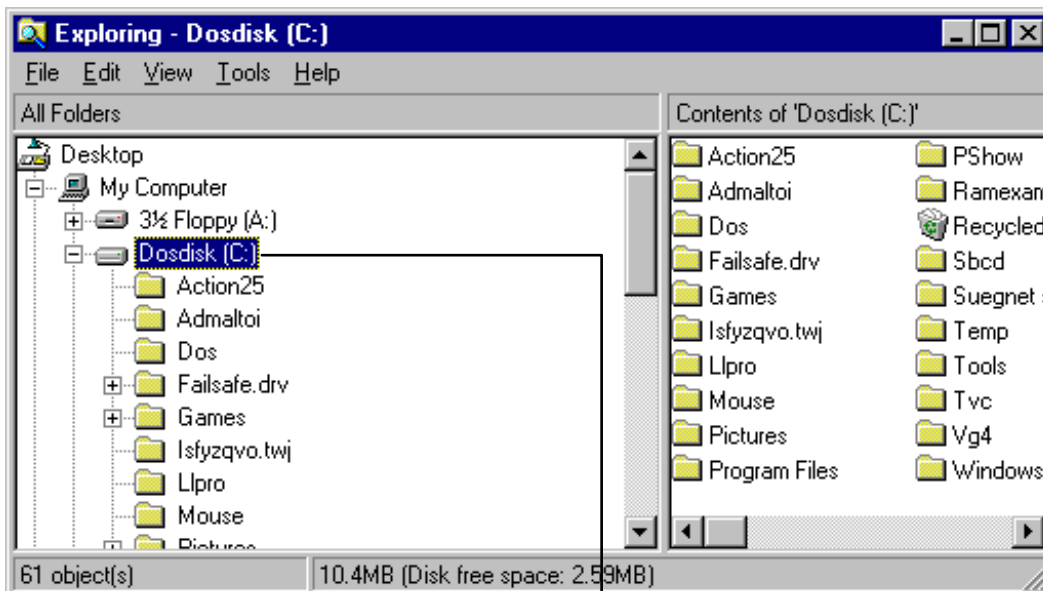
Windows explorer is the program that allows a user to manipulate the different resources of the computer. The user can create new folders, copy, move or rename files. The following sections explain how to perform some of these actions using Windows Explorer.

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.

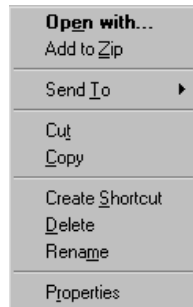
5. Type in the name of the new folder.
6. Click once on the left side of the name to go directly to that folder.

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.

Name	Size
Lesson~1	1427 KB
Lesson~2	69 KB
Lesson~3	86 KB
Lesson~4	1005 KB
LESSON~5	302 KB
Lesson~5	288 KB
Lesson~6	145 KB
Lesson5	302 KB
manual.doc	16 KB

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.

Name	Size
les1ww	57 KB
les2ww	18 KB
Lesson~1	1427 KB
Lesson~2	69 KB
Lesson~3	86 KB
Lesson~4	1005 KB
LESSON~5	302 KB
Lesson~5	288 KB
Lesson~6	145 KB
Lesson5	302 KB

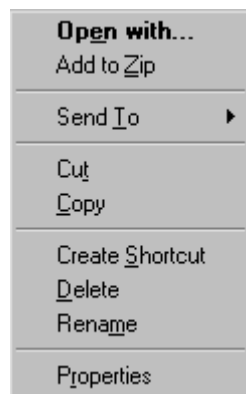
Example of a group of non-adjacent files

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.

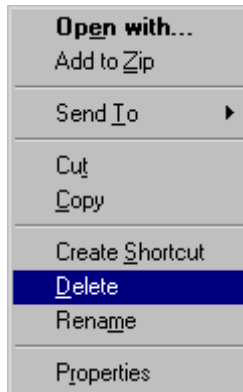


4. Click on **Copy** in the sub-menu that appeared.
5. On the left side of explorer, click on the folder **FOLDER-B** with the right mouse button.
6. Click on **Paste** in the sub-menu that appeared.

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:



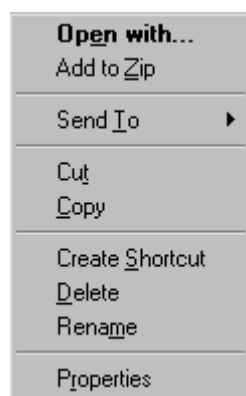
3. Click on **Rename**.
4. Use the keyboard to change the name.
5. Press enter when finished typing the new name.

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

When a file is moved from 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.



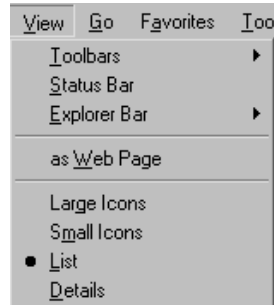
4. Click on **Cut** in the sub-menu that appeared.
5. On the left side of explorer, right-click on the folder **FOLDER-B**.
6. Click on **Paste** in the sub-menu that appeared.

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

TO 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**

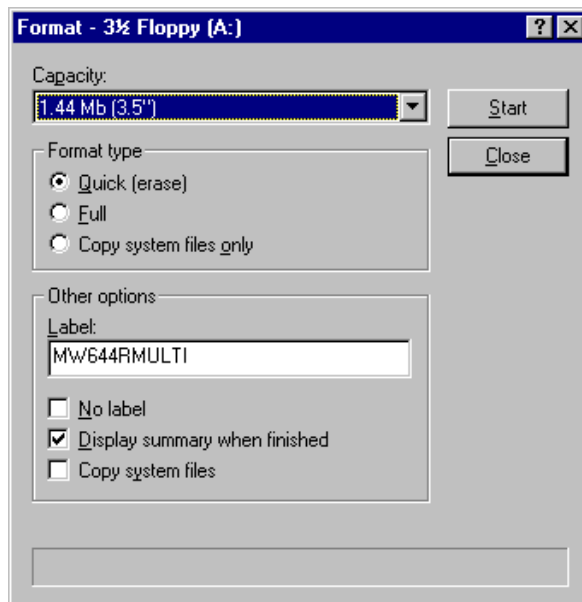


The *Details* view displays information like what kind of file it is, the date and time it was last modified or created, etc.

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 stifty 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 stifty drive.

COPY FROM STIFFY TO STIFFY

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

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 :

<i>Exit</i>	Will exit DOS and return to Windows.
<i>Alt + TAB</i>	Pressing TAB while holding down Alt, allows you to switch between programs.
<i>Alt + Enter</i>	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

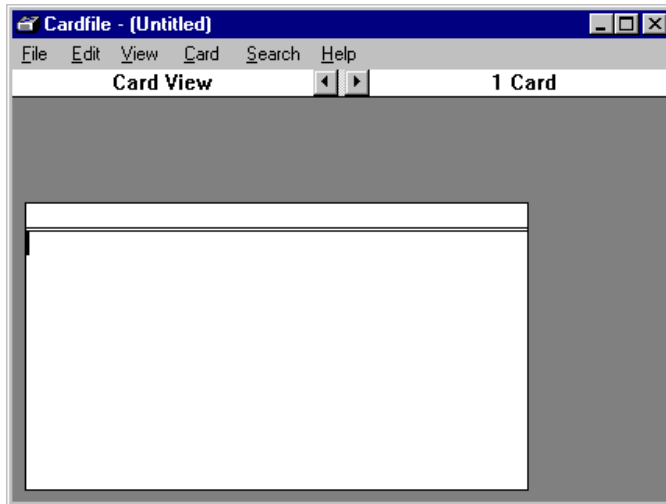
Windows 95 contains a number of accessory programs that are very useful to the computer users. These programs include:

- *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.

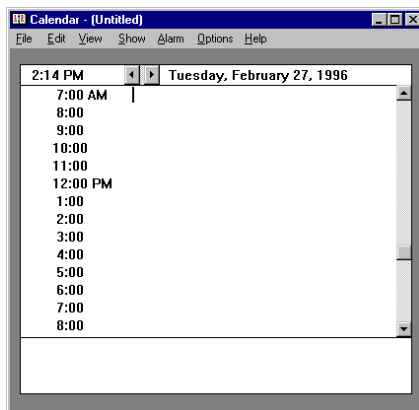
Instructions are given to open each of the accessory programs but if you would like to use any of the accessories, please consult the on-screen Help-file for further information.

TO ACTIVATE CARD FILE

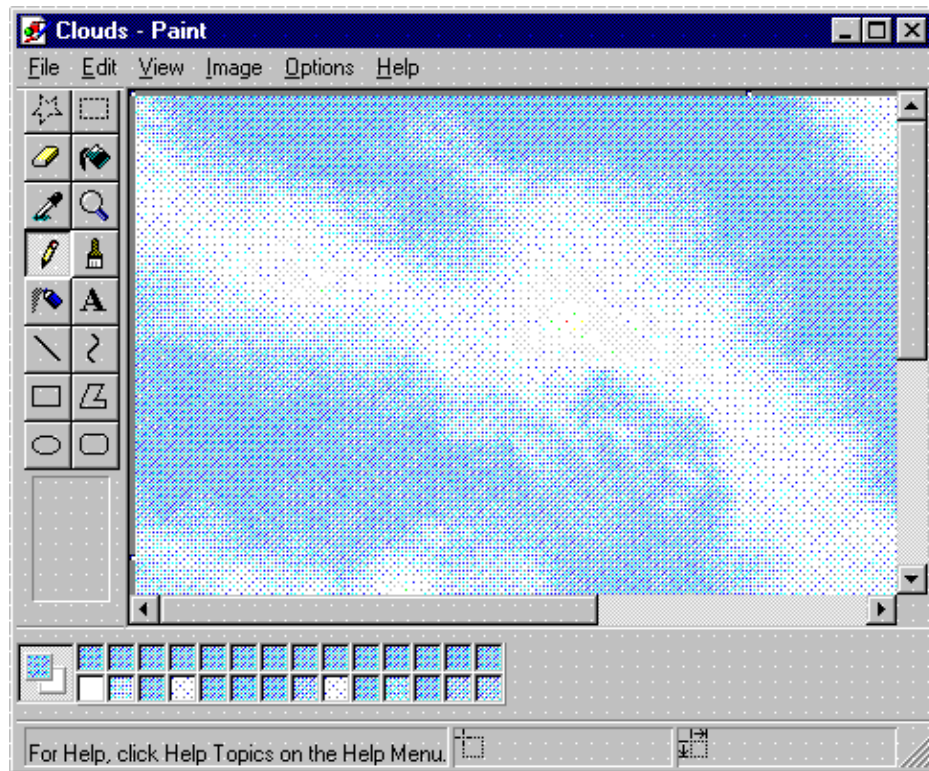
1. Click on **Start**.
2. Move over **Programs**.
3. Move over **Accessories**.
4. Click on **Card File**.

**TO ACTIVATE CALENDAR**

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

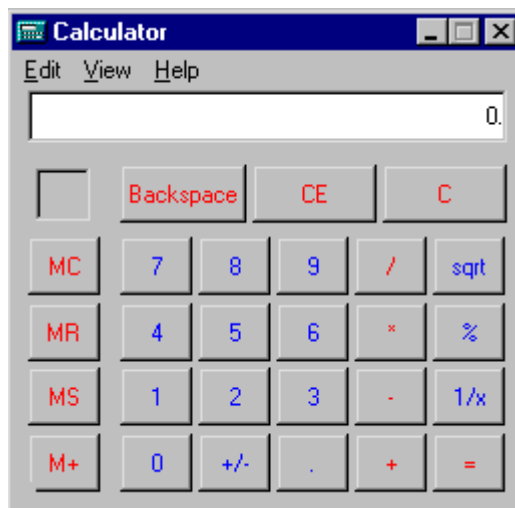
**TO ACTIVATE PAINT**

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

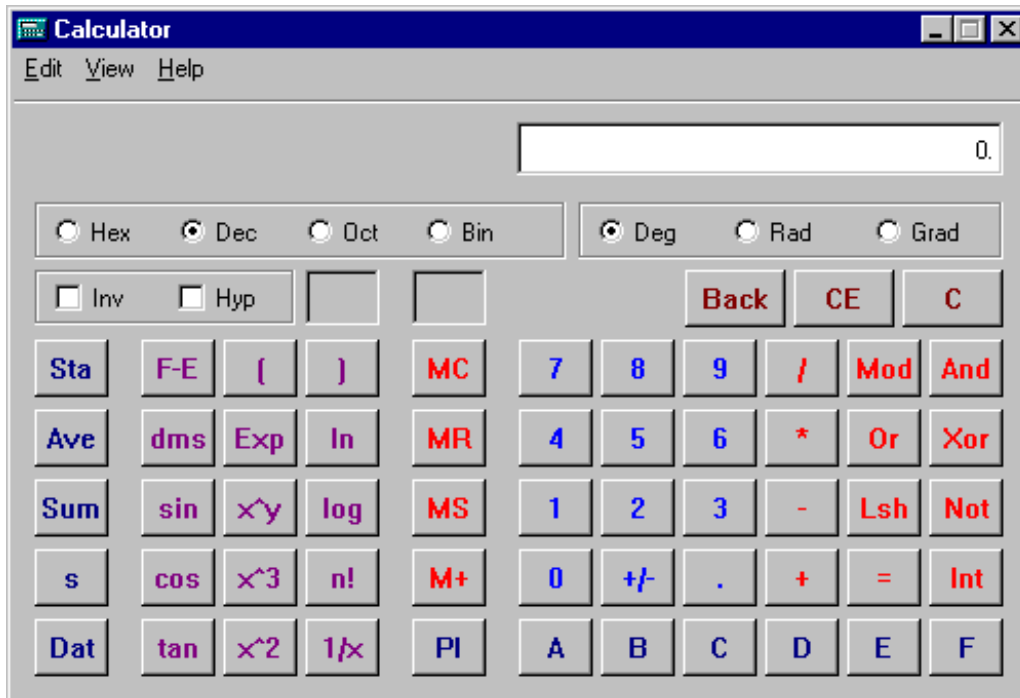


TO ACTIVATE CALCULATOR

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



The Calculator in standard view



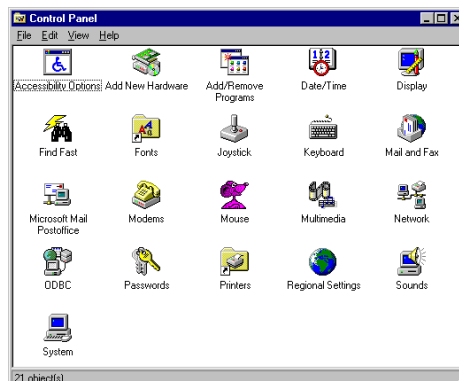
Calculator in scientific view

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.

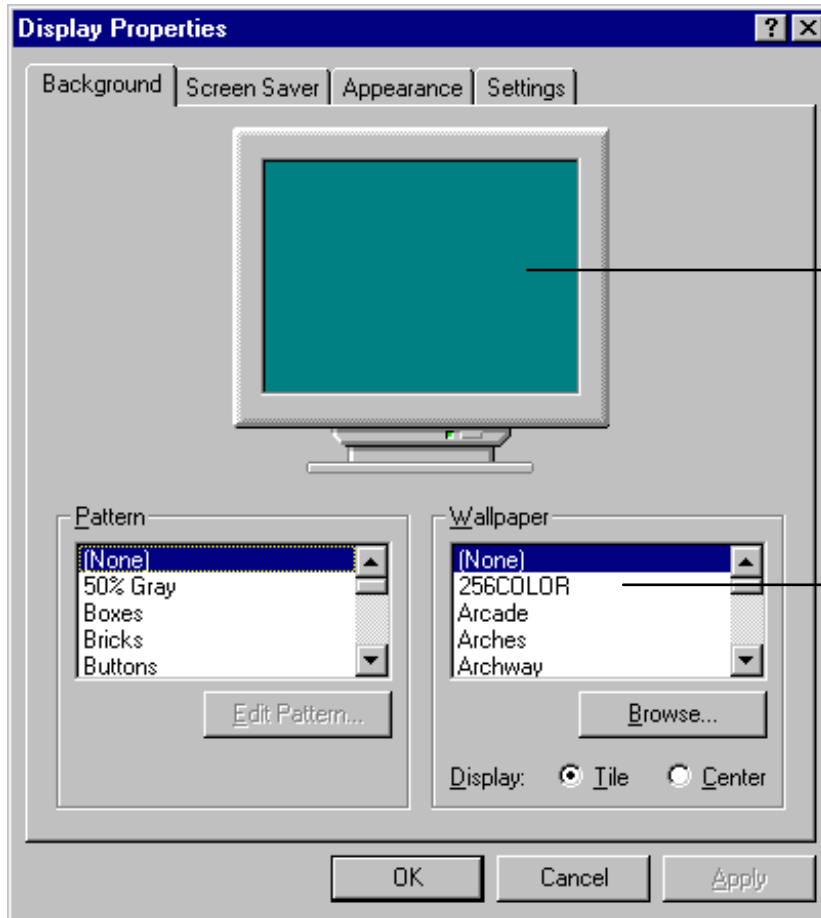
TO CHANGE THE SETTINGS OF THE DISPLAY

1. Click on **Start**.
2. Move over **Settings**.
3. Click on **Control Panel**.



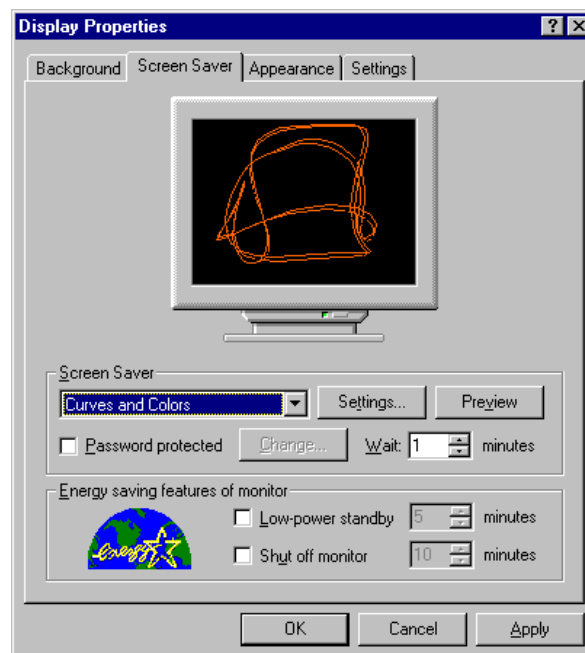
4. Double-click on **Display**.

5. A dialog box appears which you can use to change different settings. You can change the background, with this dialogue box :



This screen is a preview of how the windows will look.

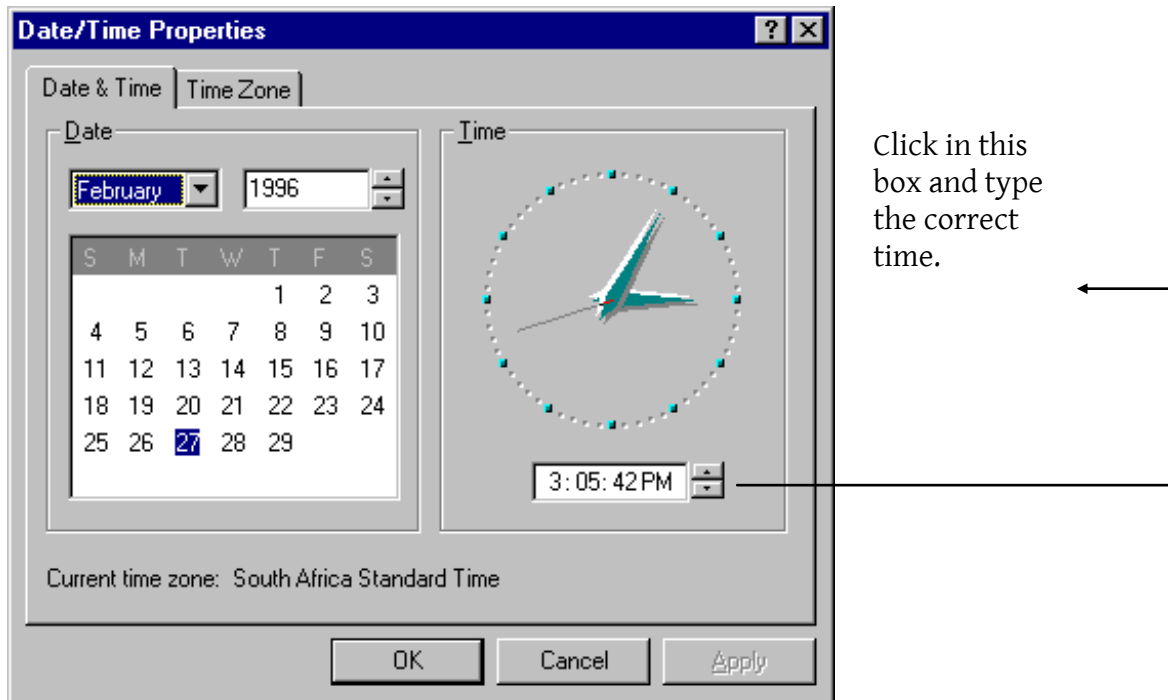
You can click on one of the bitmaps in this box.



CHANGING THE DATE AND TIME

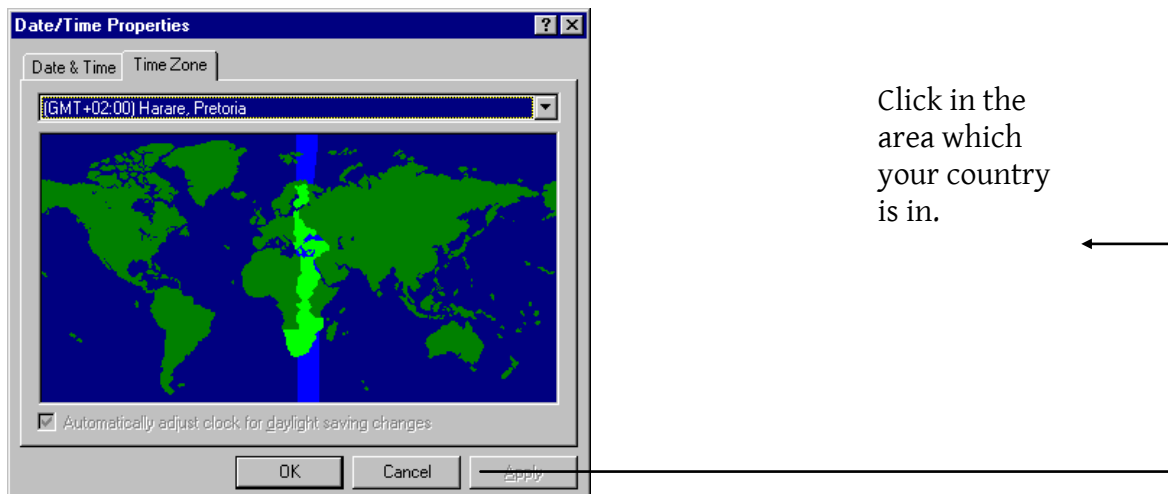
The computer has a built-in clock which should display the correct date and time. If this is not the case, the user can set the date and time:

1. Double-click on the right hand corner of the screen where the time is displayed. The following dialog box appears:



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:



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.

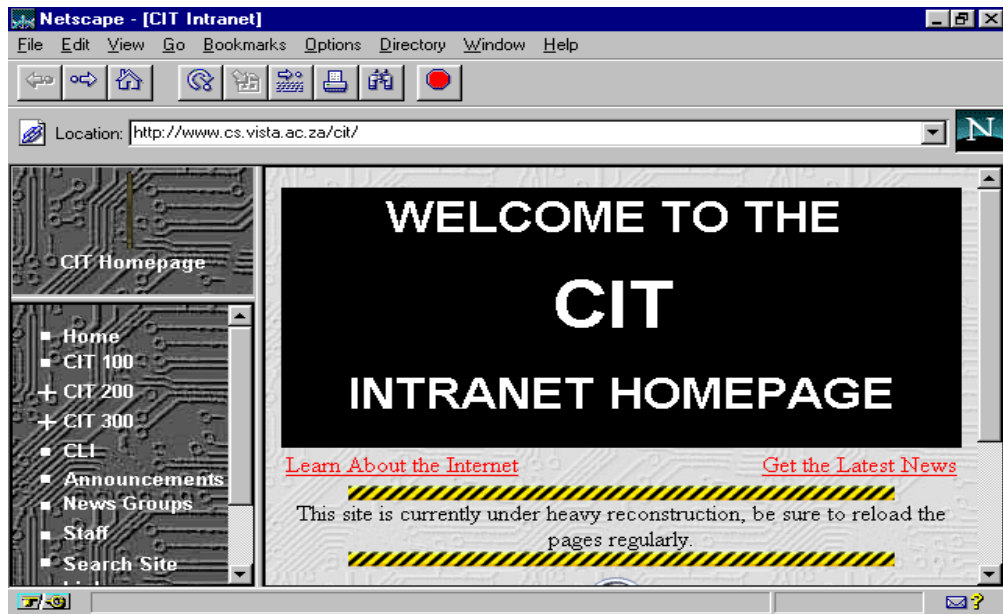
USING NETSCAPE NAVIGATOR

GETTING STARTED

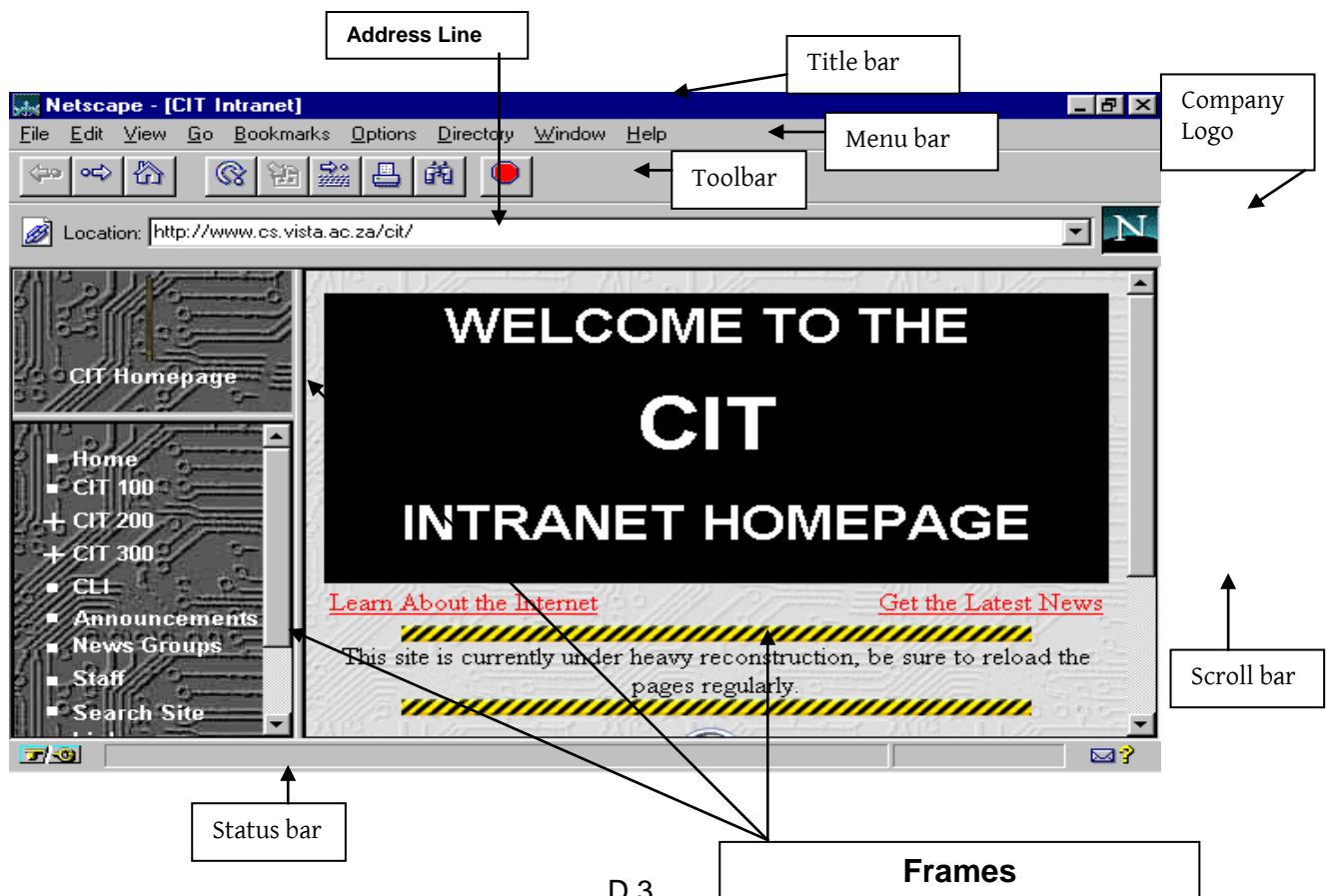
Upon starting Netscape Navigator the first page you see is your current home page. If you work in a Vista computer lab, this page will be the CIT Department’s Intranet page.

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:

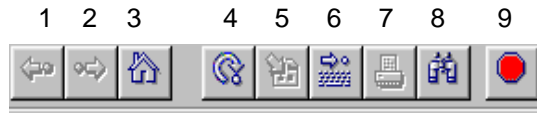
- In the current web page, click on highlighted words, pictures or menus to bring another page of related information to your screen.
- Click the **Back** or **Forward tool bar buttons** to go back (or forward) to a page you have previously seen.
- Type the web address of a web page that you want to 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 <i>home page</i> .
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.

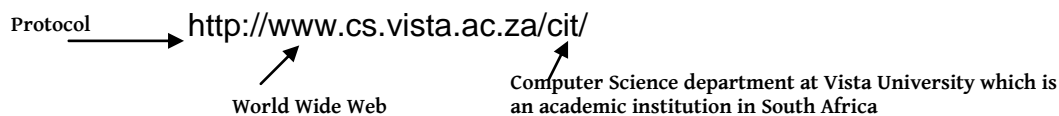
- Some scan the Web, jumping from site to site and automatically “reading” all the pages they find.
- Others require individual authors of web pages to submit description to the search engine. These descriptions are then placed in a database that users can access and in this way find what they are looking 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:



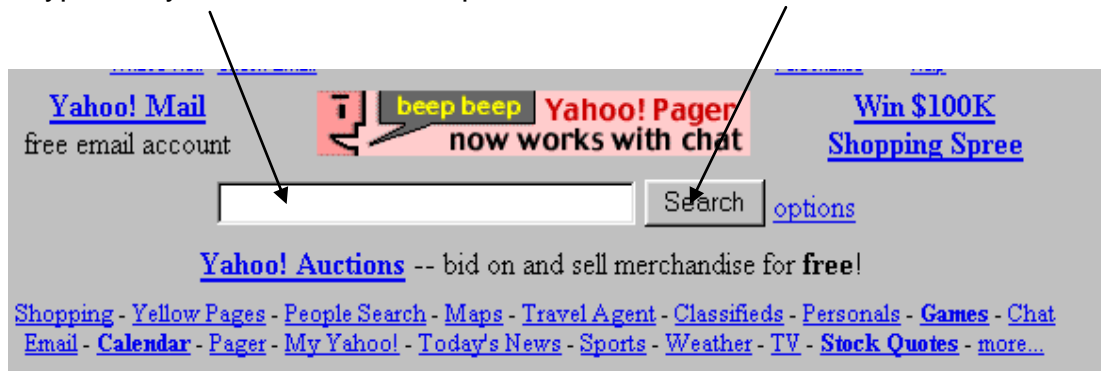
TO USE THE SEARCH ENGINE YAHOO



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:

Type a keyword in the window provided *and then* Click on search.



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 addresses to people and computers. The system divides an address into three parts:

- The **user 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

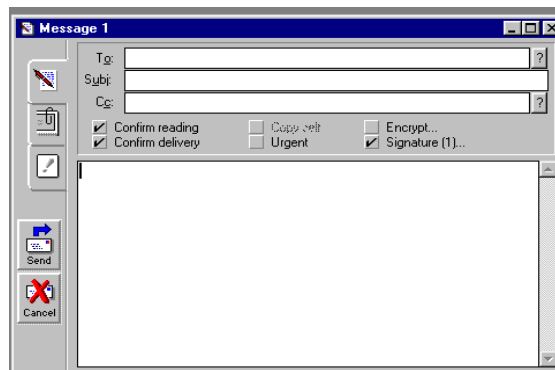
1. Click on one of the following buttons that could be found either on the toolbar or button panel:



or



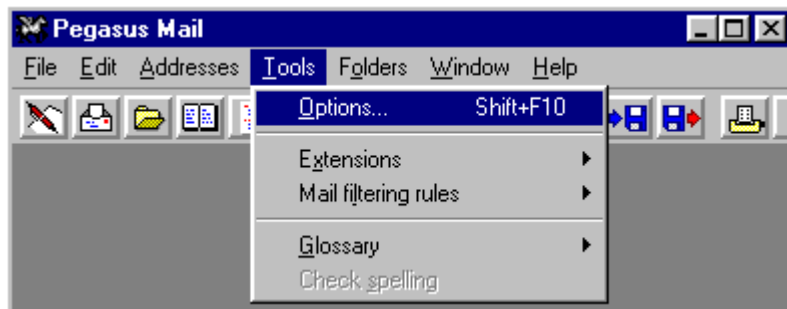
A message editing window will be opened. You can click on most parts of this screen and get a description of the function of that particular part of the window.



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.

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.

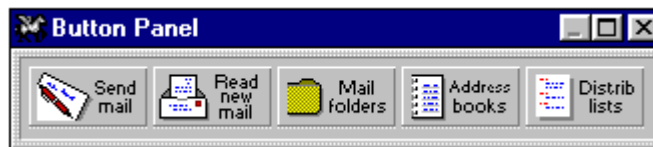


TOOL BAR

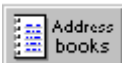

Pegasus Mail's toolbar or button panel is a set of tools which provide access to the most commonly-used parts of the program at the click of a button. Depending on the setting specified in the Button Panel Preferences (see under the Tools/Options menu), the button panel can appear in different formats and at different positions on the screen.



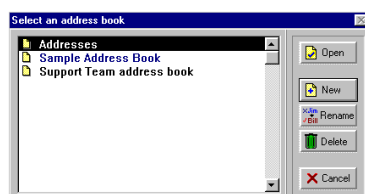
The floating button panel can be horizontal or vertical, though they both have the same buttons. We show the horizontal button panel here:

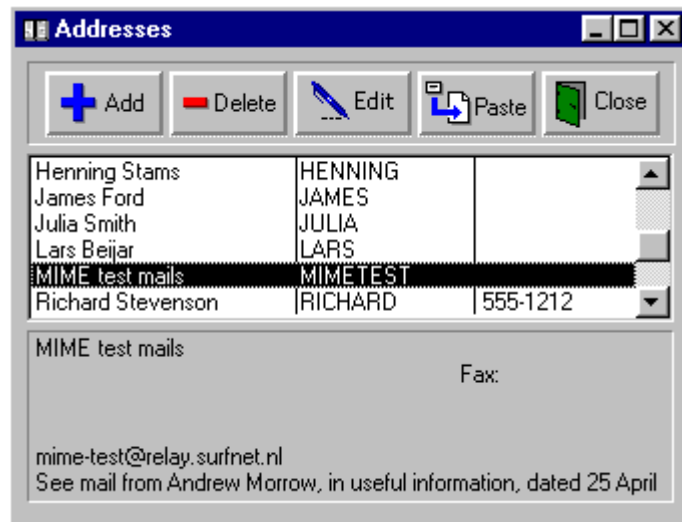


USING THE ADDRESS BOOK

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.

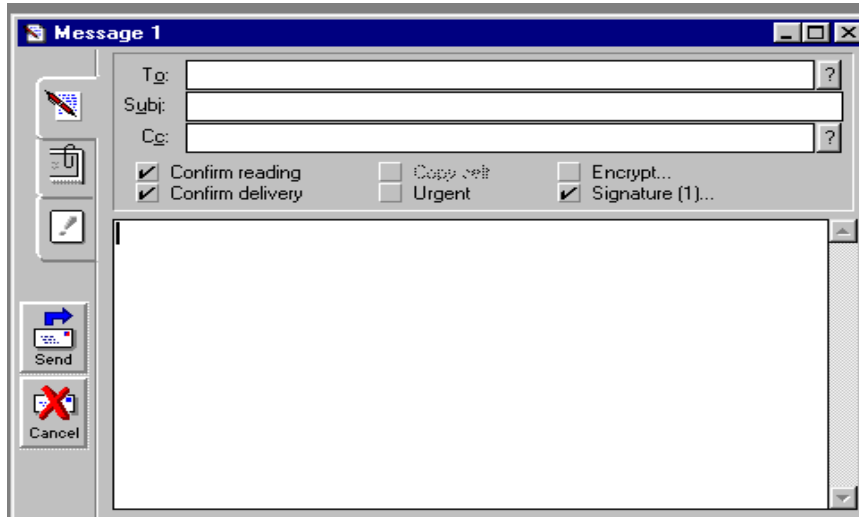
TUTORIAL D2.1

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
-

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.

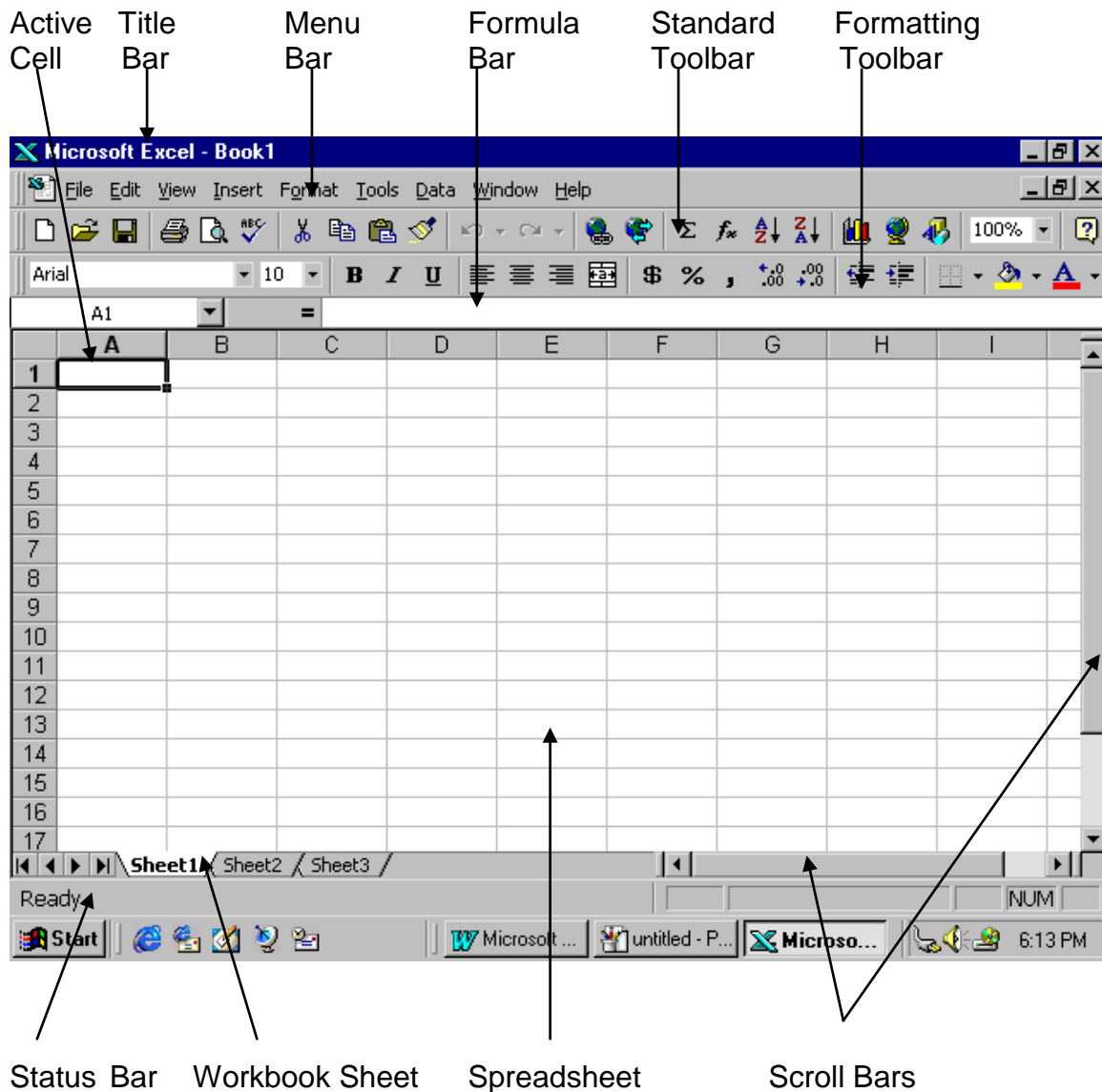
GETTING STARTED IN EXCEL

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:



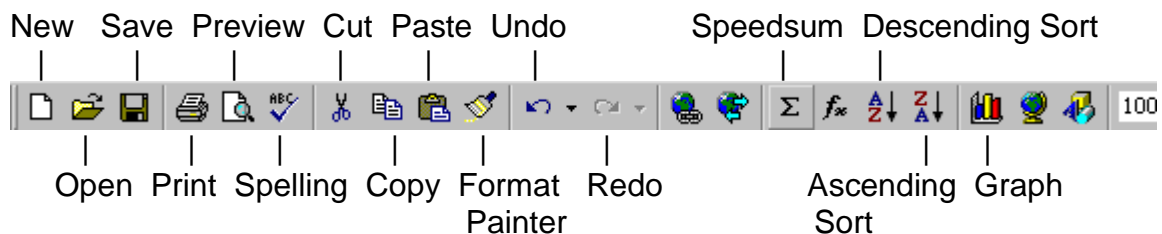
WINDOW ELEMENTS

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

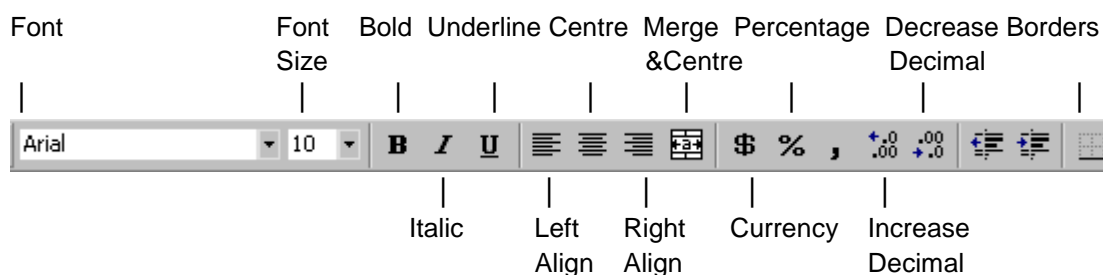


The following are the most important icons that will be used during this course:

- 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.

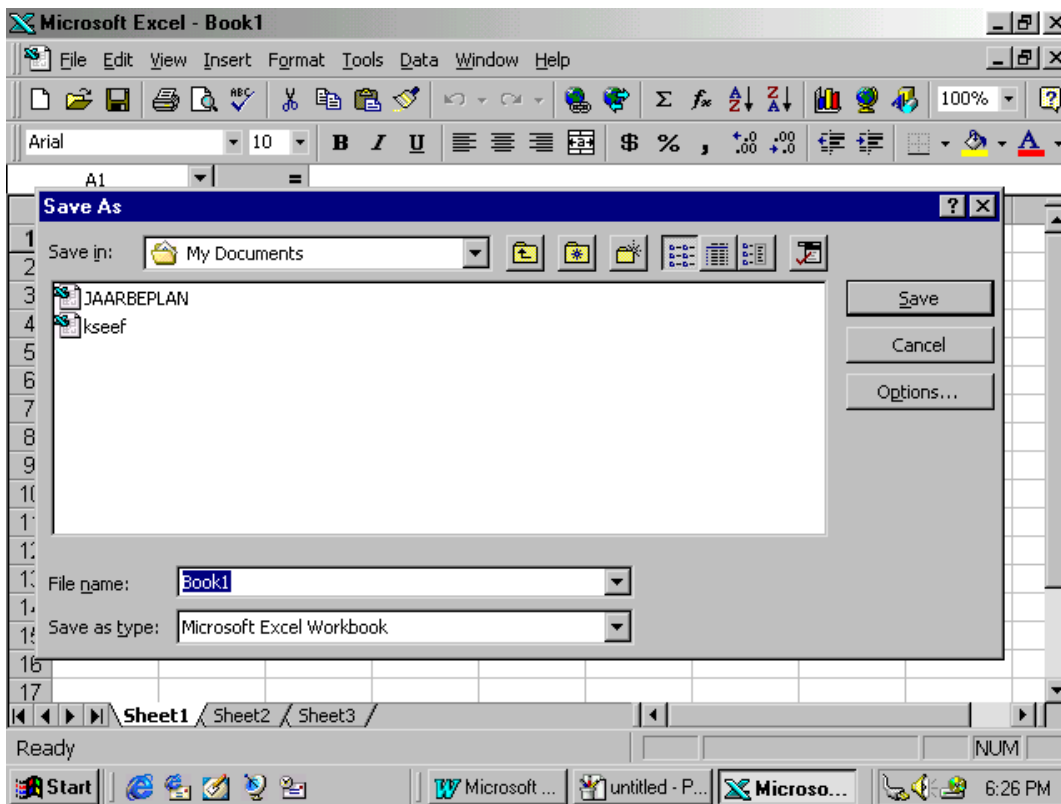
1. Click on the **Re-do icon** on the standard toolbar.

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

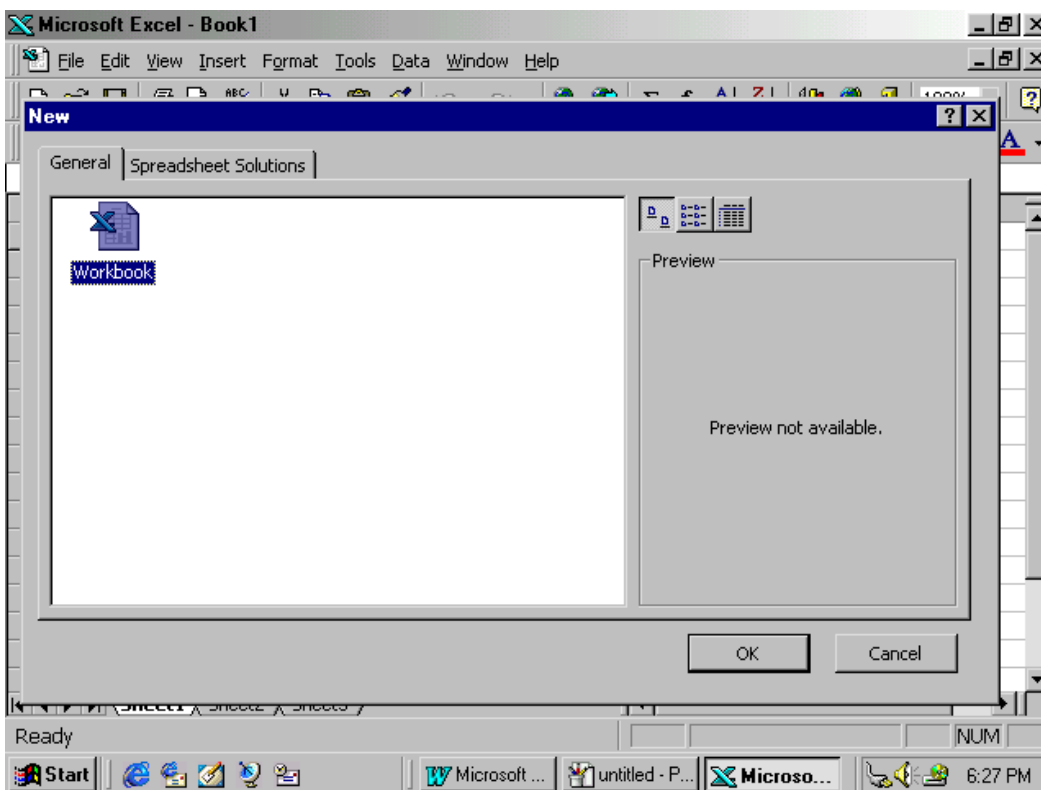
1. Click on the **File** menu.
2. Click on **Close**.
3. If you have not yet saved your workbook, then Excel will open a dialog box which will prompt you whether you would want to save the workbook. You could now choose **Yes** (which will lead to the Save-As-dialog box) or **No** which will result in 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:

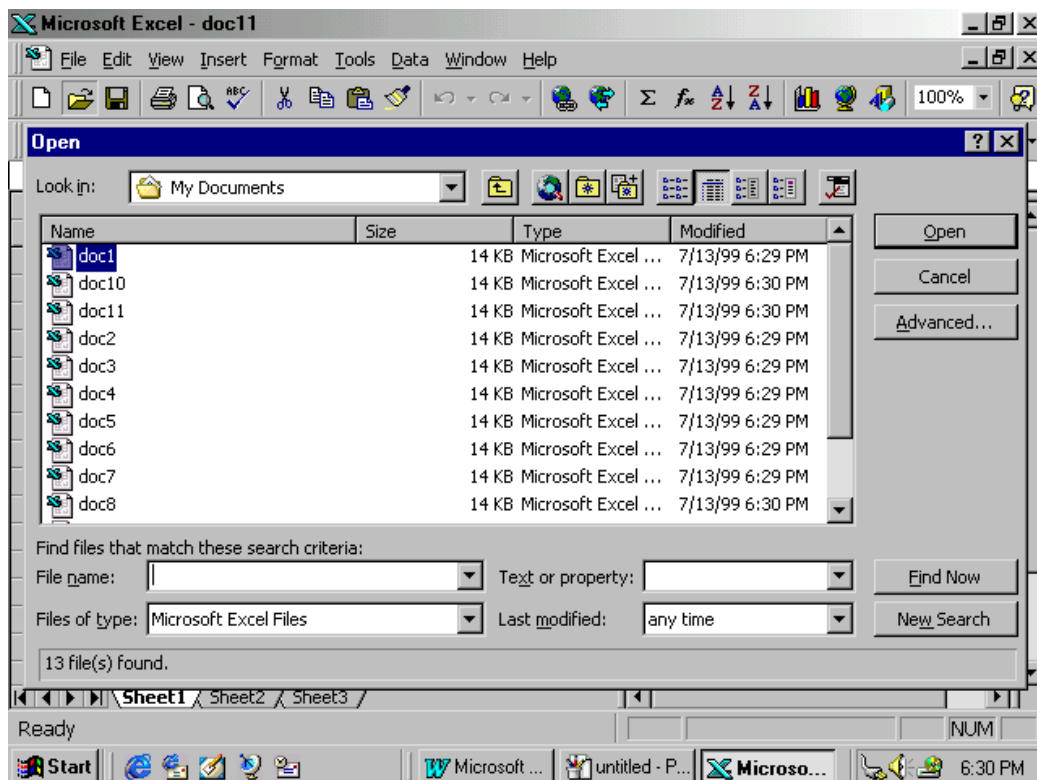
- ◆ Open an existing file
- ◆ Work with more than one workbook at a time
- ◆ Insert / delete rows and columns
- ◆ Hide and unhide columns
- ◆ Change column widths
- ◆ Change row heights
- ◆ Use different formatting techniques
- ◆ Print a workbook

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

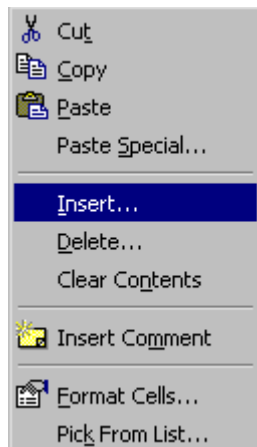
1. Click on the **Window** menu.
2. All the names of the active books will be displayed. Select the one you want to work with.

INSERTING AND DELETING ROWS / COLUMNS

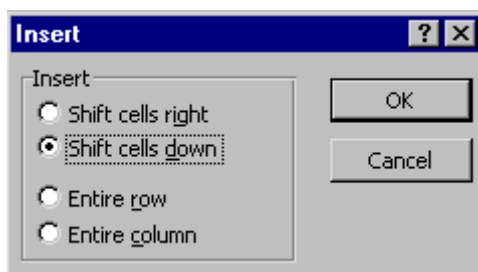
It is possible to insert rows and/or columns to an existing spreadsheet.

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

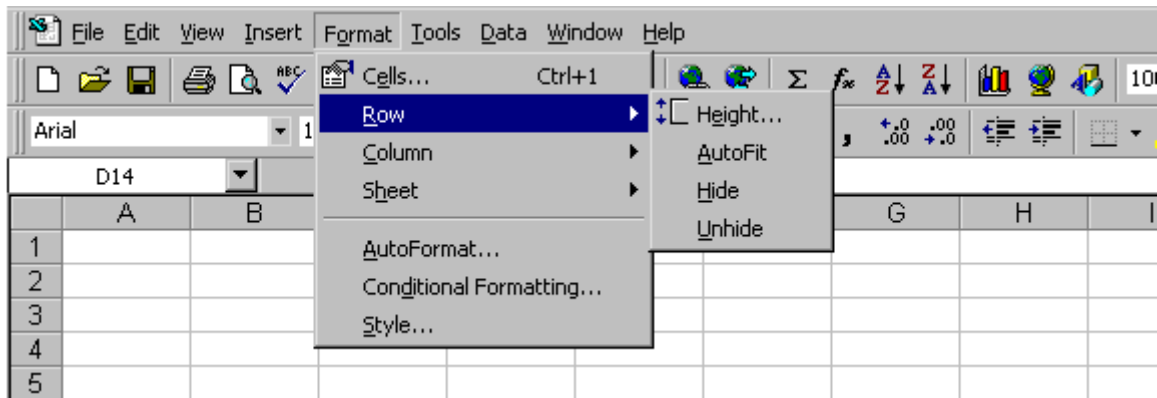
1. Select the row / columns that you wish to delete.
2. Click the right mouse button in the row / column. A menu appears.
3. Click on **Delete**.
4. Click on **Entire row** or **Entire column** whichever is applicable.
5. Click on **OK**.

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

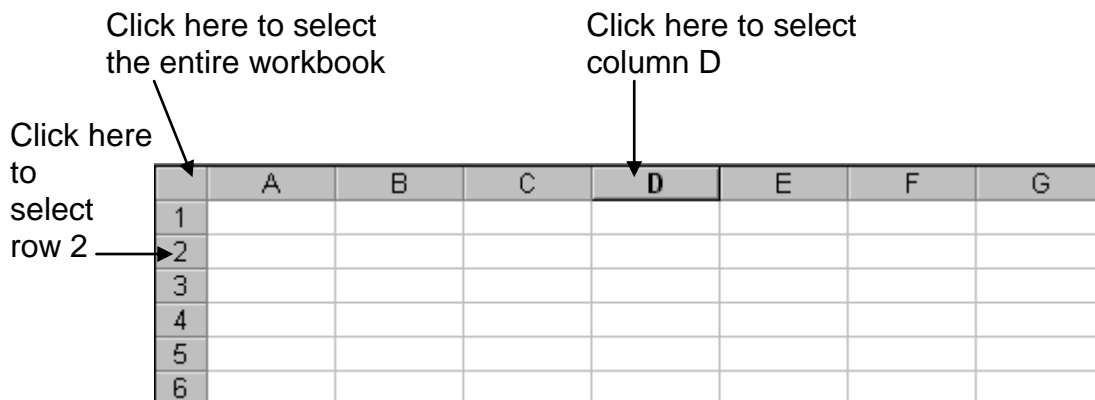
	A	B	C
1	MY BUDGET 2000		
2			
3	EXPENSE	INCOME	JAN
4			
5	Car		600
6	House		600
7	Petrol		100
8	Food		200
9	Clothes		50

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.



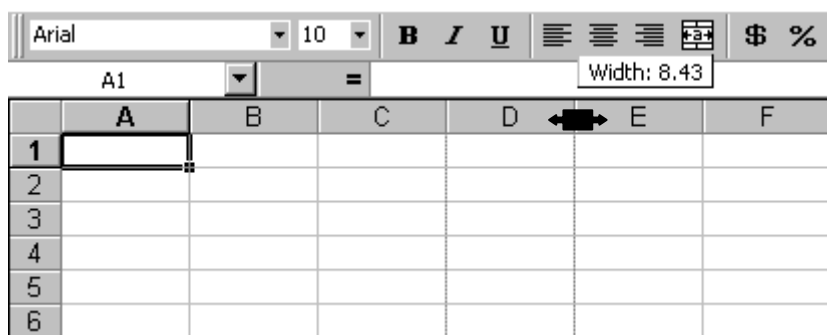
RESIZING COLUMNS and ROWS

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.



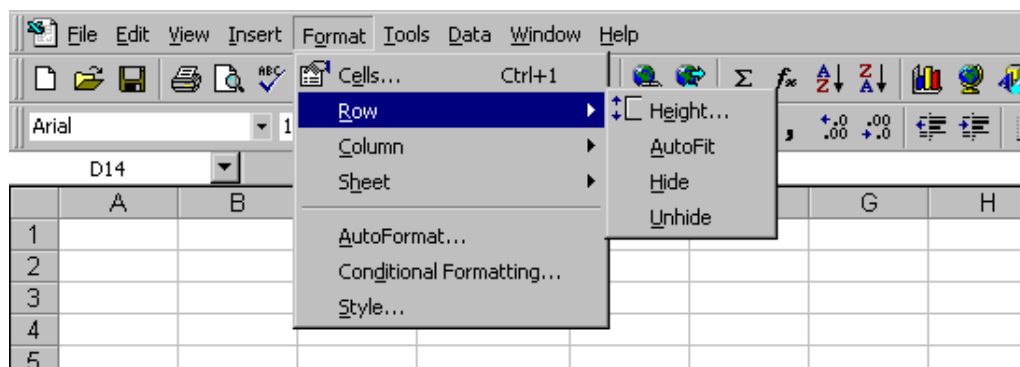
2. Drag the double-arrow until the row or column is the required size.

TO RESIZE SEVERAL ROWS OR SEVERAL COLUMNS IN THE SAME PAGE TO A UNIFORM SIZE

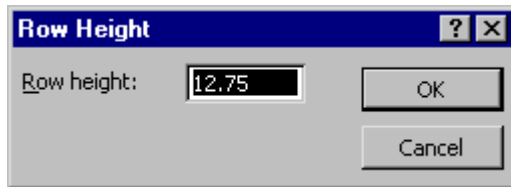
1. Select contiguous rows or columns (by clicking and dragging their borders).
2. Decide on a row or column within the selection that you want to govern the uniform size, then drag the double-arrow. All the rows or columns are resized to the same dimension even if they started out with different sizes.

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

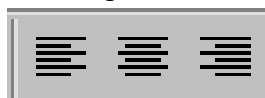
1. Select the cells that have to be changed.
2. Click on the appropriate **icon** on the **Formatting Toolbar** as explained in Chapter B1 (i.e. change the font type or font size or select **Bold**, *italic*, Underline).



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

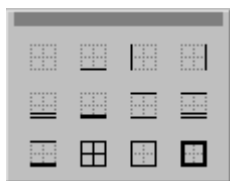
Excel allows you to add borders around your data in order to emphasise important parts of a workbook. Excel has a number of borders to choose from i.e. thin, thick, solid or double lines. You can also select to place the border above, below, right, left or around all four sides of a cell.

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).

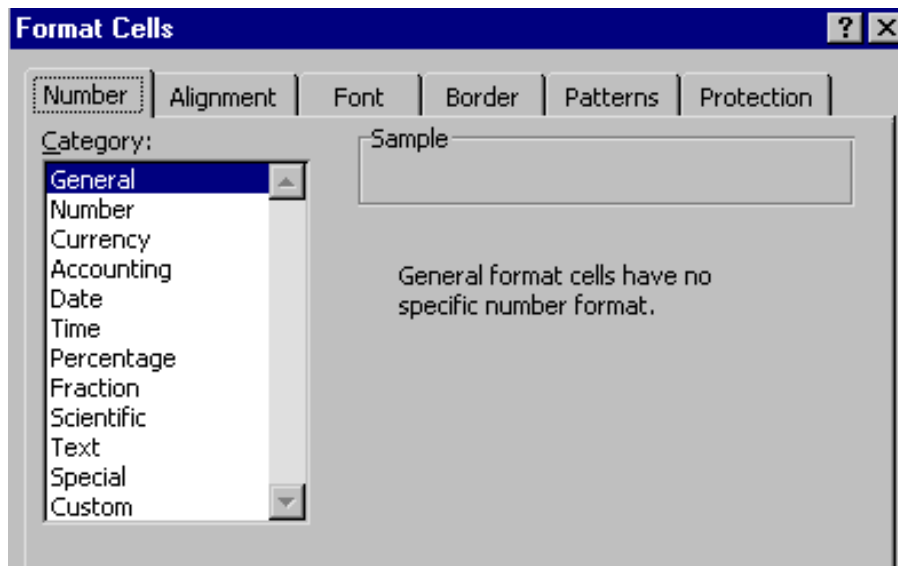
TO CHANGE THE FORMAT OF DATA

Data in a cell can be displayed in different types of formats. The most important formats are:

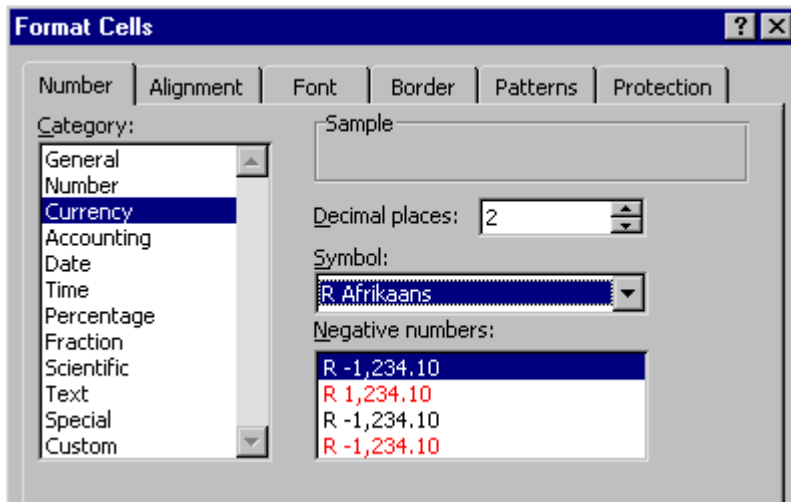
- *General* where the content is determined by the first character of input and numbers are not displayed in any pre-set format.
- *Numbers* where the user can specify how many decimal digits should be displayed. If it is set to 2 decimal digits and the number 5 is typed in, it will be displayed as 5.00.
- *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:



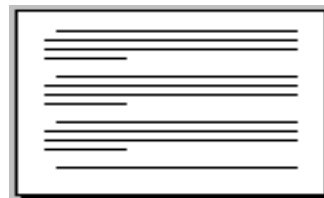
The number of digits after the decimal point; the symbol displayed in front of the numbers and the way negative numbers are displayed, can be selected.

PRINTING WORKBOOKS

Before a spreadsheet is printed, the user has to decide whether it must be printed in *Portrait* or *Landscape* view.



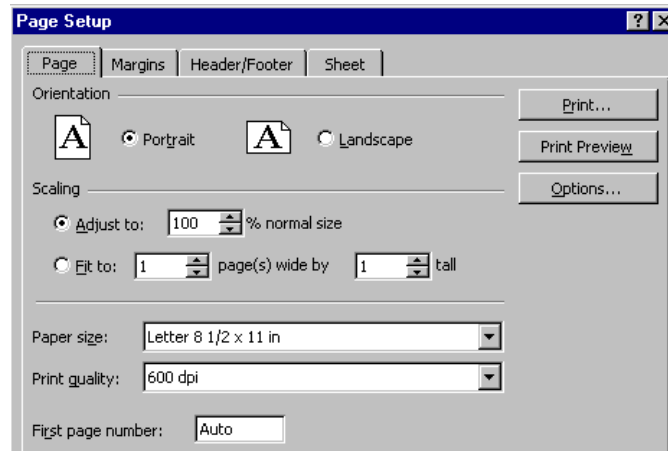
Portrait view



Landscape view

TO SELECT PORTRAIT OR LANDSCAPE VIEW

1. Click on the **File** menu.
2. Click on **Page Setup**. The following dialog screen appears:

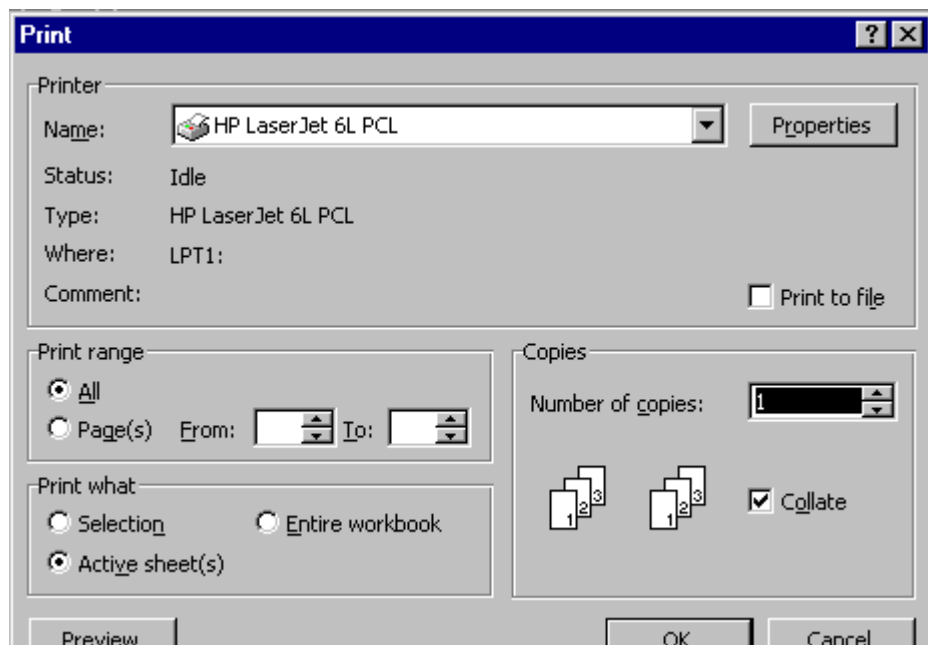


3. Click on **Portrait** or **Landscape**.
4. Click on **OK**.

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:

$$+3+6*5 = +3+30 = 33 \quad \text{BUT} \quad +(3+6)*5 = +9*5 = 45$$

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(C3:C5)` and then copied to cell D, it will remain to be displayed as `=sum(C3:C5)` 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.

	A	B	C	D	E	F	G
2							
3							
4		<i>NAME</i>	<i>STUDENTNR</i>	<i>Test1</i>	<i>Test2</i>	<i>Proj1</i>	<i>Proj2</i>
5							
6			100	100	100	100	
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
6	FRyDE	99731868	93	32	92	62	
7	GAAJE	99601827	73	16	59	66	
8	KABAI	99804557	27	0	14	50	
9	KELE	29529005	47	13	42	48	
10	MALEFANE	99507201	53	19	54	60	
11	MAPOLESA	99604037	60	13	49	54	
12	MASAWA	29110408	53	25	62	34	
13	MATLADI	99508192	87	13	62	66	
14	MEFANE	99604249	53	12	44	26	
15	MELATO	99601568	47	9	36	48	
16	MOHALAJENG	99600449	60	17	54	66	
17	MOKALAKE	99505534	73	14	57	64	

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.

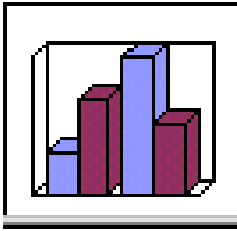
CHART TYPES

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:

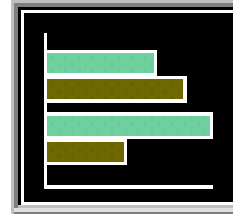
Chart type	Purpose
Pie	This chart can be used to show the relationship amongst parts of a whole.
Bar	This chart is used to compare values at a given point in time.
Column	This chart is used to emphasise the difference between items.
Line	This chart is used to emphasise trends and values over time.

EXAMPLES OF CHARTS

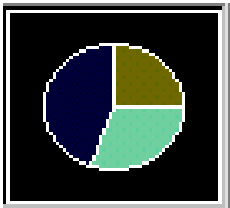
Column Chart



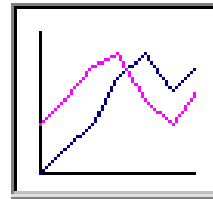
Bar Chart



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.

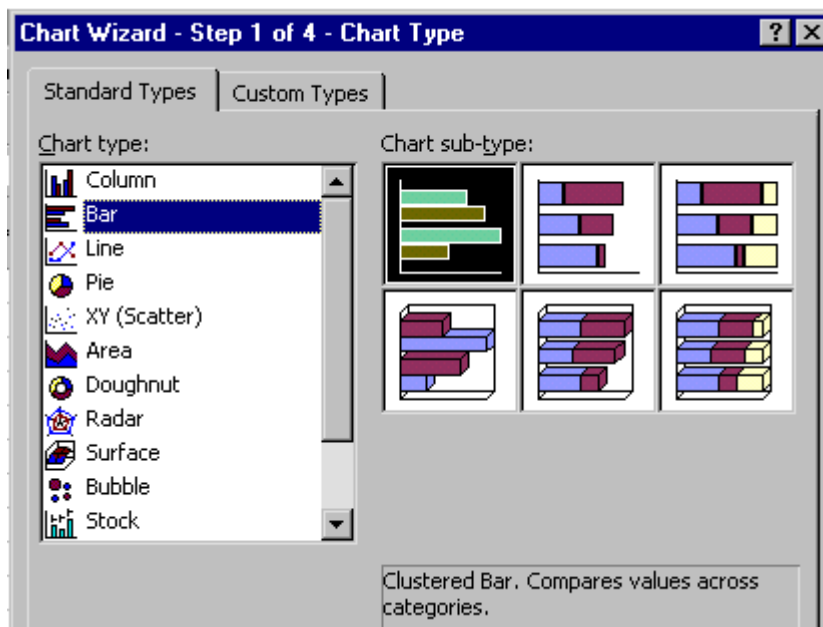
1. Create the following workbook:

Budget			
<i>Description</i>	<i>Jan</i>	<i>Feb</i>	<i>March</i>
Clothing	100	150	200
Food	20	250	200
Travelling	50	70	30

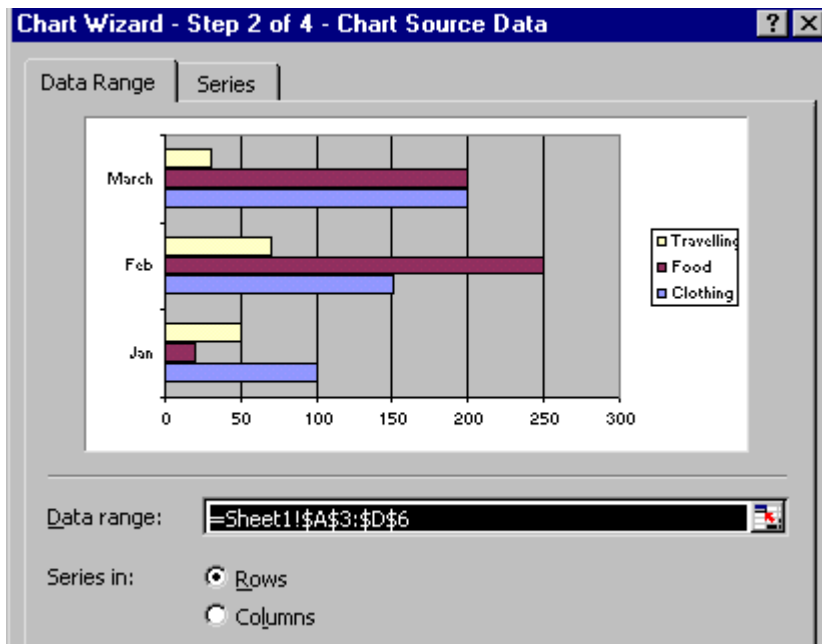
2. Select the data that will be displayed on the chart.

Budget			
<i>Description</i>	<i>Jan</i>	<i>Feb</i>	<i>March</i>
Clothing	100	150	200
Food	20	250	200
Travelling	50	70	30

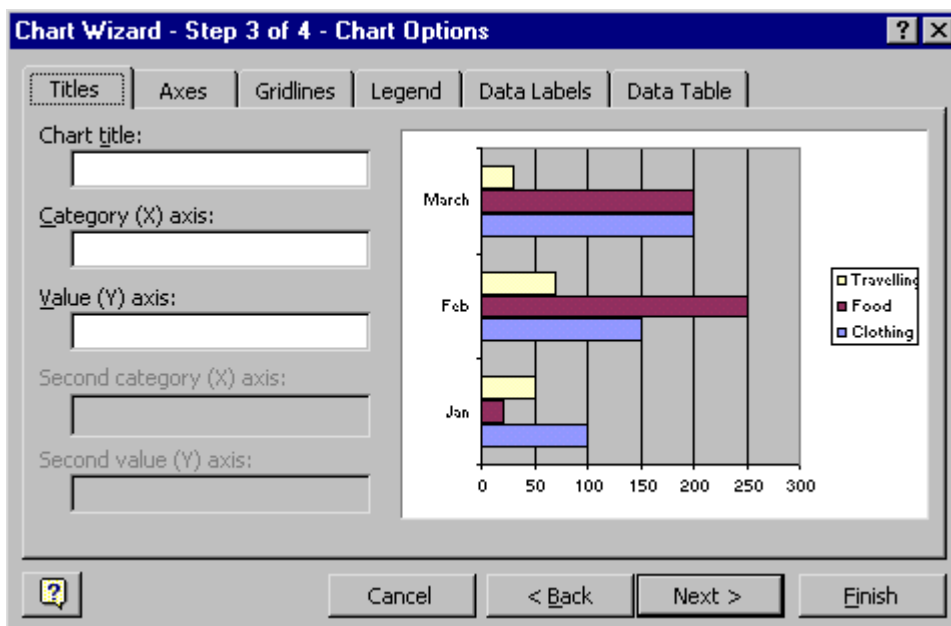
3. Click on the **Insert** menu.
4. Click on **Chart**. The following dialog box appears:



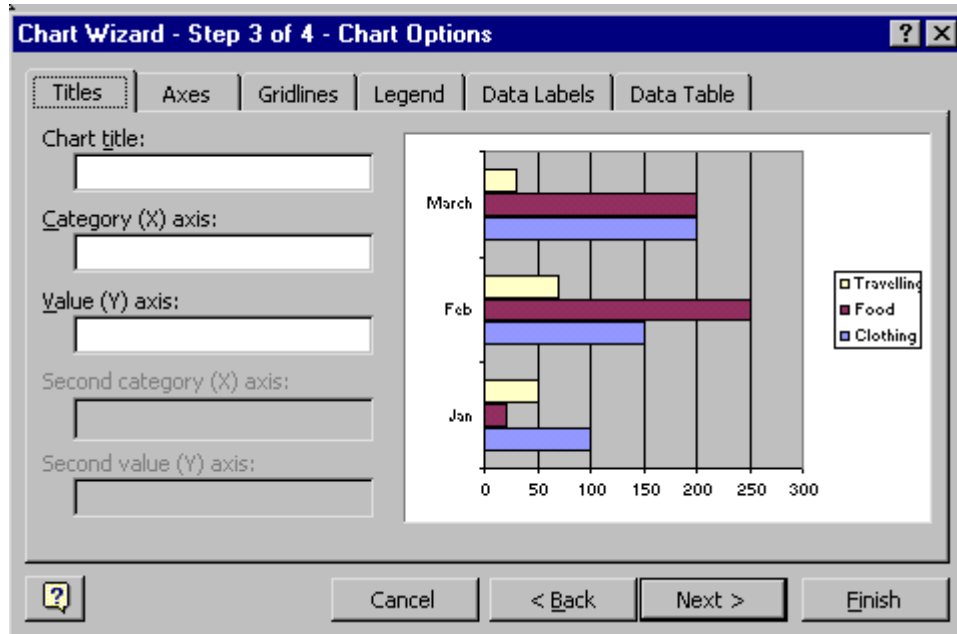
5. Select the type of chart that has to be created. In the example we want to select **Bar**. A number of different bar-chart options are given on the right hand side of the screen. Select the one you prefer.
6. Click on the **Next** button. The following dialog box appears:



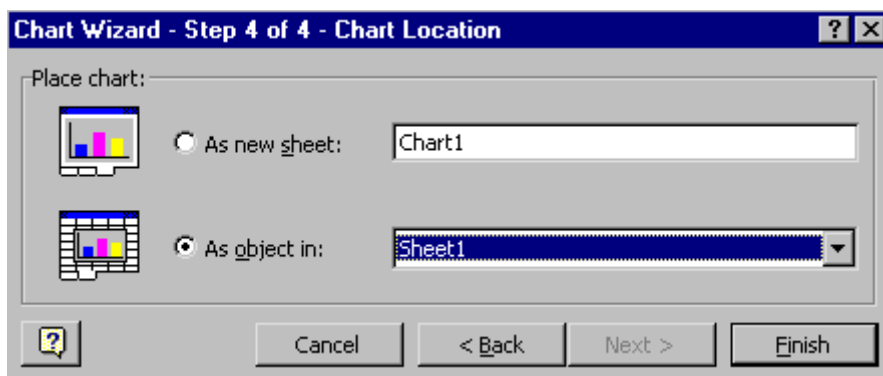
7. Make sure the data range is correct. If necessary, type the correct range in the required box. Click **Next**. The following dialog box appears:



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:

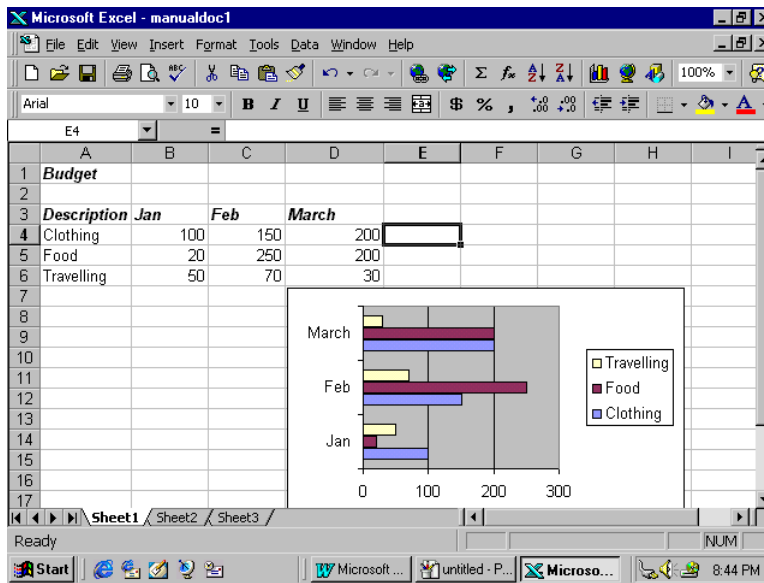


12. Select the position of the legends in the **Placement option**. If you do not want the legend to be displayed, click on the option **Show legend** to remove the check mark in the box.
13. Click on **Next**. The following dialog box appears:



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

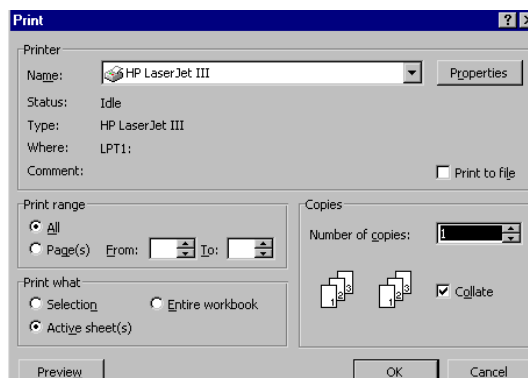
1. Click on the **File** menu.
2. Click on **Save**. The chart will be saved in the workbook.

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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