

# **THE OUTCOMES (COMPETENCIES) OF THE STUDENTS STUDYING FOR COMPUTER LITERACY AT UNISCHOOL**



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Submitted in part fulfillment of the requirements for the Master of  
Education: Educational Technology Degree in the Faculty of Education  
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*Submission Date:*  
June 2001

# ABSTRACT

Now, it is a time for me to take a journey to share my Computer Literacy experience with readers. After extensive reading and hard work, I have discovered new information about Computer Literacy course offered by different institutions.

As a result of this study, which focuses on outcomes (competencies) of Computer Literacy course offered by UniSchool, my experience (knowledge & skills) has been developed. Such experience has been developed in terms of outcomes (types), computer hardware & software, computer users, computer language and method of teaching. All these areas are covered in this report. Other areas, which are also covered, are computer viruses, categories of computers, brief history of computers and purpose of the study.

**The order in which these areas are presented is as follows:**

The first part (chapter 1) covers the statement of purpose, critical questions, rationale of the study, outcome definitions, other concepts of outcome, research method together with approach and methods of gathering data as well as theoretical framework.

The second part (chapter 2) covers computer definitions, history of computer, types of computer, major components of computer (hardware, software & users) and computer literacy.

The hardware part covers Input, processing, storage, output and other devices. The software part covers Operating system, application programs, development / programming software and utility software.

The third part (chapter 3) covers the methods of teachings

The last parts (chapter 4, 5 & 6) cover research methodology, data analysis, conclusion, recommendations and limitations.

Therefore, for the details of these parts the readers will simple read each chapter of this report.

# ***DEDICATION***

I dedicate this Report to my two sons: **Thabo & Sibonelo**, my wife: **Nokuthula**, my mother: **Fikile**, my two brothers: **Mtu & Victor** for being so understanding, inspire me to do my studies even during difficult times.



# ACKNOWLEDGEMENTS

I wish to express my gratitude to the following excellent people who have generously contributed to the success of this Report, even though they have been under tremendous work pressures: FIRST Mr BR Nel & DR KISTAN for their motivating supervision, Mr D. Wiles for his encouraging technical support and all those who participated in the Project.

# DECLARATION

I, *SIMON BHEKUMUZI KHOZA*, declare that this dissertation is my own work, and has not been submitted previously for any degree.

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Researcher

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Supervisors

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# CHAPTER 1

## RESEARCH PROPOSAL PARTS

### 1. INTRODUCTION

South Africa is in the process of transformation. Different organisations want to become service providers of different courses that are currently offered. They are competing for survival. Transformation process needs multi-skilled people, especially research and computer skills. Research section is the one that is used to investigate the relevant technology that has to be used for effective and efficient production. Today most organisations if not all of them use computers. Therefore, they send their employees for computer training, but they may end up sending them only to those institutions that have clear position in terms of outcomes. This transformation involves issues like the South African Qualification Authority (SAQA), National Qualification Framework (NQF) and many others that encourage achievement of outcomes.

Therefore, this study is investigating around the area of Outcomes to try to solve the following problem by answering three critical questions.

### 2. STATEMENT OF PURPOSE

**To investigate the outcomes (competencies) of learners graduate with the Certificate in Computer Literacy at UniSchool.**

UniSchool is a private institution, which uses the computer-training resources, such as lecturers, computers and the classrooms of different universities in different provinces. It has one branch in the Western Cape (Cape Town), two branches in Gautang (Pretoria), and one branch in KwaZulu / Natal at Natal University (Durban). The project is conducted at Natal University UniSchool branch, where the researcher works as a part time tutor. It is also easy for the researcher to access information useful in the development of the institution.

### 3. CRITICAL QUESTIONS

- A. What are the intended outcomes of the Computer Literacy certification?
- B. What technology, teaching methods and course outline are used in the course?
- C. What are the actual outcomes of the Computer Literacy certification?

*Outcomes are clear, observable demonstrations of student learning that occur after a significant set of learning experiences. They are not values, attitudes, feelings, beliefs, activities, assignments, goals, scores, grades, or averages, as many people believe. Typically, these demonstrations, or performances, reflect three things: (1) what the student knows; (2) what the student can actually do with what he or she knows; and (3) the student's confidence and motivation in carrying out the demonstration. A well-defined outcome will have clearly defined content or concepts and be demonstrated through a well-defined process beginning with a directive or request such as 'explain,' 'organize,' or 'produce.'* (p. 20,21)

Outcomes involve many concepts that one needs to understand before s/he can clearly define the outcomes. Some of these concepts are *competence, unit standards, assessments and others*. There are many definitions that are used for the *competence*, but most of them share the common idea of continuous performance. For example one of the definitions defines it as the capacity for continuous performance within specified ranges and contexts resulting from integration of a number of capabilities and is the expression of qualification (National Training Board, 1997:9). In other words it means that the holder of the outcomes can perform or transfer them to many other situations, because of their flexibility and adaptability. Competencies work interchangeably with specific outcomes.

*Unit Standard* states the specific outcomes that need to be achieved to make up a credit on the National Qualification Framework (NQF). It is the expression of judgement that is arrived at through consideration of many factors by people.

*Assessment* is about making judgement about results of learning so that decisions can be made. It is usually a way of trying to find out whether a learner can do a certain job or not. But all these concepts are connected to SAQA and NQF where outcomes form the key concept of the new system of education and training, which is Outcomes Based Education and Training (OBET). One problem that outcome-based education causes for educators is assessment. By its very nature, outcome-based education eliminates traditional assessment tools such as tests or grades. Gail Furman addressed



this topic by examining how outcome-based education caused problems in assessment. She wrote (1994),

*Assessment issues arise, of course, from any use of outcome-based education. The central premise of OBE, as we have seen, is the alignment of outcomes, curriculum, and assessment. The OBE design process stipulates that assessments be developed after outcomes are defined and tailored to authentically assess the outcomes...Thus OBE implies that the educator must develop original, authentic, performance-based assessments linked to specific outcomes. This feature of OBE raises the specter of many thorny issues surrounding assessments in general, and performance assessment in particular. (p. 429,430)*

The problem Furman saw was not that outcome-based education could not be assessed easily. After all, the student can either demonstrate the desired outcome or not demonstrate it. The assessment is in the method. The problem is in translating this assessment into a form that the community and state legislators can understand (Furman, 1994)

Spady (1994) sees outcomes as the knowledge, competencies and orientations that you deem successful for assuring success. So outcomes are the demonstrable and assessable and products of a learning process. They go beyond the specification of subject content, because they involve knowledge, skills, values, affective elements and score, understanding, level of learning and context. They require a clear and transparent articulation of criteria against which successful or unsuccessful performance is assessed. The criteria specify all the above elements such as knowledge, skills, outcomes, standards, competence and many others.

There are **three types of outcomes** that are defined by the South African Qualification Authority (SAQA). They are *Critical cross—field outcomes (essential outcomes)*, *Learning Area outcomes* and *Specific outcomes (competencies)*. They go further where there are twelve (12) critical cross—field outcomes that are designed by SAQA for all learning areas. They are as follows:

## **5.1.1. CRITICAL CROSS-FIELD OUTCOMES**

### **5.1.1.1 Identify and solve problems and make decisions using critical and creative thinking.**

Develop thinking skills and problem-solving skills, so that they can make decisions, which will help them and others. In particular this implies being able to plan and conduct investigations into issues and problems and use the knowledge gained to propose solutions.

### **5.1.1.2 Work effectively with others as a member of a team, group, organisation and community.**

Contribute ideas willingly and confidently but also respect others, be fair, listen to others, share the workload and take turns.

### **5.1.1.3 Organise and manage themselves and their activities responsibly and effectively.**

Respect themselves as important and equal to others, confidently take the initiative without always waiting to be told what to do, have a clear idea of what they want to achieve and, with your help, plan their activities so they can achieve their goals in ways that respects others.

### **5.1.1.4 Collect, analyse, organise and critically evaluate information.**

Know where to look for information that they need and how to use this information to make decisions and solve problems - especially with amount of information being generated and the pace at which it becomes outdated in the information age. They also need to be able to discriminate and critically evaluate all information, detect bias and make judgements about its validity and reliability.

### **5.1.1.5 Communicate effectively using visual, symbolic, and/or language skills in various modes.**

Tell other people (using speech, numbers, pictures or writing) about their ideas and, especially, construct convincing arguments



in which they use evidence effectively to support their point of view.

**5.1.1.6 Use science and technology effectively and critically, showing responsibility towards the environments and the health of others.**

Develop the skills and confidence to use science and technology, especially information technology like computers, radio and print media, to achieve their goals while remembering that science and technology can cause harm to others and should be used carefully.

**5.1.1.7 Demonstrate an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation.**

Be able to understand that everything in life is connected, so that they always think about the result of their decisions and actions before they do anything.

**5.1.1.8 Reflect on and explore a variety of strategies to learn more effectively.**

Think about how they think and learn, recognise their particular strengths and weaknesses and choose thinking and learning strategies, which will help them, succeed.

**5.1.1.9 Participate as responsible citizens in the life of local, national and global communities.**

Take an active part in developing a democratic society in which all people are treated equally and where active participation in decision-making is encouraged at every level of the society.

**5.1.1.10 Be culturally and aesthetically sensitive across a range of social contexts.** Develop a pride and confidence in one's own language and heritage while appreciating the diverse religious, cultural and linguistic heritage that we all share. Learn to work in a multicultural, multilingual classroom, school, country and world.

**5.1.1.11 Explore education and career opportunities**

Understand how the work they do at school helps equip them for

the world of work; and how to make practical and informed choices about the educational and career pathways they would like to follow.

#### **5.1.1.12 Develop entrepreneurial activities.**

Develop the independent and creative thinking, as well as knowledge and self-confidence, so that they can identify potential economic opportunities and work out effective strategies to become job creators rather than job seekers when they leave school.

### **5.1.2. Learning area outcomes**

The new system of education and training approved eight (8) learning areas, especially for General Education and Training Certificate with sixty-six (66) competencies or specific outcomes. The learning areas are not "subjects" in the old sense with a syllabus of "prescribed content". Rather, they are defined by a set of closely related specific outcomes or competencies. The learning areas are as follows:

#### **5.1.2.1 Language, Literacy and Communication**

#### **5.1.2.2 Human and Social Sciences**

#### **5.1.2.3 Technology**

#### **5.1.2.4 Mathematical Literacy, Mathematics and Mathematical Sciences**

#### **5.1.2.5 Natural Sciences**

#### **5.1.2.6 Arts and Culture**

#### **5.1.2.7 Economics and Management Science**

#### **5.1.2.8 Life orientation**

Learning area outcomes are defined for each of the learning areas. These are skills, values and abilities, in which a learner is expected to demonstrate for each learning area.

### **5.1.3. Specific outcomes**

Specific outcome involves particular context. They are understanding, knowledge and attitudes, which are displayed by learners in a particular context. The outcomes do



not specify content, but list the competencies learners will need to develop in a learning area in order to qualify for the Certificate. This means it is up to facilitators (educators) to develop a set of learning programmes, which will help learners, develop these competencies and achieve the outcomes. The curriculum must be "design down." The desired exit outcomes of the students must be agreed on first and then from there, all the appropriate instructional plans can be designed. Outcome-based education will not work if the educators simply take the curriculum already in place and forces outcomes to fit that curriculum. The curriculum supports the outcomes and as such is designed after the outcomes.

Therefore, outcomes are the end goals of learning; they are the things that learners can do. They are not lists of subject matter or content that have to be memorised. For a learner to achieve an outcome they need to develop

- relevant knowledge,
- skills to acquire and apply that knowledge to solve problems,
- The values and attitudes to perform effectively and responsibly.

Knowledge, skills and values cannot be separated.

## 5.2 Computer literacy

Computer literacy forms part of Technology, which is one of the eight- (8) learning areas. This learning area is based on the claim that 'we live in a technically advanced society'. Without accessing new technology, we will be unable to compete internationally (Professor Sibusiso Bhengu, 1997). I strongly believe that this claim suggests that if we offer course that do not have clearly defined outcomes, our course may not have good status globally. It is also not easy to assess the learners whether they have relevant values, knowledge and skills to access the new technology if there are no specified outcomes.

Computer literacy as it involves the ability to write and read using computer, constitutes three major parts. These three parts are computer *Hardware, Software and Users*. I believe that there is no way that any good study can ignore any of three parts, because they form the backbone of all computer courses. Therefore, this study involves computer definitions, brief history of computer, main categories of computer and then the three major parts.

Computer Hardware is all parts of the computer that we can see and touch. Hardware areas that are covered are called Information processing cycle, because they are the only parts that are currently used by UniSchool. Those areas are Input devices, System Unit with peripheral devices, output devices and storage devices. Most of these parts are described and supplemented by different figures. Input, Output and storage devices start with tables that are used to illustrate different categories.

Software is all the parts of a computer that we can not see and touch. Software areas are operating system, programming software, utility software and application software. Most pictures if not all of them that are used in the application programs come from Microsoft office. One of the reasons for this is that UniSchool uses MS Office. Programming software includes one table that is used to group programming languages.

Under computer users the study covers questions like 'Who uses the computer'? and others related questions.

### **5.3 METHODS OF EDUCATION**

While it is so important to concentrate on the above-mentioned aspects, it is also very important to analyze the methods used to teach the whole course. Sometimes the methods hinder or motivate learners in the process of learning. This means that trainers should make sure that they are using the most suitable methods of teaching that motivate the learners in order to achieve the outcomes easily. Method of teaching is flexible just like all other variables that are controllable. If it is not suitable change and use the suitable one. So, this study discusses those methods that are mostly used for technical subject like computer courses. Those methods are Lecturing, Question and Answer, The use of textbook, Demonstration, The Keller plan and Independent study (programmed instruction). Other methods are listed but not discussed.

## **6. METHODOLOGY / STUDY TYPE**

### **6.1. APPROACH**

The study is descriptive research, if we consider its approach, because it is based on the present circumstances. This means the researcher is striving for a better understanding of the current situation through a data collection process that enables him to describe the situation in more detail.



The description research has descriptive surveys as one of its three subdivisions, which also has its four subdivisions, where one of the four subdivisions is Case study survey. The researcher is working as a tutor, which is why the case study survey is suitable.

The case study is used, because it is suitable in the investigation one or more phenomenon / entity, which is carefully defined and characterized by time and space. So, this study is trying to achieve an in-depth analysis of the learners' outcomes at UniSchool only.

## **6.2 AIM**

If we consider the research in terms of aim, it may be safer to say it is an applied research. The study aims at finding answer to a specific question and increase technological knowledge as the applied research does.

## **6.3 RESEARCH METHOD**

The study is mostly dominated by the qualitative (Interpretive) method, because the researcher is dealing mostly with computer events and class behavior in terms of computer. He is concerned with 'What is happening' and 'how is happening'. The main aim is the description of what is found. Although questions like 'How effective / useful is it?', which are more quantitative (Positivism) may be included for triangulation, but they are not dominating.

## **7. THEORETICAL FRAMEWORK**

This study is dominated by the Interpretive (Practical) paradigm, which is one of Spradley's analogies (1980) as cited by Ely et al (1991). He accepted the interpretive approach as one of the predominant models of social research. He compared it to explorers, because they are operating in the same way for the same results. Their aim is the description of what is found. Therefore the researcher is trying to explore and then write descriptions of findings. Although there are some elements of positivism, but they are not dominating.

The UniSchool course is based on four basic characteristics of computer literacy. Those characteristics are awareness, knowledge, interaction (skills) and reality (attitude). They are taken as the outcomes of the whole course.

Assumptions of the course are that at the end of the course the learners will be able to do the following:

- ❖ They should be aware of how and where computer programs can be used
  - ❖ They should have knowledge of what a computer is and how it operates.
  - ❖ They should appreciate the realities associated with computers.
  - ❖ They should learn to use the computer for different applications, which is the course backbone. They are encouraged to interact with computers effectively.
- Even the study focuses more on the skill part of the course, which is the application or interaction.

Therefore, based on these assumptions it is clear that there are no clearly defined outcomes of the course.

## **8. DATA SOURCE, DATA PLAN AND INSTRUMENTS OF GATHERING DATA**

Data is collected from course books, lecturers, and learners' records / results and the UniSchool course co-ordinator. In most cases the researcher collects data personally from any of the two involved groups.

The researcher uses a random Probability sampling (simple random sampling) by targeting any two groups that start the course at certain dates. So he is studying those two group as they started towards the end of year 2000. This means that all groups had equal chance of being included provided that such a group started on the date that was targeted by the researcher. The researcher is aware that simple random sampling is not always the best for drawing samples, because it is not always representative of the population. But for this study it is suitable, because the groups that are being studied were also randomly registered without any skill test. So they are a good reflection of the population, because they consist of all types of people from different sectors such as teachers, clerks, nurses, police, and others.



## 8.1. DATA IS COLLECTED BY MEANS OF THE FOLLOWING INSTRUMENTS

- ◆ **Question A**, record analysis is used to collect data for this question. It includes prescribed books, syllabus and lecturers' files. The programs are included in these records, while interviews supplement this instrument. The information is easily accessible to the researcher, because he forms a part of the course. However observation is the most dominating instrument.
- ◆ **Question B**, for this question observation is used to collect data. The researcher operates as active participant observer to collect data for critical questions especially Questions A & B. It is possible because he has a job to do in the setting in addition to the research. Each class is observed for 12 days, which is a time taken by each group to complete the course. During observation the researcher observes all that is happening in each classroom and writes it down after the session.
- ◆ **Question C**, semi-structured interviews were supposed to be used to collect data for this question especially from lecturers, but there were only used to the course co-ordinators and assessment criteria was analyzed. They were used, because it allows in-depth of data to be achieved. In-depth data is achieved, because it provides an opportunity to probe and expand the respondents' responses. It allows the researcher even to alter the sequences in order to probe more deeply. The semi-structured interview also helps the researcher to copy with those respondents that seem to have a tendency of avoiding certain questions. It is conducted twice per group, which is during the course and at the end of the whole course. The lecturers were excluded because they had nothing to do with assessing learners. This includes evaluation of the learners' assignments and examination results. A tape recorder is used during interviews to record data.
- ◆ **Questionnaires** are used to triangulate the data that is collected by other instruments. They also used the researcher to data for critical question C from the learners. Questionnaires are given to students at the end of the course by the researcher who also collects them from the students.

The questionnaires are prepared in order to measure facts, motivation and knowledge. This means that the different types of questions that are being used are factual, motivation and knowledge questions.

They are constructed of two main types of questions, which are Open and Closed questions. They are used in order to allow each and every learner to respond at least to certain questions. Specific questions that are included are Multiple—choice (Checklist), Dichotomous and Filter & follow up. But all these questions form part of the main questions.

The Open types of questions are included specifically to capture the respondent's ideas spontaneously in his / her own words.

On the other hand closed questions are included in order to focus immediately on details. Prof. CM Fourie of TSA (2000) observed that most of population has the intellectual ability to answer the closed types of questions. Therefore these questions may even accommodate the respondents who are shy, who do not have much time and those who do not express their opinion easily. They also have less time—consuming to perform. So, closed question follows or is followed by open question so that if the learner is unable to answer one of the two types, s/he can at least answer the other type.

**9. GRAPHICS AND TABLES** are used for data analysis and presentation. This information will be communicated to UniSchool verbally in a form of a presentation and working document.

## **10. CONCLUSION**

The literature has revealed the important of the outcomes and other main issues of the study in this chapter. Therefore the next chapter discusses the details of computer hardware, software, users and computer literacy.



# CHAPTER 2

## LITERATURE REVIEW **A**

### 1. INTRODUCTION

Today success of people and organizations is mostly depend on a valuable information, which helps them to make informed decisions. The valuable information is a verifiable, timely, organized, accurate, useful and cost effective collection of facts. The valuable information is derived from data, which is a row of facts, including text, numbers, images and sounds.

They have many reasons of acquiring the valuable information, such as the following:

- 1.1 Organizations wish to expand and distribute their products and services locally, nationally and internationally. They need worldwide information about marketing.*
- 1.2 They are in a competition, where they are forced to collect sufficient information about their competitors' product and services.*
- 1.3 They also need to collect sufficient information about the requirements of their customers and government regulations.*

In order to collect such information they need computers and computer skills (Computer literate workers) as well as workers who are information literate. Computer has become one of the most important tools of collecting the valuable information. But computer needs them to be literate, which is the ability to read and write using a computer (discussed towards the end of this chapter). It also needs someone who is information literate, which is an ability to find, analyze and use information in the relevant situation.

In otherwords requirements for the valuable information are the tools (computers) and the two skills mentioned above (computer and information literate).

### 2. WHAT IS A COMPUTER

Computer is a machine that can be programmed to accept data (called Input), store the data, process it and so produce useful information (called Output) (UniSchool 1999)

Computer is an electronic device, operating under the control of instructions stored in its own memory unit that can accept data (Input), process data arithmetically and logically, produce results for future use (Shelly, Cashman & Waggoner 1998).

Most computer definitions if not all of them share some common features such as the following:

*2.1 Computer is a tool / thing not a human being.*

*2.2 It has input, processing, storage and output components.*

But to be more specific, computer refers to system unit where computing takes place.

### **3. BRIEF HISTORY OF COMPUTER**

It is very important to first understand the history of computers, so as to predict the future of computers and know what they can do now. We cannot afford to ignore computers because they are controlling the world as rapidly changing technology.

#### ***3.1 ABACUS***

Most historians if not all view the ancient abacus, used by the Chinese, about 5000 years ago, as the first computer. It was used to represent numbers, as it consisted of stones that were strung on threads in a wooden frame.

#### ***3.2 FATHER AND MOTHER OF COMPUTERS***

The father and mother title was first given to Charles Babbage, because he was the first man to develop a certain Mechanical machine (hardware) called Differential Engine in 1842. It was similar to our modern computers, but it was steam driven to calculate numbers.

The mother of computer title was first given to Lady Ada Augusta Byron King Countess Lovelace (1815—1852). She was helping Charles in developing the instructions for doing computations (software) on his hardware.



### ***3.3 THE FIRST MODERN COMPUTER***

The first modern computer became operational on 14<sup>th</sup> February 1946, which was referred to as the Electronic Numerical Integrator and Computer (ENIAC). It weighed 30 tons and was approximately 30 metres long and 6 metres high.

The ENIAC was then followed by different generations, where the first one was introduced on 14<sup>th</sup> June 1951 with development of the Universal Automatic Computer (UNIVAC), and it was in operation up to 1958. These computers had a problem of cooling, as they become very hot.

The second generation was from 1959 to 1964, which was using transistors that did not need any warm up time.

The third generation was from 1964 to 1970, which was using silicon chips.

The fourth generation was introduced from 1971 to now, which is the extension of the third generation.

The last one is the fifth generation, which is from now to somewhere in the future. The computer developers are still in the process of developing this generation, where they are aiming at designing a computer that is both powerful and intelligent.

## **4 THE FIVE MAIN TYPES OF COMPUTERS**

### ***4.1 SUPERCOMPUTERS***

They are the largest computers, which are capable of processing millions of instructions per seconds, and storing vast quantities of data. Military and other big institutes normally use them.

### ***4.2 MAINFRAMES***

These are smaller than the supercomputers, but they are also large. They are capable of processing instructions at very fast speeds and normally used by banks, insurance companies and others sectors, where hundreds of thousands of records of information need to be stored and processed.

### 4.3 MINICOMPUTERS

These are smaller and slower than the mainframes, and are widely used by businesses and educational institutions to store details of the employees and students.

### 4.4 SERVERS

Servers are smaller than the minicomputers, and they also form part of computer.

### 4.5 MICROCOMPUTERS / PERSONAL COMPUTERS (PC)

These are the smallest and cheapest desktop computers that have shown an effective growth in sales since the 1980s, when they entered the market until now. They have become wide spread and almost every business and many homes now have these personal computers. Most of these computers if not all of the have valued dates, which start from 1980 to 2099. This means that any other date, which is before 1980 or after 2099 can not be used in these computers.

## 5. MAJOR COMPONENTS OF COMPUTER

Computer has three major components that enable it to generate information. Those components are (1) **HARDWARE**, which is any part of a computer that we can see and touch. (2) **SOFTWARE**, which is any part of a computer that we cannot see and cannot touch. (3) **COMPUTER USERS**, which are people that use computer.

### 5.1 HARDWARE

Hardware is divided into four (4) main parts, which are called Information Processing Cycle. They are (1) Input devices, (2) System Unit with peripheral devices, (3) Output devices and (4) Storage devices. Computers also have communication devices, which do not form part of the Information Processing Cycle.

#### 5.1.1 INPUT DEVICES

Input devices are used to enter *data, commands, programs* and *user responses* into the computer memory. *Data* is the raw of facts that can be in the form of text, numbers, images and sounds. *Commands* are phrases and keywords that are entered to the computer by the users to direct the computer in order to generate the required

information. *Programs* are instructions that direct the computer to generate information required from data. *User responses* are data that are used by computer users to answer or respond to the messages that are displayed by computer software.

There are at least twenty-two (22) Input devices that are used to enter data into the computer memory. They are grouped into four categories, which are (1) Keyboard devices, (2) Pointing devices, and (3) Source Data Automation and (4) Terminal Input devices. TABLE 1, below illustrates the grouping of the input devices.

**TABLE 1 (Input Devices)**

<u>KEYBOARD</u>	<u>POINTING DEVICES</u>	<u>SOURCE DATA AUTOMATION</u>	<u>OTHER INPUT DEVICES</u>
Keyboard	Mouse	Scanner	Digital Camera
	Touch Screen	Optical Recognition	Sound Input
	Touch/Track Pad	Magnetic Ink Character Recognition (MICR)	Biological Feedback Input
	Trackball	Data Collection Devices	Video Input
	Pointing Stick		Voice Input
	Joy Stick		Electronic White Boards
	Light Pen		
	Digitizer		
	Graphic Tablet		
	Pen Input		



This study only provides details of input devices that are used by UniSchool, such as keyboard and mouse. Those that are not used by UniSchool are only discussed with limited details.

#### 5.1.1.1 Keyboard (Plate 1)



**Plate1 (Keyboard)**

Keyboard as shown in Plate 1 is one of the two most common input devices that are used to enter data into the computer. The keyboard enters data into the memory of a computer to be stored temporarily and then displayed on a screen of a computer monitor. A normal layout of a common keyboard is “QWERTY” layout, because of the first top six alphabets that gives “QWERTY”, if one reads them.

The keyboard has function keys, which are situated, at the top of the keyboard. They start from F1 to F12. They are used to initiate certain commands as short cut keys and they perform certain tasks. For example, if you press F7 in Microsoft Word you are performing a spell checker to correct any spelling mistake. On the same row there is an ESCAPE (Esc), which is situated at the left of the function keys. It is often used by computer software to cancel an instruction.

There is also a numeric keypad with numbers that resemble a calculator format. These numbers only work if the numeric lock (Num Lock) key is “ON”, if it is “OFF” other command that are below the numbers become active and work.

The keyboard has arrow keys, which are UP ARROW (↑), DOWN ARROW (↓), LEFT ARROW (←) and RIGHT ARROW (→). They are used to move cursor on the screen of a computer monitor. Other keys that are also used to move the cursor are Tab, Home and End keys. Cursor is a symbol, which can be in a form of a vertical bar (|), underline character ( \_ ) or rectangular (  ).

Other keys like Insert (Ins), Delete (Del) and Backspace can be used to erase, edit, or alt text displayed on the screen. If Caps Lock key is “ON” a green status light on the right top corner of the keyboard is also “ON” and all letters that are typed are



capitalized. Page down (Pg Dn) or Page up (Pg Up) keys move the whole page down or up.

In addition to these keys, it also has certain keys that have two symbols in each. They have upper and lower symbols. The symbols only work if Shift key is pressed down and the lower symbols work if Shift key is not pressed.

There is also an 'Enter key', which works like 'OK' in Windows, because it usually tells the computer to perform or continue with whatever instruction you give to the computer.

'Ctrl' key like the Shift key does not work alone, but it works with other keys. For example if you want to save document in Ms Word you can press 'Ctrl + S'. This command can then saves your document.

'Alt' key is normal used to activate Menu in Windows.

'Prt Sc Sys Req' key is used if you want a printout or hard copy of a screen (screen dump).

There are many other keys, which are not mentioned here that can be used.

#### **5.1.1.2 Mouse (Pointing device) Plate 2**

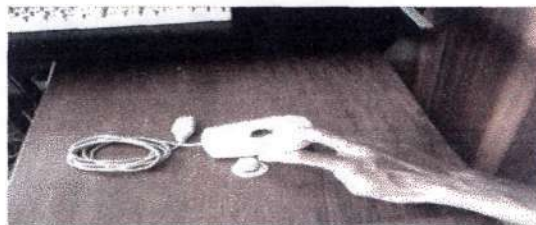


Figure 1 (Mouse)

**Plate 2 (Mouse)**

Mouse is also one of the two most common input devices. The mouse is used to move a certain symbol, which appear on the screen of a monitor called Mouse pointer. This mouse pointer can be in many shapes, but the common one is an arrow shape (↔). The mouse moves the mouse pointer to a certain location called Hot Spot. Computer users can only issue the command if the mouse pointer is at the Hot Spot. It can be issued by Click, Double Click or Click + Drag. Bottom of the mouse has a ball shape like part (shown in Plate 2), which senses the mouse movement. Desktop can be used for mouse, but for better movement it must be provided with a mouse

pad, because in most case desktop tends to be too smooth for the ball like shape part to rotate. Mouse pad is a rectangular piece of cushioned material that provides better traction for the mouse than desktop.

Mouse is usually connected to the computer by means of a cable. It uses electronic circuits that translate the movement into signals that can be used in order to communicate with the computer. In order to move its bottom ball must move so as the mouse pointer. When this ball moves it rubs against rollers that are inside the mouse. One of the rollers measures up—and--down movement and the other measures side—to—side movements.

The top of the mouse usually has two or more buttons (Figure 1). If you point anything (Hot Spot) on the screen and press one button (Click), it means you are performing action. For example if you click any menu button drop—down menu appears in order to select whatever command / option you want to perform. We can use the mouse button to move object or select / highlight text by pressing the button and move (called Click—and—drag). We can also press it twice (double click) for certain actions. For example we can double click certain boxes (Icons) that appear on the screen, if you want them to be opened or click once and then press the enter key on the keyboard. An Icon is generally a box like object (Figure 2) that carries certain information. In order to use such information you must first open the icon.



**Figure 2 (Computer with Icons)**

The function of mouse button can change to accommodate both right and left-handed people. If the function is given to the left buttons then the right buttons only work for special tasks, such as opening menu or sub—menu.

### 5.1.1.3 Touch Screen (Plate 3)



Plate 3 (Touch Screen)

Touch screen (Plate 3) input allows the user to interact with a computer by touching whatever the options the user wants on the screen. This touching is normally done by finger or using a certain object. The options can be in a form of numbers, words or objects. Computer software interprets the finger touch after it has been converted into impulses by electronic technique. The screen has beams of infrared light that are projected across its surface. The beams are interrupted by the finger touch and then generated an electronic signal that identifies the location of the touch on the screen. So, this signal tells the computer to perform a certain required task.

Some post offices today have installed the touch screen for people who want to pay electricity, water or telephone bills / accounts. But it does not allow the user to type using the keyboard, because it does not have one.

### 5.1.1.4 Track / Touchpad

Touchpads are divided into two types, which are attached (built in) and detached (stand—alone) touch pads. Attached pad is built into the computer (usually portable computer). Detached or stand—alone touch pad is used for any personal computer.

The touch pad is normally in a form of a rectangular surface, which commonly uses an electronic grid underneath its pad surface to sense the location and finger movement. It is sometimes called Track pad.



#### 5.1.1.5 Trackball (Plate 4)



Plate 4 (Trackball)

Trackball (Plate 4) is similar to the bottom part of the mouse, as it has a ball like part on its top part. The ball is used to move the on—screen mouse pointer by rotating it with your finger to the direction that you want. Unlike the mouse where the user has to move the whole mouse in order to move the mouse pointer, trackball only uses the ball rotation.

Therefore, it does not need a lot of space to move, as the mouse does. It also has some clicking buttons.

#### 5.1.1.6 Pointing Stick

Pointing stick is in a form of a pencil eraser and it is normally located within the keyboard. To use it the user simply presses it with a finger in order to move the on—screen mouse pointer to whatever direction that is required. The movement direction of the mouse pointer depends on the amount of pressure applied by the user.

#### 5.1.1.7 Joystick (Plate 5)



Plate 5 (Joysticks)



Joysticks (**Plate 5**) are commonly used for computer games, where vertical sticks / stems are used to control the movement of the on—screen object, which includes vehicle or any other object. It also has some buttons that can be pressed by user to activate certain action.

#### **5.1.1.8 Light Pen**

Light pen is a pen that is used by computer user to select processing options and draw on the screen (it can create or modify graphics). The pen touches the screen with its light cell, which is located in its tip that senses light from the screen in order to find the location of a pen and then performs the required task.

#### **5.1.1.9 Digitizer**

Digitizer creates drawings or replaces them after tracing them. It converts all drawings and photographic details into digital impulses that can be transmitted to a computer. It uses a pen—like object or buttons, which are on a hand—held digitizer device.

#### **5.1.1.10 Graphics Tablet (Plate 6)**



**Plate 6 (Graphics Tablet)**

Graphics tablet (**Plate 6**) is commonly used in computer—aided design (CAD). The way the users use the tablets is similar to that of the digitizers accept that the tablets also generate unique characters and commands automatically.

#### **5.1.1.11 Pen Input**

Pen input is like a pen that the user hold it like a pen and write with it on the screen (hand—written characters and shapes) of a computer. Then the computer recognizes it like valid data to be processed. It can also work like the mouse clicks. If the user

press it twice the computer interprets it like the double clicks of the mouse. Data here can also be entered in a form of gestures that can be recognized by the computer. Some of gestures are delete ( $\leftrightarrow$ ), select ( $\rightarrow$ ) and others. The pen computer uses a certain software and hardware to interpret the pen movement that results into computer action. There is no need for the user to use the keyboard with the pen input.

#### **5.1.1.12 Scanner (Plate 7)**



**Plate 7 (Scanner)**

A common scanner (**Plate 7**) works like a Photostatting machine to capture a text and images of an entire page of a document. This data is then converted into a digital data that can be stored by the computer.

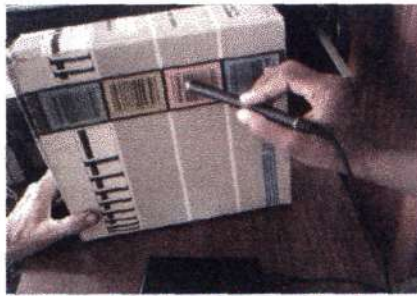
Others are hands—held types of scanners that can only capture certain parts of the page not the whole page. But those parts can be combined together to a page of the computer. They are available in monochrome (one colour) and colour types.

#### **5.1.1.13 Optical Recognition**

Optical Recognition devices read characters, marks and optical code to produce scores. They use a certain light that converts collected data into digital data that can be understood by a computer.

Characters are read by means of Optical Character Recognition (OCR) devices. They are commonly used to read some computer—printed and typed—written characters by scanning them into the computer. They can even convert text images into word processing, because they have certain software that allows this task.

Marks that produce scores (tests or answer sheets) are read by Optical Mark Recognition (OMR) devices that collect data and produce the scores.



**Plate 8 (Bar Code & Bar Code Reader)**

One of the common Optical Codes is a Bar code (**Plate 8**) that is normally used for grocery, book and other items. It has some vertical lines (called guard patterns), price number (usually on the top right), product numbers on the bottom left and other numbers. For example if we buy a certain item from shops, bar code is pushed next to a certain machine that uses a certain light source to enter a correct amount of the item into the computer to be processed. But if such machine is not working the keyboard can also be used.

#### **5.1.1.14 Magnetic Ink Character Recognition (MICR)**



**Plate 9 (Cheque)**

Magnetic Ink Character Recognition reader is commonly used by banks to read cheques (**Plate 9**). It uses special magnetized ink to read.

#### **5.1.1.15 Data Collection Devices**

Data Collection Devices are commonly used for site data collection, especially where it is difficult to control the situation. These are places like factories, construction sites, warehouses and alike.



#### 5.1.1.16 Terminals (Plate 10)



Plate 10 (ATM)

Terminals are divided into Special—Purpose, Dumb terminals and programmable terminals.

Special purposes are programmed to collect data during time of transactions. Examples of the special purpose terminals are Automatic Teller Machines (ATM) used by banking industry (Plate 10) or computers that are used by Hotels and Restaurants.

Dumb terminals cannot work as independent devices. Although they do have keyboard and screen, but they are connected to certain computers. They do not have processing and storage areas of their own.

Programmable terminals are programmed by computer programmers to perform some basic limited tasks independently. They have their own processing, storage devices, keyboards and screens. They can be connected to other computer in order to perform some bigger tasks.

#### 5.1.1.17 Digital Camera (Plate 11)



Digital camera

Plate 11 (Digital Camera)

Digital cameras range from portable (called field camera—Plate 11) to stationary cameras that are connected to the computers. They digitally record photographs or pictures that can be stored and displayed on the computers. Most organizations / institutions today use the digital camera to record photographs of their employees / students for personal records and easy identification.

#### **5.1.1.18 Sound Input**

Most computers have some installed sound cards, which usually have electronics that convert sound to digital data that can be stored and processed by computer software. In order to communicate with the sound cards computer users may use Microphone sound device, electronic music keyboard or other suitable devices.

#### **5.1.1.19 Voice Input**

Voice input is a software that recognizes the speech or voice of a person who is issuing a certain command, so that the computers can digitize the speech or voice. It is then stored processed by the computers. This device is faster than the keyboard in entering data into the computer. But such software is usually trained for this task in order to recognize the voice. Other voice recognition input can even answer questions that are asked by the computer users.

#### **5.1.1.20 Video Input**

Common video input is the use of video capture card, which is used to connect videocassette recorder (VCR), television or video camera to the computer. The video card help in converting video signal into digital data that can be compressed, stored and processed by the computer. These cards are available as separate or as built—into the computer.

#### **5.1.1.21 Biological Feedback Input**

Biological feedback input devices often use certain software that can convert temperature, movement and skin—based electrical signals into digital data that can be understood by the computer for processing and storage purposes.

#### **5.1.1.22 Electronic Whiteboards**

Electronic Whiteboards are commonly used in conference room to record all written work into the attached computer file using their built—in scanners. Such data is stored for future purpose. The electronic whiteboard do not work or record data, if they are not connected to the computer. Dry—erase-marking pen that is used with

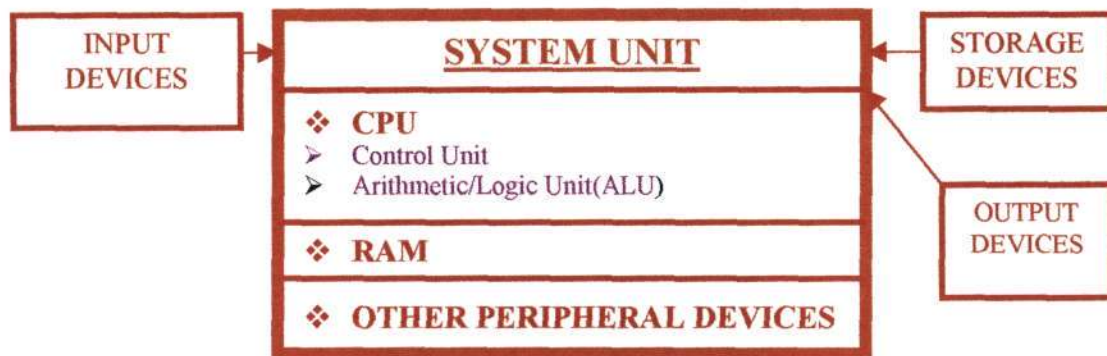
this whiteboard has certain reflective collars near its tips that help sensors to delete unnecessary data. They also help in the recording and identification of colors.

### 5.1.2 SYSTEM UNIT (PLATE 12)



**Plate 12 (System Unit)**

System Unit is usually a metal box as shown in **plate 12**. A metal box contains a System Unit (**Figure 3**). It is a part of computer that carries different parts and it is where processing and other actions take place. The system unit has a Motherboard (**Plate 13**) and Central Processing Unit (CPU) Random Access Memory (RAM) and other peripheral devices. It is connected to the input, storage and output devices as shown in **Figure 3**.



**FIGURE 3 (System Unit members)**

#### 5.1.2.1 Motherboard (Plate 13)



**Upgrade Socket**

**Plate 13 (Motherboard)**



System Unit has a circuit board (called motherboard) where most parts of the system unit are connected as shown in **Plate 13**.

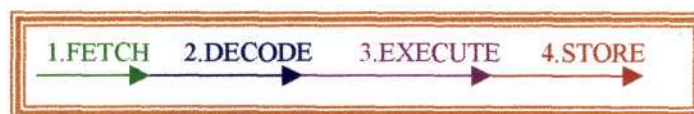
### 5.1.2.2 Microprocessor

Microprocessor is an integrated circuit that contains a central processing unit (CPU). The CPU uses computer memory to store data and program instructions required for processing. The following table (Table 2) shows some examples of a microprocessor.

**TABLE 2**

TYPE	MANUFACTURER	SPEED	WORD SIZE
80286 (286)	Intel	6—12 MHz	16
80386 (386)	Intel	16—33 MHz	32
80486 (486)	Intel	25—100 MHz	32
Pentium	Intel	75—200 MHz	64
Pentium Pro	Intel	150—200 MHz	64
Pentium (MMX™ Tech)	Intel	166—233 MHz	64
Pentium II	Intel	233—450 MHz	64
68020	Motorola	16—33 MHz	32
68030	Motorola	16—50 MHz	32
68040	Motorola	25—40 MHz	32
Power PC	Motorola	50—225 MHz	64
Alpha	Digital	150—333 MHz	64

CPU has two major parts (Figure 2). They are Control Unit and Arithmetic / Logic Unit. Central Unit passes data from one place to the next place by performing Machine Cycle. Machine Cycle has four operations, which are fetching, decoding, executing and storing information (Figure 4)



**FIGURE 4 (MACHINE CYCLE)**

Fetching is when the computer takes the program instructions from memory. Decoding is a manipulation of the program instructions into commands. Executing is

a processing of the commands. Storing is when the system records results of the commands into the memory.

The **control unit** has a certain space where it stores specific types of data temporarily, especially program instructions and other useful data. The space is called **register**. It also has a system clock, which is a chip that generates electronic pulses in order to control processing time of all operations.

The **Arithmetic / Logic Unit (ALU)** performs four mathematical operations and other mathematical symbols, which are said to be logically. The four mathematical operations are Multiplication (x), Addition (+), Division ( $\div$ ) and Subtraction (-). The mathematical symbols that are used for logical operations are Greater than (<), Smaller than (>), Equal to (=), and others. The ALU has its register to record the processing.

In **data representation**, the computer first converts the data into digital data (binary digits) in order to understand such data. This is done because most computers can only understand two binary digits (bits). Those binary digits are one (1) and two (2), which are electronic states of 'ON' and 'OFF' respectively. Eight (8) bits represent one (1) byte or character. This means any alphabet or number is represented by eight (8) bits or one (1) byte. For example thirty-two (32) bits or four (4) bytes represent a word 'wall'. In order to avoid large quantity of numbers certain units of measurement are used. Those are Kilobytes (1024 bytes), Megabyte (approximately 1000 Kilobytes), Gigabyte (approximately 1000 Megabytes) and Terabyte (approximately 1000 Gigabytes or 1 000 000 000 000 bytes). The two digits produce two hundred and fifty-six (256) different possibilities that can represent data (characters and symbols). These 256 characters and symbols are represented in the computer by two (2) common codes. The codes are American Standard Code for Information Interchange (ASCII) and Extended Binary Coded Decimal Interchange Code (EBCDIC). However these codes cannot represent languages that uses ideograms (symbols that represent multi-meanings). So, Unicode, which is a sixteen-bit (16-bit) code, is used for this, because it represents more than 65,000 symbols and characters. Unicode includes both the ASCII and EBCDIC.

In most computers data is checked for storage by means of **Parity bit**. **Parity bit** is an extra bit that is included in each byte of the computer in order to check errors. Parity

can be either even or uneven number, depending on the type of computer. Computer can be either even or uneven machine, judged by the 'ON' bits.

### 5.1.2.3 Computer Memory

When computer users turn 'ON', which is booting the computer, they are actually activating **Read Only Memory (ROM)**. ROM stores startup instructions or data used in switching on the computer. Booting the computer is divided into **hot** and **cold** boots. **Hot boot** is when we press reset button of the computer or press the Ctrl +Alt and Del keys together and choose End Task or Shut Down. **Cold boot** is when we switch 'OFF' the computer and start it after a while.

The computer uses Random Access Memory (RAM) during time of processing. RAM is an integrated circuit, which is temporarily used by the processor to store data and program instructions that are currently being used. For permanent storage we may simply use secondary storage. Other computers have an extra memory, which is located between the CPU and the RAM; the extra memory is called Cache. The cache keeps program instructions, which are used frequently by the CPU. With cache computer process faster than usually.

Computers also have **Complementary Metal-Oxide Semiconductor (CMOS)**, which stores information that is required when we boot (start) the computer. But, such information is different from that of the ROM. It includes real clock that is used for date and time (different from the system clock), computer system information and other information that can change if necessary. The CMOS uses a battery to function even if the computer is off.

### 5.1.2.4 Peripheral devices and other parts



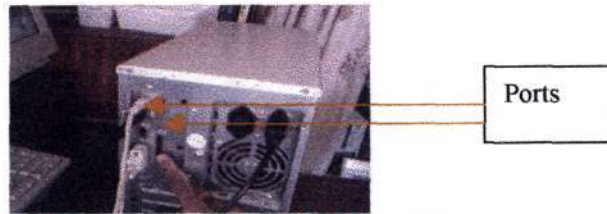
Power supply

**Plate 14 (Power supply)**

Peripheral device is any part that is connected to the system unit. Some of those parts are Power supply (**Plate 14**), Upgrade sockets, Ports, Bus and many others.



**Power supply** (Plate 14) receives and supplies current (electricity) to the computer by converting it from wall outlet electricity to lower voltages that can be used by the computers. **Upgrade socket** (Plate 13) is a type of receptacle for the microprocessors that can be used to install a more powerful CPU.



**Plate 15 (System unit with Ports)**

**Ports** (Plate 15) are socket used to connect the system unit to the peripheral devices. Bus is any path along which bits are transmitted.

### 5.1.3 OUTPUT DEVICES

Output is a data, which has been converted into information through processing. Output devices produce four (4) types of output (results). They are reports, graphics, audio and visual images.

#### Reports

**Reports** are items that can be printed or displayed on the screen of a computer monitor. The printed material with information from the computer is called **hard copy**, but report that is displayed on the screen is called **soft copy**. This study is a good example of a report, because as I am typing is displayed as the soft copy. Once I print it on a printing machine it becomes the hard copy. Report mostly consist of text.

**Graphics** are similar to the report, but they mostly consist of pictures / photographs that are used to convey messages instead of using text. The plates and clip arts that are used in this study are good examples of graphics.

In **Audio** output message is conveyed by spoken words, sounds, or music from the computer instead of reading it, the computer user simply listen to it.

In **Visual images** output is mostly captured by a video input device, video camera, video cassette recorders and other tools.

**Table 3** (Output Devices)

Display devices	Printers		Others
	Impact	Non-impact	
Monitors	Dot Matrix	Ink Jet	Special-Purpose Printers
Flat Panel display	Band	Laser	Data Projectors
		Thermal	Facsimile (Fax)
		Platter	Multi-function devices

#### 5.1.3.1 Monitor (Figure 5)



**Figure 5 (Monitors)**

Monitor (Figure 6) is one of the most common types of display devices that present the visual output on the screen (display surface of the monitor). The monitors often have adjustable bases that allow different angle of the monitor. The monitor is sometimes called Cathode Ray Tube (CRT). It is usually made up of plastic or metal that contains electronic components. They are available either as monochrome (one colour) or colour monitor. Monochrome displays one colour of text on one background with no graphics. Colour monitor displays many colours that include graphics.

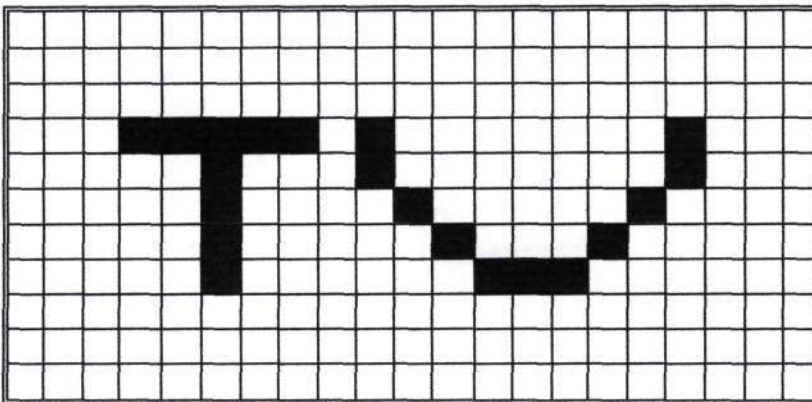
### 5.1.3.2 Flat Panel Displays (Figure 6)



**Figure 6 (Flat Panel Display)**

**Flat panel** displays (Figure 6) are also one of the most common types of display devices. They normal used in portable computers, because their screen is thinner than the CRT. They often use either Liquid Crystal Display (LCD) or gas plasma technology. In the LCD a liquid crystal deposited between two sheets of polarizing material. Gas plasma screen substitute a neon gas for the liquid crystal material.

The monitors use lighted dots called pixel (similar to Figure 7). Dot pitch is a distance between each pixel. If the monitor has many pixels it becomes clearer than the one that has fewer pixels.



**Figure 7 (Pixels Example)**

Most monitors and video adapters that are used in nowadays support Video Graphics Array (VGA) and Super Video Graphic Array (SVGA). VGA devices can display a clarity of 640 (horizontal) X 480 (vertical) pixels. SVGA can display 800 X 600 and 1,024 X 768 pixels.



**Figure 8 (Example of Coloured phosphor dots)**



In order to display colour each of these pixels must have three Coloured phosphor dots. The three colours that are used are green, red and blue as represented in Figure 8. For each a separate electron gun is used. A various of intensity of the electron beam strikes the phosphors and make some coloured dots glow more than others produce many colours.

#### **5.1.3.3 Dot Matrix Printers (Plate 16)**



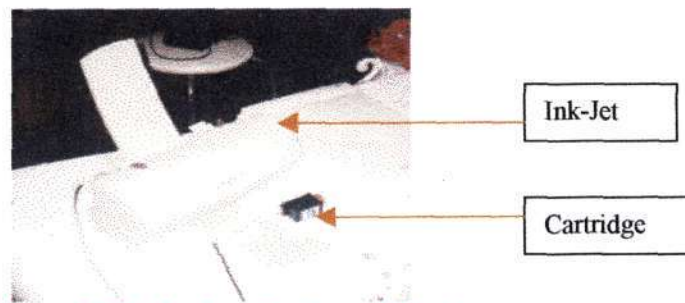
**Plate 16 (Dot Matrix printer)**

Dot matrix printer is an example of impact printers. Dot matrix printer like other impact printers uses some small dots to produce character / image. It uses some wire pins, which strike against an inked ribbon to produce printed images. It usually use continuous form papers, which have about thousands of connected pages in one box. It is a cheapest printer, which is often used for multiple copies of a document. It saves time, because it takes a long time for the user to change paper in the printer. The speed is measured in character per second (cps).

#### **5.1.3.4 Band Printer**

Band printer is also an example of impact printers. It has a horizontal rotating band containing numbers, alphabets and selected special characters. The band printer produces printed images by striking characters with hammers located at each print position behind the paper and ribbon.

#### 5.1.3.5 Ink-Jet Printer (Plate 17)



**Plate 17 (Ink-Jet & Cartridge)**

Ink-Jet printer is an example of non-impact printers, which means that they do not strike paper to make some dots. Instead of striking they spray tiny drops of ink onto the paper. The printer heads of the Ink-jet printers contain nozzles with ink holes. The ink is propelled by heat through any combination of nozzle holes to form a character image on the paper. The ink is contained in a removable container called cartridge as indicated in Plate 17.

#### 5.1.3.6 Laser Printer (Plate 18)



**Plate 18 (Laser Printer)**

Laser printers are examples of non-impact printers. The laser printers convert data into a laser beams that are directed to a positively charged revolving drum by a spinning mirror. The beam touches each position on the drum to become negatively charged and attracts a toner. Toner is a powdered ink, which is transferred on the paper and fused by heat and pressure to create character or image to the paper. Speed of the laser printer is measured in pages per minute (ppm).

### 5.1.3.7 Thermal Printers

Thermal printers produce character or image using heat to transfer coloured inks from ink sheets onto the printing surface. The thermal printers are known by producing high quality colour output.

### 5.1.3.8 Plotters

Plotters are divided into **pen plotters** and **electrostatic plotters**. The **pen plotters** are divided into *flatbed* and *drum* plotters.

*Flatbed* pen plotters use a software that direct the movement of a pen(s) to come into contact with a flat surface of a paper and produces the image. They use one or more pens with different colours.

*Drum* pen plotter produces drawing using a rotating drum over which pens are mounted.

**Electrostatic** platter produces drawing using row of wires that create an electrostatic charge on the paper.

### 5.1.3.9 Special-Purpose Printers

These are any types of printers that are developed only for special tasks.

### 5.1.3.10 Data Projector

Data projectors take the image or text that displays on a computer screen and project it on a big screen or face of a wall. They are commonly used or designed for presentations, especially in Auditoriums, seminar rooms or meeting rooms. **Plate 19** shows one example of a data projector (*video projector*).



**Plate 19 (Video Projector)**



#### 5.1.3.11 Facsimile (Fax)

Fax devices are available as stand-alone machines or built-in computer machine. Stand-alone fax converts the scanned image of an original document into digitized data that can be transmitted over telephone lines.

Built-in fax can transmit a well-prepared document that can be displayed on the screen or sent to the printer for the hard copy.

#### 5.1.3.12 Multifunction Devices



**Figure 9 (Combo—Fax/Copier/Printer)**

Multifunction device (Figure 9) is a single machine, which performs multi-tasks such as scanning, printing, copying and also faxing the document images.

### 5.1.4 STORAGE DEVICES

Storage devices unlike memory store data and programs, which are not being used and they are stored permanently. Storage is sometimes called auxiliary or secondary storage. When the storage device is storing data, a process is called recording, writing or saving information. Reading is when the computer retrieves information that was stored on the storage device.

**TABLE 4 (STORAGE DEVICES)**

MAGNETIC DISK	OPTICAL DISKS	MAGNETIC TAPE	SPECIAL PURPOSE DEVICES	OTHER STORAGE DEVICES
Hard disk	CD-ROM	Cartridge tape	Optical Memory card	PC card
Floppy disk		Reel tape	Memory button	Raid
Disk cartridge			Smart card	Mass storage

#### 5.1.4.1 Hard Disk (Plate 20)



**Plate 20 (Hard Disk)**

Hard disk (**Plate 20**) provides largest storage capacities than other storage devices. In most cases they are not removable as they are permanently mounted inside the computer. The hard disk has one or more rigid platters, where it magnetically records data and program instructions. The data and the program instruction can be stored on both sides of the hard disk platter.

The hard disks can be divided into partitions. Partitions are separate areas that can be used to store data as if they were separate disks. The partitions usually start with letter 'C'. Before data is stored the hard disk must be formatted. To format the disk is to divide the recording surface of the disks into *tracks, sectors, clusters and remove any existing data available on the disks*.

*Tracks* are many areas that are formed by dividing the recording surface of the disk into different full circles. *Sectors* are pie-shaped areas that are formed by dividing each of the tracks into small areas. *Cluster* is a combination or use of two or more track sectors at the same time.

When the drive writes or reads from the hard disk, the hard disk rotates at about 3600 to 7200 revolutions per minute. The binary codes are used to store data on the disk tracks. The recording on the rotating disk is done by means of write / read head, which is a recording mechanism that generates electronic impulses. Through these electronic impulses the write / read head senses magnetic areas that have been used or to be used.

If the recorded data is required from the disk, such data must be transferred to the memory first. **Access time** is a term given to the time required to transfer such data. The access time has three (3) stages, which are *Seek time, Rotational delay and data transfer rate*. *Seek time* is a time the computer takes to position the write / read head over the correct track that has data to be used. Rotational delay is a time taken by the correct sector that has the required data to rotate under the write / read head. Data



transfer rate is a time required by the computer to transfer the data from hard disk to the computer memory.

The computers have directory that record information about all file and the space that has been used. Such directory is called **File Allocation Table (FAT)**. Data that comes from the hard disk has to be controlled. Therefore, computers have hard disk controllers that are used to control the flow of data. Two common **controllers** (collection of electronic circuits) that are used for personal computers are **Integrated Drive Electronics (IDE)** and **Small Computer System Interface (SCSI)**. They can be built into the hard disk or separate.

#### 5.1.4.2 Floppy Disk (Figure 10a and Figure 10b)

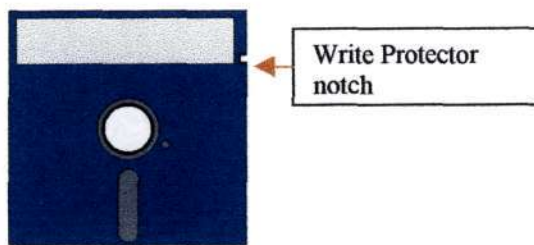


Figure 10a (5¼ Floppy Disk)

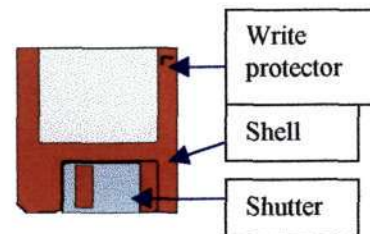


Figure 10b (3½ Floppy / Stiffy)

The two common types of floppy disks (diskettes) are 5¼ inches wide (Figure 10a) and 3½ inches wide (Figure 10b). The earlier floppy disk that was introduced in 1970s was succeeded by the 5¼ inches wide floppy disk. The 5¼ inches wide floppy bend easily and its drive is usually identified as drive B:. They have about 360K of storage capacity and the high-density of 1.2 Megabytes (MB) storage capacity. But nowadays they seem to disappear, while 3½ floppy (stiffy) and CD-ROMs are popular. The 3½ Floppy (Stiffy) disks are the most common type of floppy that are used by most personal computers today. Their drive is usually identified as drive A:. They are sometimes called stiffy disks (by South African), because the are not bendable. They can store up to 1.44 Megabytes (MB) of data, which can be equivalent to 700 pages of 2000 characters per page. The 3½ floppy disks consist of shell, shutter, metal hub, disk, liner, write protector window and magnetic coating. The floppy disks like hard disks need to be formatted be the data is stored. The same procedure of writing / reading from the disks is also used for the floppy disks.



#### 5.1.4.3 Disk Cartridges

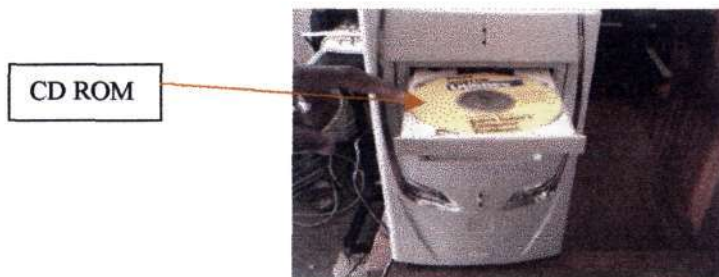
Disk cartridges are removable and portable types of the hard disks. They usually store more than one gigabyte of data. Bernoulli disk cartridge is an example of disk cartridge. Cushion of air is used to keep disk surface from touching the write / read head. This is done through special drive units that are designed to do this task. The disk cartridges are commonly used for computer backup. To make a computer backup is to make a separate copy of all files or data available in the computer.

In order to save time and space of the disks, disks need to be defragmented and data must be compressed.

To defragment the disk is to use software that controls the data to be stored on the clusters that are in a row (contiguous clusters). If defragmentation is not done, the computers take along time to read data that is stored in different clusters that are not in a row.

To compress data is to use short form of words by replacing them with certain symbols. For example, if the user has to write / record a sentence, which consists of five words he / she could replace them with  $\pm$  five symbols. Therefore, the computer could store  $\pm$  five characters instead of storing the whole sentence.

#### 5.1.4.4 Compact Disk Read Only Memory (CD ROM)



**Plate 21 (CD-ROM)**

CD-ROM is a smaller optical disk, which is less than five inches in diameter as shown in Plate 21. The CD ROM can store up to 650 Megabytes (MB) of data, which can be equivalent to 325 000 pages of typed document with 2000 characters per page. The CD-ROM as optical disk uses a high-powered laser to write data. The high powered laser does this by burning microscopic holes of the surface of the optical disk. The CD-ROMs use lower powered laser to read from the disk by reflecting light, which is converted into a series of bits to be processed by computer. It is commonly identified by symbol 'D'.

#### 5.1.4.5 Magnetic Tape Devices

Magnetic tape has one side that record patterns of bit that represent data, through a covered magnetized material. Magnetic tapes store data sequentially (one after another) using the binary codes like ASCII or EBCDIC. Their drives have electromagnetic write / read head that can write or read the magnetic patterns of bit representation.

The two examples of magnetic tape are **Cartridge tape** and **Reel-to-reel tape** devices. Cartridge tape is similar to audio cassette tape accept that it is slightly bigger than the audiocassette. **Reel-to-reel tape** has two reels, a supply reel to hold the tape that will be written to or read from, and a tape-up reel to temporarily hold portions of the supply reel tape as it is being processed. The cartridge tape devices have replaced the reel-to-reel tape devices.

#### 5.1.4.6 Other Types of Storage Devices

Some examples of other storage devices are **Mass storage**, **RAID storage systems**, **PC cards**, **Smart cards**, **Optical memory card** and **Memory buttons**.

**Mass storage systems** are used to access data in a larger database. They can be used to provide even an automated retrieval of data from a library of storage media.

**Redundant Array of Inexpensive Disk (RAID)** is a group of integrated small disks that may be used to replace some big expensive systems. **PC cards** are equal to the size of a bank cash or credit card. They are fitted into PC card slots and are used for storage, additional memory and also communications. **Smart card** is one of the special-purpose storage devices. It is used as a pre-paid telephone calling card. It is commonly used by TELKOM in South Africa (Phone card). The smart cards are equal to the size of a bank cash or credit card. If it is inserted into the telephone boot, a small screen of a telephone boot displays balance amount in the card. **Optical memory card** is another example of the special-purpose storage devices. The optical memory cards are also equal to the size of the cash / credit card. They use laser beams to store digitized data. They usually allow data to be entered not to be erased. **Memory buttons** look like watch batteries is also special-purpose storage devices. They consist of a pen-like device, which is used to update or read data in the button by touching the button.



## 5.2 SOFTWARE

Software is categorized into four (4) main divisions. Those divisions are Operating system (system software), Utility software, Programming software and Application software.

### 5.2.1 OPERATING SYSTEM (SYSTEM SOFTWARE)

Operating system as part of the System software consists of many programs that control computer operations. Those operations range from **starting up** the computer, **loading, storing application software, executing, formatting** disks and other functions.

The operating systems are programs that are stored on the hard disk drive to manage the computer operations. These programs are copied from hard disk drive to the memory of the computer, if the computer starts the operation (boot). These programs are called *kernel* and reside on a resident portion of the computer. But, those programs that remain on the hard disk drive during operation are called non-resident portion.

The operating system has certain features called **user interface**. User interface is a part that controls communication between the computer and user. This means it directs how the user enters commands and how results are presented on the computer screen.

The user interface is divided into three (3) types. Those three types are *Graphical User Interface (GUI)*, *Command-line user interface* and *Menu-driven user interface*.

Graphical User Interface (Figure 2) has some clues (such as the Icons and others) used by users to perform tasks easily. *Command line user interface* usually uses the keyboard to enter data or commands. The commands used by the users are called *command language*. *Menu-driven* user interfaces have menus that have different options, which are used to tell the computers in order to perform some necessary tasks.

Some examples of the operating system are **Disk Operating System (Ms / PC DOS), Windows 3.0, Windows 3.1, Windows 3.11, Windows 95, Windows 98, Windows 2000, Windows CE, Macintosh and many others**





**Figure 11 (Ms DOS)**

Microsoft Corporation developed Personal Computer Disk Operating System (PC-DOS) and Microsoft Disk Operating System (Ms DOS) for IBM-Compatible personal computers. They normally use the command line user interface and the menu-driven user interface.

Microsoft Windows 3.0 (Windows 3.0), Microsoft Windows 3.1 (Windows 3.1) and Microsoft Windows 3.11 (Windows 3.11) are graphical user interface, because they were developed to work in combination with DOS to simplify its use. They were the first widely used graphical user interface.

Windows 95 (Figure 2), Windows 98 and Windows 2000 use DOS as one of their application programs (Figure 11). They are not depended on the DOS for operation, because they are also operating systems on their own.

**Windows CE** are commonly used in smaller computers and wireless communication devices, because they require little memory. But, they are proper operating system not operating environment.

**Apple Macintosh** is also a proper operating system, which was designed for commercially graphical user interface. Today Macintosh is working for all the computers, not only for Apple manufactured computers, as it was the case before. It was developed in 1984, where it was working only for Apple manufactured computers.

The Operating system has four (4) basic tasks. The tasks are **Input & Output management, Memory management, Process management and System management**.

In **Input and Output management** the Operating system uses device drivers to communicate with each input or output device. If a new device is installed, a new device drive should be installed. The operating system uses *Spooling process* to facilitate the effective use of printers. *Spooling* is a process of saving a report before

it is taken to the printer. This is managed by the Operating system, because printers are slower than other devices. In the case of multiple users the operating system is the one that prioritize requests, printer and other related functions.

In **Memory management** the Operating system uses buffers to store data that comes from the input devices or data that is ready to go to the output devices. Buffer is a name given to the memory that is used for this process. The Operating system also manages the partition of the hard disks.

The Operating system increases disk space by means of Virtual memory management. Virtual memory management is methods used by the operating system to increase disk space. One of those methods is *paging*. *Paging* is a process of transferring a certain fixed number of bytes from disk to the memory each time data or program instructions are required.

In **Process management**, the Operating system manages processing in three ways. The three ways are *Single processing or tasking*, *Multitasking* and *Multiprocessing*.

*Single processing / tasking* is when the operating system allows only one application and one user to work on the computer. If a certain application is required more than the current application, current application must be closed.

*Multitasking* is performed by the operating system in three ways, which are *context switching*, *co-operative multitasking* and *pre-emptive multitasking*.

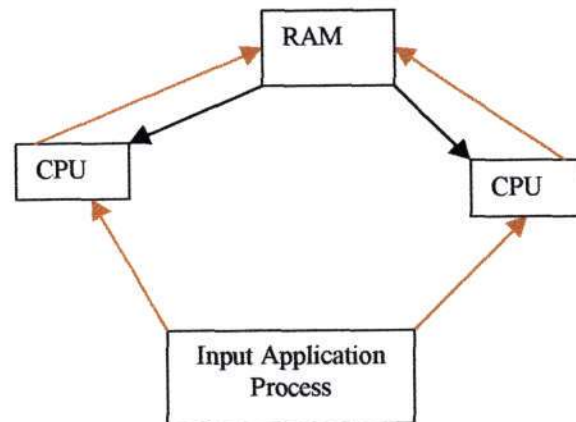
*Context switching* is when more than one application is opened on the screen to be used. Although only one application becomes active at a time but they are more than one.

*Co-operative multitasking* is when processes are used co-operatively by switching back and forth automatically, when they reach break stages. The operating system follows a logical order in doing this.

*Pre-emptive multitasking* is when the operating system prioritizes the processes to the CPU. For example some input devices are usually given the first priority than the output devices.

**Multiprocessing** is done using more than one CPU by either asymmetric or symmetric multiprocessing.

With *Symmetric* the CPUs use one RAM and also one input application process as shown in Figure 12.



**Figure 12a (Symmetric)**

With asymmetric multiprocessing there are separate input application processes and separate RAM as shown in Figure 12b.



**Figure 12b (Asymmetric Multiprocessing)**

In System management there are *System Security, Disk and File management* as well as system performance of the computer.

*System security* includes use the use Passwords, Usernames and others ways of that are used to gain access to the computer system.

*Disk and File management* is a function of a program, which is included in the operating system to format disk, move file / folder, copy file / folder, create folder,



rename and performs many other tasks. Today one of the most common programs used for this is Windows NT Explorer or Windows Explorer (Figure 13).



**Figure 13 (Windows Explorer)**

### 5.2.2 PROGRAMMING SOFTWARE OR LANGUAGE

“Programming language is a set of words, symbols, and codes that enables the programmer to communicate the solution algorithm to the computer” (Shelly, Cashman & Woggoner 1998)

Programming software is divided into five (5) categories. Those categories are *Machine languages, Assembly languages, Third-generation, fourth-generation and fifth-generation natural languages*. They are grouped into two (2) main divisions, which are **low-level and high-level languages** as shown in Table 5.

### TABLE 5

LOW LEVEL LANGUAGES	HIGH-LEVEL LANGUAGES
Machine languages	Third-generation languages
Assembly languages	Fourth-generation languages
	Fifth-generation languages

The **low-level** languages are designed to run on specific computers. The **high-level** languages are designed for many different computers.

Some examples of programming language are FORTRAN, BASIC, COBOL, Pascal, RPG, Ada, C, C++ and Visual Basic.

*IBM programmers led by John Backus developed FORTRAN (Formula Translator) in 1950s as a high-level programming language. It was designed mostly for mathematical and logical expressions.*

*BASIC (Beginner's All-purpose Symbolic Instruction Code)* was developed in 1960s by T. Kurtz and John Kemeny. It was designed mostly for introductory skills in programming.

Grace Hopper developed *COBOL (Common Business Oriented Language)* in 1960s. It was designed mostly for business application.

Niklaus Wirth developed *Pascal* in 1960s, mostly for structured programming concepts. It was named after Blaise Pascal as one of the first programmers.

IBM, mostly to generate reports for businesses developed *RPG (Report Program Generator)* in 1960s.

U.S Department of defense developed *Ada* in 1970s. It was named after Augusta Ada Lovelace Byron (the mother of computer).

Dennis Ritchie developed *C* in 1970s mostly for the system software.

Bjarne Stroustrup developed *C++* in 1980s as an extension of the C.

Microsoft Corporation developed *Visual Basic* in 1990s, mostly for the Windows application.

In addition to the programming language there are language translators, which are system software programs that convert programming instructions into the binary codes that can easily be understood by the computers.

### **5.2.3 UTILITY SOFTWARE**

Utility software helps in the management of computers against viruses. Viruses are usually small software programs written, sometimes as a joke and sometimes for malicious intent, to perform actions without the knowledge of the user of the computer on which they execute.

The first official record of the word 'bug' being used for computer error, was in 1945. When a moth flew into one of the relays of the Mark 1 computer and jammed it. The moth was then taped into the logbook, with the report "First actual case of a bug being found".

The viruses can only be transferred by disk, network or modem into the computer. Some are jokes and display a message on the screen at a certain time or on a certain day, while others are more destructive or harmful, as they can slow down the computer, delete information off hard disk or even worse.

They are divided into **Boot sector**, **File virus**, **Trojan horse** and **Macro viruses**. **Boot sector** replaces the booting programs, which are used to start the computer system. **File viruses** destroy the computer files by inserting virus code into program files. A **Trojan horse** virus is designed to look like legitimate program. A **Macro** uses the language of application software in order to hide.

To be safe from viruses it is important to install an anti—virus computer program into the computer, as most of these programs use to scan disks or even files in addition to check the whole computer for any virus. These anti—virus programs need to be updated to work even to current viruses.

#### **5.2.4 APPLICATION SOFTWARE (PACKAGES)**

The application software is divided into two (2) categories. Those are Vertical application software and Horizontal application software. Vertical application software is developed only for specific industry. Horizontal application software is developed for all different types of organization.

This study concentrates on the horizontal applications, especially those that are used by UniSchool. The reason is that UniSchool does not have vertical application software that is used in computer literacy course.

Examples of application software are: (1) Word Processing, (2) Spread sheet, (3) Presentation, (4) Database, (5) Internet, (6) E-mail, (7) Desktop publishing, (8) Computer-Aided Design (CAD), (9) Personal information management, (10) Project



management, (11) Multimedia authority, (12) GroupWare, (13) Accounting, (14) Personal finance, (15) Integrated software and software suites.

#### 5.2.4.1 Word Processing Program /Application (Figure 14)



Figure 14 (Microsoft Word processing)

Word processing is commonly used to produce or modify text document, but it does allow image as well as shown in Figure 14. The following table present some of the common features, which are found in Word processing software.

#### Some common features of Word processing software

- |   |                                     |
|---|-------------------------------------|
| ➤ <i>Soft or Hard return</i>            | ➤ <i>Spelling checker</i>           |
| ➤ <i>Font format</i>                    | ➤ <i>Margins and Alignment</i>      |
| ➤ <i>Line spacing</i>                   | ➤ <i>Indent</i>                     |
| ➤ <i>Columns and Table</i>              | ➤ <i>Graphics</i>                   |
| ➤ <i>Page number, Header and Footer</i> | ➤ <i>Borders and Shading</i>        |
| ➤ <i>Save</i>                           | ➤ <i>Print Preview</i>              |
| ➤ <i>Portrait and Landscape</i>         | ➤ <i>Number of copies and Pages</i> |
| ➤ <i>Underline</i>                      | ➤ <i>Mail merge</i>                 |

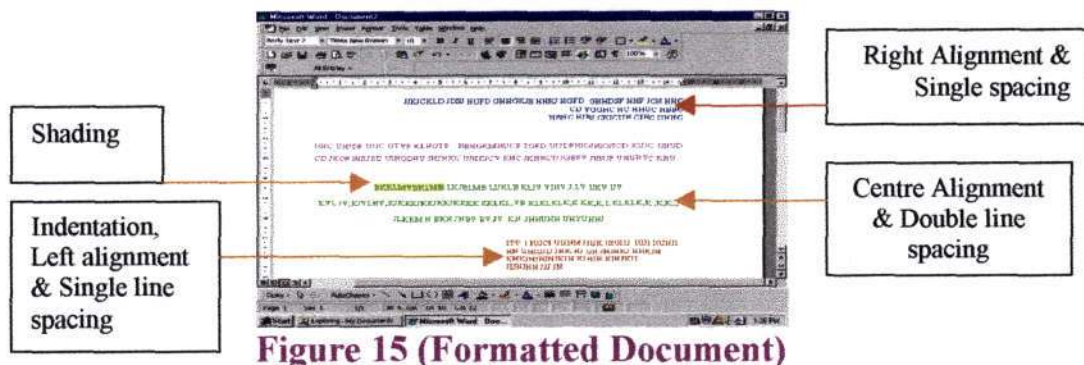
**Soft or Hard return:** if the cursor moves to the next line automatically is called soft return. But, if it moves to the next line, while 'enter' has been pressed is called hard return.

**Spelling checker** allows the users to correct spelling mistakes in the document.

**Font format** allows the users to use different types, style, size and colours of characters as it is demonstrated in this document.

**Margins and Alignment:** Margins allow the user to specify space in the border of a page (Left, Right, Top and Bottom). **Alignment / Justification** (Figure 15) allows the user to position text in relation to a fixed reference point (left, right or center). For example this document is formatted with 'Justify / Full Justification' that is why the document is straight on both Left and Right.

**Line spacing** allows the user to specify spaces between sentences. The most common line spacing are single, 1.5 and double as shown in Figure 15.



**Figure 15 (Formatted Document)**

**Indentation** allows the user to leave certain spaces on the left or right of the sentence or paragraph as shown in Figure 15.

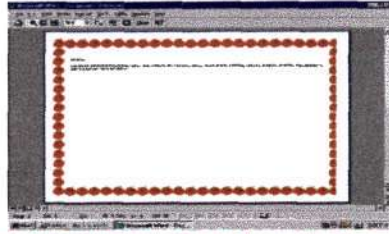


**Figure 16 (newspaper Columns)**

**Column and Table:** Columns allow the users to format a document like new paper or magazines as shown in Figure 16. Tables allow the users to format documents with rows and columns, as there are many **Tables** that are shown in this document.

**Graphics** allow the user to incorporate different graphics or pictures in the document, as it is happening in this document, where the **Plates** and **Figures** are incorporated with text.

**Underline** allows the users to underline the text. Some examples of this are word 'Table' and the main headings of each chapter of this document, which are underlined.



**Figure 17 (Page Border & Landscape)**

**Borders and Shading** are lines used with graphics, text or tables. Table borders are used in all the Tables of this document (Blue and Pink borders). Page Borders is a design that goes around the whole pages as shown in Figure 17. Page border is formatted only on one page and then the rest of the pages will be automatically be inserted. **Shading** allows the users to change background of a certain portion of a document as shown in Figure 15.

**Page numbers, Header / Footer** are also formatted on one page and then other pages will be automatically be formatted as shown on the top of each page of this document.

**Save** allows the user to store information for future use.

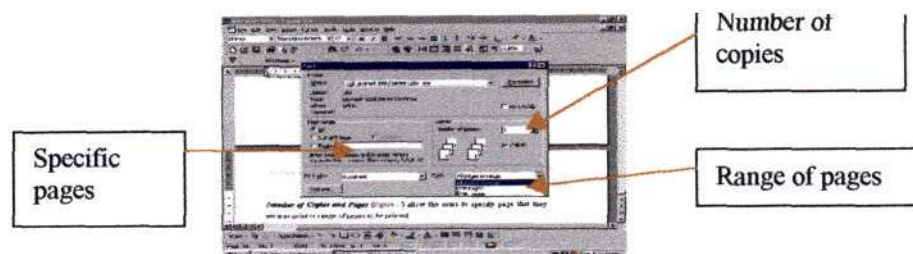


**Figure 18 (Print Preview & Portrait)**

**Print Preview** allows the users to see how the document will look like when it is printed (Figure 18).

**Portrait and Landscape:** **Portrait** (Figure 18) allows the user to print pages of a document vertically. **Landscape** allows the user to print pages of a document horizontally as shown in Figure 17.



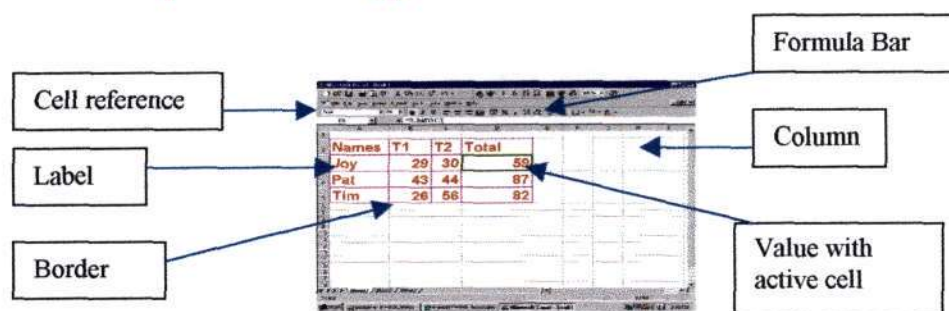


**Figure 19 (Print Dialogue Box)**

**Number of Copies and Pages** (Figure 19) allow the users to specify page that they want to print or range of pages to be printed.

**Mail merge** is a database feature, which allows the user to create one document that can produce multi-documents.

#### 5.2.4.2 Spreadsheet Application Software

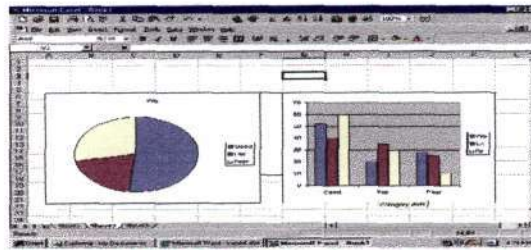


**Figure 20 (Ms Excel Spreadsheet)**

Spreadsheets have columns that have alphabets on top (A to IV), they are spaces between vertical lines as shown in Figure 20. The spreadsheet has 256 columns. The spreadsheets have rows, which are spaces between horizontal lines and have numbers on the left (1 to 65536). Any intersection between one row and one column is called cell as shown in Figure 20. Data is enter into the cell, mostly by means of the keyboards. The cell may contains four types of data, which are Labels (text), Values (numbers), Formula or Function. The top of the spreadsheet has white space called formula bar, where content of the active cell is displayed. Formula bar is next to the Cell reference, which displays name of the active cell.

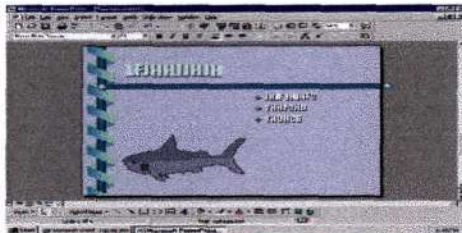
The spreadsheet has Sheet Tabs at the bottom of the sheet.

Different types of graphs can also be produced using the spreadsheet as shown in Figure 21.



**Figure 21 (Pie & Column graphs)**

#### **5.2.4.3 Presentation Application Software (Figure 22a &b)**



**Figure 22a (Power Point)**



**Figure 22b (Power Point)**

Presentation software is for presentation of information to audience. Presentation can be prepared to present any type of information. The information may include the use of text, charts, graphs, pictures, slide transition, animation, sound, shading, design, background and colours. Presentation is prepared on different slides, which are presentation documents.

In order to prepare an effective presentation one needs to prepare storyboard first. Storyboard is a pre-planning of how information should be arranged / organized during presentation process. After the storyboard information can be transfer to the slides. On the slides, presentation must be properly animated (images with movement), so that the presenter gains a sufficient attention from the audience. This will also help the presenter to avoid a situation where the presenter is discussing the first point, while the audience is already reading all the point even the last point. This may lead to a situation where the audience tends to lose concentration, because they know all the points before they are discussed.

The computers users may print the slides in groups or as individual slide.

#### **5.2.4.4 Internet Communication Software (Networks)**

Networks are used by different people to share information by means of computers. The following are three main types of networks:

- Peer—to—peer networks



- Local Area Networks (LAN)
  - Wide Area Networks (WAN)
- 
- The peer—to—peer networks are used to connect a small number of computers in an office or at home. They do not have server, they are simply linked computers.
  - The local area networks are usually made up of the peer—to—peer networks and can be located in one or more buildings in a certain area. They have one or more servers / hosts to which other computers in the network connect.
  - The wide area networks are usually made up of the local area networks that are used to connect computers across cities, countries or even the world. They use telephone lines or special digital lines. Each computer needs a Network Interface Card (NIC) and a network cable, which attach the card to another point in the network.

**Internet History:** The origin of the Internet lies in the year 1960 when the researchers in the United States of America began experimenting with computer networks. They worked for two decades on a government project called ARPANET. The aim of the project was to have a network of computers that would always be operational even if some of the computers were out of communication for some reasons. As a result of this project, a number of protocols were created to allow different computers to communicate with each other. The Internet was adopted rapidly by different countries, including South Africa in 1980



**Plate 22 (Modem)**

**Internet Communication:** The Internet consists of thousands of interconnected servers which have individual computers connected to them, where all of the information is found. The Internet protocols (IP) /Transfer Control Protocols (TCP) are used to communicate over data and telephone lines. The use of these protocols enables computers using different operating systems to communicate with each other.



The DOS—based Personal computers, Ms Windows 3.1, Windows for Workgroups, Windows 95, 98 & 2000 or Windows NT operating system, Macintosh computers and UNIX based systems all use and understand TCP / IP to connect and communicate with each other on the internet. In addition to this we also need modem (Plate 22) for dial—up connections. The common speeds of modem are 14 400, 28 800, 33 600 and 56K.

**Internet Access:** The access can be Permanent or Dial—up.

The permanent connection is where a computer is connected directly to the Internet through a leased line. It is connected to a telecommunication company's communication backbone structure direct, but this method is expensive.

The dial—up connection involves purchasing an account at service providers who are permanently connected and dialing the service provider from one's computer using a modem. This is a most popular and appropriate even to home PC users, as it is cheaper than the permanent one.

### **Other important services for the dial—up connection**

- Bandwidth that indicates the amount of information that can be downloaded from overseas at one time.
- Lines that indicate how many people can be logged on at any one time.
- Software that may be provided by the service provider to up running.
- It is also important that one choose a service provider that has a 24—Hour help line.

### **❖ WORLD WIDE WEB (WWW)**

The World Wide Web (WWW) is the Multimedia part of the Internet. The WWW was invented because of incompatibilities of platforms and tools frustrated communication and data retrieval and limited users to a fixed linear or hierarchical path. So, to overcome these obstacles, Tim Berners-Lee, a physicist at Conseil European pour la Recherche Nucleaire (CERN), the European Laboratory for Particle Physics in Geneva, proposed a hypertext project in 1989. He was alone in the whole project. This “web of information nodes hyperlinked together rather than in a hierarchical tree or an ordered list” became available as the program “World Wide

Web” in December of 1990. It became available to public in March 1991. It is currently one of the fastest growing parts of the Internet. The WWW content displays as a page and, unlike other Internet sites, text is formatted in various fonts, styles, colours and sizes. Pages may also contain animated text, pictures, sounds and video clips. It has trillions of pages of information on just about any topic imaginable. They are created by people or companies, and found on servers all around the world. They use special language called HyperText Markup Language (HTML). These pages usually contain hypertext links, where you click on them and then take you to another page. Each page has a unique address called Uniform Resource Locator URL. An example of the URL is <http://www.microsoft.com> or <http://www.mweb.co.za> where the first part of URL is HTTP, which is one of the standard protocols and then followed by the name of the server.

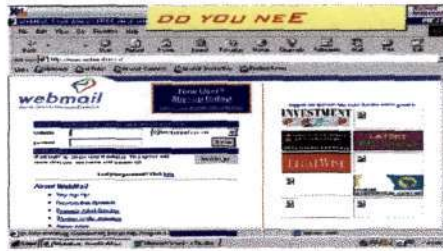


**Figure 23 (Internet Explorer)**

There are many web browsers available such as Microsoft Internet Explorer (Figure 23), Netscape Navigator and others that help in interpreting the codes of web pages and displaying such. The first browser was not designed to display graphics, but only text. The second generation, which included graphics (Graphical interface) was Mosaic. Marc Andreessen introduced mosaic (he was a student at the University of Illinois in 1993). He also became one of the founders of the Netscape Navigator. To search for information on the web the users use search tools called Search engines.



## ❖ INTERNET ELECTRONIC MAIL (Figure 24)



**Figure 24 (Webmail E-mail reader)**

A person with Internet access has an e—mail address to where anyone who want to send him / her message can do so. When the message is sent it takes only minutes to be received anywhere in the world. An example of the e-mail address is [sbkhoza@mweb.co.za](mailto:sbkhoza@mweb.co.za) where the first part is person's /company's name and then @ sign. The second part is the name of the server and company, and then 'za' for South Africa.

A certain software that is used in reading the e-mail is called e-mail reader (Figure 24). The e-mail readers usually allow us to read and type message even offline. An example of the email readers is Outlook Express.

When we dial into our service provider, the email reader will download all the messages that have been sent to us since we last download messages. At the same time our email readers will also upload messages from us to the server for delivery to the email addresses we have specified. Our email readers should automatically attach or detach files to and from our email messages. The more advanced readers offer more advanced features, such as an address book feature to store the email addresses that we use often. They also have filtering feature, which allow us to see or not see messages from certain people. There are many other features that are not mentioned here.

### **5.3 COMPUTER USERS**

There are two categories of computer users. They are Technical and Application users.



### **5.3.1 TECHNICAL USERS**

Technical users are primarily involved in supporting and developing the application programs used by other people. Therefore they need an extensive knowledge of the computer hardware and all the four categories of the software.

### **5.3.2 APPLICATION USERS**

The application user category has a largest number of users. These users apply the programs that are produced by the Technical users. They may have limited knowledge of programming, but have only application knowledge of application programs.

## **6. COMPUTER LITERACY**

One of the definitions of Computer Literacy that was cited by UniSchool (1999) comes from Collins' dictionary. Literate is defined as the ability to read and write. Then, if the computer is combined with the literate, it produces Computer Literacy. Therefore, Computer Literacy is the ability to read and write using a computer. Then someone who has successfully completed the Computer Literacy course becomes Computer Literate.

#### **❖ UniSchool Computer Literacy consists of Five (5) modules as follows:**

- ✓ Computer fundamentals
- ✓ Word processing (Ms Word)
- ✓ Spreadsheet (Ms Excel)
- ✓ Presentation (Power Point)
- ✓ File Management (Windows NT Explorer)
- ✓ Internet (Internet Explorer)

#### **❖ Technikon South Africa Computer literacy as a Module Consists of the following parts:**

- ✓ Word processing (Ms Word)
- ✓ Spreadsheet (Ms Excel)

❖ **UDW Computer Literacy consists of the following parts:**

- ✓ Word processing (Ms Word)
- ✓ Spreadsheet (Ms Excel)
- ✓ Presentation (Power Point)
- ✓ Desktop Publisher
- ✓ Internet (Netscape)

❖ **Umlazi Tech. Computer Literacy consists of the following sections:**

- ✓ Word processing (Ms Word)
- ✓ Spreadsheet (Ms Excel)
- ✓ Presentation (Power Point)
- ✓ File Management (Windows Explorer)
- ✓ Database (Ms Access)

❖ **Dave Larson Computer Literacy course (CSC318B) consists of the following Modules:**

- ✓ Word processing (Ms Word)
- ✓ Spreadsheet (Ms Excel)
- ✓ Presentation (Power Point)
- ✓ Internet (Netscape)
- ✓ Database (Ms Access)

It has come to my attention that all the above courses share Word processing (Ms Word) and Spreadsheet (Ms Excel) as the two common Modules. Therefore, I may conclude that Computer Literacy basic modules are Word processing and Spreadsheet.

Computer Literacy like Educational Technology has three major parts, which are similar to that of educational technology. Educational technology groups its three components into two divisions, which are Technology in Educational (hardware & software) and Technology of Education (underware). Computer Literacy has

Hardware, Software and User. The hardware is shared to both fields, but software is defined differently. In educational technology software is material that carries information (disks, transparencies, etc). In computer literacy software is any part of the computer that we cannot see and touch. The users use certain methods in using the computers that are equivalent to the underware. Therefore, the two fields share the same platform.

## **7. CONCLUSION**

Having discussed all these computer issues, one may concludes that we cannot afford to exclude computer technology in most activities of education and training. It helps us to control most of our activities. But, we need to gain control over it, because if it controls us, it may then harms us. In order to gain control we need extensive training, which includes relevant methods of teaching. It is for this reason that next chapter discusses methods of teaching, especially those that are used by UniSchool lecturers.



# CHAPTER 3

## LITERATURE REVIEW **B**

### 1. INTRODUCTION

People of all fields of studies need critical understanding of whatever that they are using. They need relevant training, which involves well-trained trainers as well as both the Technology in education (hardware & software) and Technology of education (underware). The trainers use the hardware, software and underware to produce someone who is computer literate. I have discussed the hard ware and the software, so this chapter discusses methods of education and training (underware).

### 2. METHODS OF EDUCATION AND TRAINING

There are many methods of education and training, ranging from teacher-centred, subject-centred to learner-centred. The following list shows some of those methods, but the study discusses only the first six, because they are commonly used in teaching technical subjects (including computer courses).

#### 2.1 THE SIX METHODS ARE:

- 2.1.1 Lecturing Method
- 2.1.2 Question and Answer method
- 2.1.3 The Use of Text Book Method
- 2.1.4 Demonstration
- 2.1.5 The Keller Plan as a teaching Method Independent study (Programmed Instruction)

#### 2.2 OTHER METHODS ARE:

- |                          |                              |
|--------------------------|------------------------------|
| ♣ Discovery Method       | ♣ Discussion Method          |
| ♣ Project Method         | ♣ Team teaching Method       |
| ♣ Tutorial Method        | ♣ Quizzes Method (Symposium) |
| ♣ Inter-group activities | ♣ Rainbow group activities   |
| ♣ Conference Method      | ♣ Debate Method              |

- ♣ Guest speaker Method
- ♣ Core-Team activities
- ♣ Game, Models and Simulation Methods
- ♣ Buzz group
- ♣ Brainstorming Method

### **2.1.1 LECTURING METHOD**

Most writers who wrote about lecture method have certain common features. Those common features are as follows:

Lecture Method refers to a single teacher presenting information to a group of learners. Information is from teacher to learners as one way direction type of communication, because learners mainly participate as listeners. However, nowadays the lecture method involves some interactive audio-visual resources, which facilitate the presented information.

#### **2.1.1.1 Advantages of the Lecture Method**

- ❖ The lecture method can be used to present uniformity of information to a large audience by one teacher within a short period of time. So, it is economically good, because it does not require many teachers to be employed. It is also a best-organized and systematic method of presenting content. Therefore, it is for this aspect that it is suitable for both beginners and advanced learners.

#### **2.1.1.2 Disadvantages of the Lecture Method**

- ❖ It requires careful preparation and presentation, because teacher tends to be a final authority on topic discussed.
- ❖ It may do little in promoting high-level intellectual skills and accommodate individual pace of understanding. It usually promotes passive learners who just listen to one person.
- ❖ It is not easy to judge audience understanding accurately, but it may promote note-making skills.
- ❖ It also requires a skillful presenter of information.

## **2.1.2 QUESTION AND ANSWER METHOD**

This method is divided into two (2) broad types of questions, because of different systems of education and training. Those questions are Reproductive questions and productive questions.

### **2.1.2.1 Reproduction Questions**

Those questions need memorization of exactly what the teacher gave to the learners. Christian National Education mostly had these types of questions, where learners were expected to memorize masses of fragmented facts.

As a result of my case study, where I was doing class visits to twenty (20) teachers of Umlazi Technical College, I find that sixteen of them based their teaching mostly on the reproduction questions. This includes practical subjects like drawing and trade theory. The pass rate is good, but almost all their student cannot apply the knowledge of those subjects to practical situation. For example those who are doing Building drawing are expected to acquire knowledge and skills of drawing Plans (Working drawing). But they cannot draw the plan, because they only copy some existing drawing and reproduce them during test / examination time.

Therefore, there is a danger in using only these types of questions, because the learners can hardly become employers. But they only expect someone to employ them or work as subordinates. Examples of such questions are that of a lower order questions like 'What, Which, Who and When'.

### **2.1.2.2 Production Questions**

Productive questions are organized in such a way that they challenge learners to think critical about what is asked. These questions are of a higher order, such as 'How and Why' questions.

Outcomes-Based Education is characterized by more productive questions. That is why one of the factors that hinder success of the OBE in South Africa is the teachers' skills as observed by Prof. J. Janson (1997). Most of these teachers are the product of the Christian National Education. It then becomes difficult for them to accommodate any new changes that come with OBE.



These questions marry theory and practice, which is from concrete to abstract. But in order to use question and answer method successfully one needs to use both reproductive and productive questions.

### **2.1.3 THE USE OF TEXTBOOK**

In terms of educational technology resources have replaced aids, because aids implies that a teacher is replaced by teaching tools. One of those tools is a textbook, which is also no longer called teaching aid, but teaching resource. As a result of those changes 'Textbook Method' was also changed to 'The use of textbook', because it was associated with teaching aids.

#### **2.1.3.1 Advantages**

- ❖ Experts or people who have experience in that particular field commonly prepares the textbooks. Then, it is for this aspect that it can serve as a guide to teachers and learners. The order of chapters that need to be covered, usually start with simply parts to difficult ones, by following good arrangement, if it is a good textbook.
- ❖ They usually form bases of stimulating class activities. For example, if teachers want to give learners exercises or homework, they can easily refer them to the textbook. The textbook provides learners with different ideas, which are sometimes different from that of teacher. With those new ideas they can supplement the teacher's information and refer learners to other sources.
- ❖ They are also helpful to those learners who want to work ahead of their teachers, because the textbook tend to become a more reliable source than written notes. With the book the learners may critique their notes from their teacher.

#### **2.1.3.2 Disadvantages**

- ❖ The textbook words are static compared to spoken words. So, they are not suitable for teaching children and illiterate people. They cannot repeat whatever that the teacher want to repeat to learners, in order to facilitate learning. There is too little provision made for individual differences.
- ❖ There is a danger if the teachers do not tell learners that there are many possible interpretations of the prescribed textbook. This result in a situation where the learners depend heavily on the textbooks and think that there is no other truth,

accept what is written on the textbook. This is possible especially in mathematics, where learners try hard to adjust their answers to match the one that is in their books even if it is wrong.

- ❖ Today textbooks age faster, it is then dangerous not to check and find out about the latest information. For example, if the computer teacher orders Windows 3.1 textbooks and find that he / she can only have access to Windows 2000, he / she can find that those book are useless. Therefore, relevant book needs a lot of planning and experienced teacher, because most books are incomplete. They should only be used as teaching / learning resources, not as the teaching aids that replace teachers.

### **2.1.4 DEMONSTRATION**

Demonstration involves drilling, practicing and polishing of practical skills. It is mostly suitable for the teaching of technical subjects, where theory is mostly taken into practice by means of the technology in education (Hardware and software).

The instructor usually gives learners the theory by telling them. The second step is where the instructor shows the learners how do the theory works, using certain audio-visual teaching resources. At the end the learners are given a chance to do what their instructor has done.

It is very important for the instructor to follow a logical sequence of knowledge that is relevant to the learners' experience, to avoid any confusion. It must proceed gradually to new knowledge. If necessary the instructor should even drill the learners with the new knowledge to facilitate it. Once the learners master the new knowledge, the instructor should proceed to the next step to avoid boredom. But, instructors should remember learners' pace of learning is not the same. One of the methods, which can be used by the instructors to avoid negative effects cause by different pace of the learners, is to allow those learners whose pace is faster to help others. By so doing the learners learn by teaching others, drilling themselves and polishing the skills that they have achieved.

Finally, it is important for the instructors to make or check learners' work / project for correction purpose if necessary. The instructor should always become the last person to double-check the projects of his / her students.



#### **2.1.4.1 Advantages of Demonstration**

- ❖ Demonstration accommodates learners' difference style of learning. As people remember 10% of what they hear, 30% of what they see and 50% of what they see and hear (Robbins J. 1997) demonstration is one of the best methods that integrate these areas (senses) of learning.
- ❖ Survey indicated that 25% of people are mainly auditory learners, 35% are mainly visual learners and 40% are mainly physical learners. So, the demonstration method involves all these elements in order to reinforce whatever that was learned.
- ❖ Learners get an opportunity to apply / put whatever theory was given to them by the teachers into practice. By so doing they are proving the correctness of the theory and know from the start whether is possible or impossible to use it.

#### **2.1.4.2 Disadvantages of Demonstration Method**

- ❖ The instructors need a lot of time to plan and organize both the technology in education (hardware & software) and technology of education (underware). This may involves laboratories / workshops where the instructors may fail to control the inside settings. For example if there is a problem with the power supply in the laboratory, the instructor cannot use this method effectively. Budget and time can also disappoint the instructors.
- ❖ The demonstration method needs small group. If the instructor has a large group, other students may not get a chance to master the required skills. This is due to the different perceptions on the side of learners and other factors.

#### **2.1.5 THE KELLER PLAN AS A TEACHING METHOD**

This method implies the division of one course into different modules. For example computer information system is divided into theory of computer, word processing, spreadsheet and database. Each of these modules has specific outcomes, clear study material and self-evaluation questions / tests for learners. These modules are either suitable for individual or group and have flexible deadline for completion. But. The



learners only move to the next module, if the first one has been completed, using their own pace. The instructors change their roles to become stimulators and motivators.

#### **2.1.5.1 Advantages of the Keller Plan**

- ❖ It promotes a good teacher-learner relationship as the teacher's role to stimulate learners, ends up with motivation to the learners.
- ❖ It is flexible and inexpensive, because each module is being designed like one chapter of one book. The learner uses his / her own pace to complete the module.
- ❖ It motivates the learners through rewards of success. Once the learner passes the first module he / she becomes motivated to move to the next one. And it is easy to pass, because these modules are just like one chapter of a book to be covered for examination.
- ❖ Today, it is even possible to find the information of the modules on-line as an online lesson.

#### **2.1.5.2 Disadvantages of the Keller Plan**

- ❖ It increases one subject (learning area or course) into many subjects (modules); as a result the learners may take a long time to complete one subject as a course. For example one learning area (former subject) can even be divided into eight (8) modules. So, long period required to complete those eight modules may discourage the learners.
- ❖ It is suitable for well-motivated and matured learners, who can not depend on teacher's presentation.
- ❖ The teachers also take a lot of time to design it for the first time.

### **2.1.6 INDEPENDENT STUDY METHOD (PROGRAMMED INSTRUCTION)**

Programmed instruction is divided into two (2) methods, which are Linear (Figure 25a) and Branching (Figure 25b).

### 2.1.6.1 Linear Method (Figure 25a)

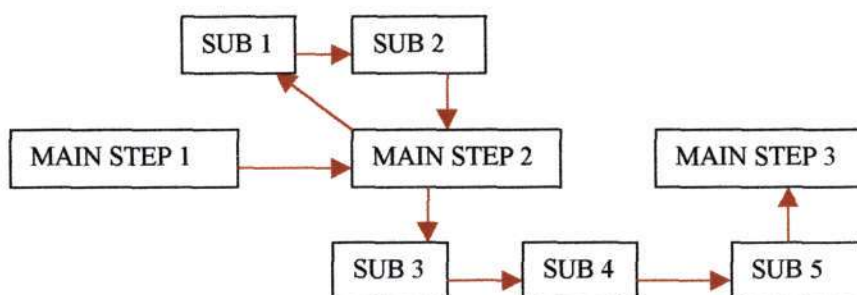


**Figure 25a (Linear Method)**

The linear method follows a sequential steps. The learner start from STEP 1 to the next step until she / he reaches the last step. The learner is not allowed to deviate from the sequential steps, as a result some teachers or learners may find that a certain step is boring. So, the teacher should at least combines certain steps, if it is possible or necessary in order to challenge those who use the faster pace.

### 2.1.6.2 Branching Method (Figure 25b)

Branching method (Figure 25b) consists of main steps and sub-steps used for correcting / bridging for the main steps. For example if the student takes STEP 3 and find that such step is difficult, she / he may first take few sub-steps. The sub-steps prepare him / her for the main steps.



**Figure 25b (Branching Method)**

### 2.1.6.3 Advantages of the Programmed Instruction

- ❖ Learners get quick feedback after each step and they can make corrections earlier or decide whether they continue with the course or not.
- ❖ It starts gradually from the simply / known (concrete) information to unknown (abstract) data. And the learning area is arranged and presented in a logical sequence.
- ❖ It promotes active learners by demanding full participation and attention at each step.

- ❖ Learners can learn even in the absent of their teacher and use their own pace as individuals.
- ❖ Instructors gain more information during the time of programming the lesson, because it demands a lot of research work.
- ❖ It is easy to compare the learners' results of progress at anytime, because the records are always available.
- ❖ The instructor has more time for the individual student, while others are busy with something else. Even if the learner was absent he / she can still catch up.

#### **2.1.6.4 Disadvantages of the Programmed Instruction**

- ❖ Programmed instruction is not suitable for all learning areas.
- ❖ Although learners become active, but they learn something that has already been discovered / predetermined. Therefore, their creativity is limited, because they do not have an opportunity to express their own thinking.

### **3. CONCLUSION**

Therefore, other methods are not discussed, because they are not involved in UniSchool training and they are not commonly used for technical subject. This means they do not form important part of the study, while the first six do.



# CHAPTER 4

## RESEARCH METHODOLOGY

### 1. INTRODUCTION

South Africa like all most other countries in the world is facing a situation, where computer technology is developing faster. But workers lack the knowledge and skills of using computers. Educational institutions like other organizations indicate that there is a need for computer training for educators. It is indicated by a large number of educators who attend UniSchool computer training and other computer institutions. There are almost a greater number of qualified teachers attending UniSchool than other professional. It is important for the teachers to buy into a notion that computer technology is a beneficial addition to their classrooms. But, we do not put blame on technophobe educators only, because problem seems to be deeper than that.

Even if educators buy into this notion, they are often not supported educationally, financially and professionally in the integration of computers into their classrooms. Most educational institutions are not offering enough computer-integrating course, which can integrate computers into the curriculum. They are still training teachers for traditional school, yet the new curriculum (Curriculum 2005) has been introduced. Most of these educators graduate without skills in computers. Even if they attend computer courses, they do not get enough attention from trainers, because of time factor. It is not surprising to find that a teacher who left teaching profession in 1980s can still walk into any classroom (year 2001 classroom) in this country and teach or replace other teachers.

As a result UniSchool and other organizations are taking the initiatives in training educators and other workers / people who want to acquire some skills in computer literacy.

### 2. SHORT DESCRIPTION OF UNISCHOOL

UniSchool was introduced in 1993 as a training institution operating with different institutions of higher education, such as universities. Although UniSchool is independent, certain universities like Natal University, University of Pretoria, University of Cape Town and others accredit its courses. For example KwaZulu /

Natal UniSchool branch uses Natal University equipment and certain staff members. University students are also employed part time as tutors.

UniSchool is divided into five (5) branches, which are Pretoria, Port Shepstroom, Johannesburg, Cape Town and Durban (Natal University) branches. Durban and Cape Town branches are called South branch and others are North branches.

UniSchool does not offer only the Computer Literacy courses, but it also offers Advanced Computer Literacy, Human Resource courses and others. But, for the purpose of the study the researcher only concentrate on the Computer Literacy, offered by Durban branch.

The Durban branch alone can train up to a maximum of sixteen (16) groups of students, because it uses about 8 computer laboratories. These laboratories can be used for morning and afternoon classes on Saturdays. Number of students in each class depends on the number of computers available in each laboratory. But maximum number of a big laboratory is about fifty-seven (57).

For the student to register for the course, he / she must be able to communicate with English language, because the course is offered in English. But there is no specific qualification required. If number of students who are register are equal to the number of two classes they write a test, so that those who scored higher than other form their own class. Those whose scores are lower form theirs as well. But, if their number does not allow two classes, then they learn together as one class. Most of these classes are offered on Saturdays (8H30 to 12H30 and 13H00 to 17H00) for twelve (12) Saturdays per class.

Durban branch alone has about eleven (11) lecturers and about 20 to 30 tutors. Basic requirement for the lecturers is any profession and computer knowledge not necessarily computer science.

The two classes were observed as follows.

### **3. CRITICAL QUESTION 'A' OF THE STUDY**

Course outline, UniSchool course notes for students and lectures' files analysis indicated that the course at least cover two out of twelve critical cross-field outcomes.



The following Table (Table 6) indicates the two critical cross-field outcomes and their learning area outcomes.

**TABLE 6**

CRITICAL OUTCOMES	LEARNING AREA OUTCOMES	TIME
The Learners will:	The learners will have knowledge of	
3.1 Communicate effectively using visual, Mathematical and language skills in the modes of written presentation (Using Computers Software).	Computer in terms of:	
	3.1.1 Notepad / Word Pad	4hrs
	3.1.2 Ms Word	8hrs
	3.1.3 Ms Excel	8hrs
	3.1.4 Ms Power Point	8hrs
	3.1.5 Internet & E-mail	3hrs
3.2 Organize and Manage themselves and their activities.	3.2.1 Computer fundamentals	4hrs
	3.2.2 Windows NT Explorer	4hrs
	3.2.3 Computer Viruses	1hr

### 3.1.1 SPECIFIC OUTCOMES OF NOTEPAD / WORD PAD

Each of the learning area outcomes has some specific knowledge, attitudes, skills and understanding, which should be displayed in a particular context called the specific outcomes. So, the specific outcomes of Notepad / Word Pad are that learners will correctly be able to:

- 3.1.1.1 Identify the elements of Windows 95 environment.
- 3.1.1.2 Identify and describe the functions of the parts of a window.
- 3.1.1.3 Access menu and make selections from the menu.
- 3.1.1.4 Recognize the standardized interface of window application and the grouping of associated menu commands.
- 3.1.1.5 End window session and shut down the computer.

### 3.1.2 SPECIFIC OUTCOMES OF MICROSOFT WORD

Learners will correctly be able to:

- 3.1.2.1 Create new Word document
- 3.1.2.2 Type text into the Word document, align and change text case
- 3.1.2.3 Save the Word document



- 3.1.2.4 Change view of the active Word document.
- 3.1.2.5 Close Word document.
- 3.1.2.6 Work with multiple documents.
- 3.1.2.7 Change font size, type and colour.
- 3.1.2.8 Apply different bullets and numbering formats in the Word document.
- 3.1.2.9 Indent and UN-indent text.
- 3.1.2.10        Use left, right, centre and decimal Tab stops.
- 3.1.2.11        Apply borders and shading to the Word document
- 3.1.2.12        Change line spacing of paragraph.
- 3.1.2.13        Set paper size and page orientation of a document.
- 3.1.2.14        Set margins of a document.
- 3.1.2.15        Insert and edit headers and footers.
- 3.1.2.16        Change printer and print the entire document.
- 3.1.2.17        Create table and add text to the table.
- 3.1.2.18        Add rows and columns to the table and change row / column width.
- 3.1.2.19        Find and replace text as well as cut / copy and paste.
- 3.1.2.20        Insert symbols.
- 3.1.2.21        Insert page breaks and pages numbers.
- 3.1.2.22        Use thesaurus, check spelling and grammar

### **3.1.3 SPECIFIC OUTCOMES OF MICROSOFT EXCEL**

Learners will correctly be able to:

- 3.1.3.1 Name some of the activities suited to the use of a spreadsheet.
- 3.1.3.2 Describe a manual spreadsheet.
- 3.1.3.3 Describe some of the problems associated with manual spreadsheets.
- 3.1.3.4 Explain what is meant by 'an electronic spreadsheet'.
- 3.1.3.5 Name some advantages of using an electronic spreadsheet package.
- 3.1.3.6 Start Microsoft Excel windows.
- 3.1.3.7 Enter data into the cells, and name the address of the active cell.
- 3.1.3.8 Use Help features and close Excel window.
- 3.1.3.9 Explain the purpose of F5 Go To key.
- 3.1.3.10        Work with more than one Workbook and arrange them.

- 3.1.3.11 Move around the worksheet area so that they can access the cells of the worksheet area.
- 3.1.3.12 Describe difference between labels, values, formulae and functions.
- 3.1.3.13 Create new worksheet and save worksheet.
- 3.1.3.14 Close worksheet and open an already existing worksheet.
- 3.1.3.15 Edit data in the worksheet, move data and copy data.
- 3.1.3.16 Work with cell ranges.
- 3.1.3.17 Work with Relative and Absolute cell References.
- 3.1.3.18 Insert and delete cells, rows and columns.
- 3.1.3.19 Name, Insert, rename, delete, move and copy a worksheet.
- 3.1.3.20 Format data with Bold, Italics and Underlining features.
- 3.1.3.21 Change font, font colour, size and background colour.
- 3.1.3.22 Align data.
- 3.1.3.23 Change number format.
- 3.1.3.24 Resize column row and use increase / decrease decimal.
- 3.1.3.25 Add borders and patterns.
- 3.1.3.26 Hide or UN-hide and protect data in rows and columns.
- 3.1.3.27 Hide and UN-hide worksheets.
- 3.1.3.28 Protect worksheet and workbook.
- 3.1.3.29 Adjust the Orientation of a workbook pages.
- 3.1.3.30 Adjust the Paper size.
- 3.1.3.31 Adjust the scaling of workbook pages.
- 3.1.3.32 Adjust Print Quality.
- 3.1.3.33 Set Page numbering.
- 3.1.3.34 Set and remove Page Breaks.
- 3.1.3.35 Set Margins.

### **3.1.4 SPECIFIC OUTCOMES OF MICROSOFT POWER POINT**

Learners should correctly be able to:

- 3.1.4.1 Start Power Point presentation and use different slides from templates.
- 3.1.4.2 Create new presentation and open the existing presentation.
- 3.1.4.3 Use different types of views.
- 3.1.4.4 Use / get Help facility in Power Point.

- 3.1.4.5 Use office assistant.
- 3.1.4.6 Use slide finder, summary and expand slides.
- 3.1.4.7 Align text.
- 3.1.4.8 Change fonts, font size and colour.
- 3.1.4.9 Edit, select, move, copy and delete text.
- 3.1.4.10 Use master slide.
- 3.1.4.11 Use slide colour scheme, different background and design.
- 3.1.4.12 Insert objects, graphs, organizational charts and clipart into the slide.
- 3.1.4.13 Link files (OLE)
- 3.1.4.14 Save and close presentation document.
- 3.1.4.15 Use multiple document interface.
- 3.1.4.16 Use slide transitions and custom animation.
- 3.1.4.17 Set up a slide show, show type, slide and use advance slide.
- 3.1.4.18 Print presentation and check spelling.
- 3.1.4.19 Name the four presentation guidelines.

### **3.1.5 SPECIFIC OUTCOMES OF THE INTERNET AND ELECTRONIC MAIL**

Learners will correctly be able to:

- 3.1.5.1 Access / visit different Web sites.
- 3.1.5.2 Use Internet search facilities.
- 3.1.5.3 Use E-mail to communicate.
- 3.1.5.4 List basic hardware required for dial-up connections.
- 3.1.5.5 List services required for dial-up connection.

### **3.2.1 SPECIFIC OUTCOMES OF COMPUTER FUNDAMENTALS**

Learners will correctly be able to:

- 3.2.1.1 Name or list and describe three essential computer principles.
- 3.2.1.2 Define computer and computer literacy.
- 3.2.1.3 Describe the origin of computer.
- 3.2.1.4 Name the main purposes for which computers can be used.
- 3.2.1.5 Name four generations of computer development.



- 3.2.1.6 Name and describe the major components of a computer.
- 3.2.1.7 List main parts of the computer operating system.
- 3.2.1.8 Name various types of the input devices.
- 3.2.1.9 Name various types of the output devices.
- 3.2.1.10 Name various types of the storage devices.
- 3.2.1.11 Name different types of computers available today.
- 3.2.1.12 Name and discuss the four types of software.
- 3.2.1.13 Name / list different types of application software available.
- 3.2.1.14 Describe the purposes of the utility software.

### **3.2.2 SPECIFIC OUTCOMES OF WINDOWS NT EXPLORER FILE MANAGEMENT PROGRAM**

Learners will correctly be able to:

- 3.2.2.1 Explain the functions of Window Explorer.
- 3.2.2.2 Use Windows Explorer to list, copy, move, rename and delete files.
- 3.2.2.3 Start application from Windows Explorer.
- 3.2.2.4 Create folders.

### **3.2.3 SPECIFIC OUTCOMES OF COMPUTER VIRUSES**

Learners will correctly be able to:

- 3.2.3.1 Protect Personal Computers from the viruses.
- 3.2.3.2 Get rid of virus from the Personal Computer.

## **4. CRITICAL QUESTION 'B' OF THE STUDY**

Two groups or classes involved were studies from the beginning to the end of the course. One group was visited for one session in order to triangular the data from the two classes. Group one (Case Study One) had thirty-seven (37) students (two White ladies, three Indian ladies, one Indian gentleman, ten African male students and twenty-one African male students) one lecturer and two tutors.

Group two (Case Study Two) had two alternative lecturers, three tutors and fifty-three (53) students (one White male, one White female, one Indian male, two Indian female, six African male students and the rest were African female students. The third group (Case Study Three) had thirty (30) students.

Critical Question B is divided into three Case Studies as follows:

#### **4.1 GROUP ONE AS CASE STUDY ONE.**

#### **4.2 GROUP TWO AS CASE STUDY TWO.**

#### **4.3 GROUP TWO AS CASE STUDY THREE.**

### **4.1 CASE STUDY ONE**

#### **4.1.1 FUNDAMENTALS ONE (FIRST LEARNING AREA)**

A first lecture of the course took place in the classroom, which had no computers. The classroom had two Chalkboards and one Overhead Projector. The lecturer was using the lecture method supplemented by 'the use of Textbook as well as the Question and Answer methods. Their textbooks had five (5) assignments, which the learners had to cover for the course marks. The chalkboard with chalk and Overhead Projector with transparencies were used to illustrate some parts of the computer. Learners had to use books to answer all assignment questions.

#### **4.1.2 FUNDAMENTALS TWO (FIRST LEARNING AREA)**

As from this session onward the class was conducted in the classroom, which had seventy-nine (79) Personal Computers (Windows 2000), one Laser Printer (mono-colour), one Overhead Projector and one Whiteboard. Each learner was given a 3,5 floppy (stiffy) disk. Majority of the students was using Zulu language as their first language.

The lecturer started by telling the learners to touch the mouse devices and move them on the desktop. They observed the movement of the mouse pointer. The lecturer illustrated some important ways of handling the mouse, while tutors were helping those who had experienced some difficulties by demonstrating to the students.

They did the following tasks guided by lecturer and tutors

4.1.2.1 They were told to point different Icons on the screen.

4.1.2.2 They learnt to click, click + drag and double click the Icon.

4.1.2.3 They learnt to open 'My Computer Icon and then Maximize, Minimize, Restore and Close it.



4.1.2.4 They clicked and dragged Icons to new locations of the desktop and use Auto Arrange to arrange them (Figure 26).



**Figure 26 (Computer Desktop)**

4.1.2.5 They changed the position of the desktop task bar and start menu to a new location (Figure 27).

4.1.2.6 They opened three windows at the same time, observed the active window and wrote text on the notepad (Figure 27) and save the text.



**Figure 27 (3 Opened Windows)**

4.1.2.7 Learnt different components of Windows (Figure 27).

4.1.2.8 Learnt the use of 'Backspace' and 'delete' keys of the keyboard.

4.1.2.9 They used help option from start menu.

4.1.2.10 Learnt how to shut down the computer.

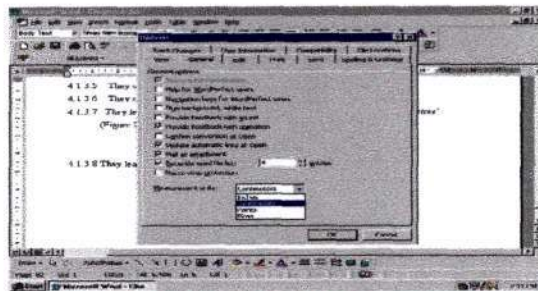
### **4.1.3 MICROSOFT WORD (MS WORD) (LEARNING AREA)**

They did the following tasks:

4.1.3.1 They opened the Ms Word document and Ms Excel book, they then used 'Alt + Tab' to switch between them.



- 4.1.3.2 They observed different bars for Ms Word, such as the menu bar, the standard and formatting toolbars as well as the status bar.
- 4.1.3.3 They opened new and existing files.
- 4.1.3.4 They saved files using their disks.
- 4.1.3.5 They used font format menu to change font, font size and colour.
- 4.1.3.6 They changed the line spacing and learnt how to indent paragraph.
- 4.1.3.7 They learnt how to change unit of measurement from 'inches' to centimetres' (Figure 28).



**Figure 28 (Unit of Measurements)**

- 4.1.3.8 They learnt how to change both left and right margins of the document.
- 4.1.3.9 They inserted the table with different borders.
- 4.1.3.10 They learnt how to highlight and resize the columns and rows.
- 4.1.3.11 They learnt how to cut / copy and paste as well as 'Undo' button.

Teaching methods used by the lecturer are lecture, demonstration and 'use of Textbook' methods (Technology of education).

Technology in education parts were computers with disks, whiteboard with pens and the Overhead Projector (OHP) with transparencies.

#### **4.1.4 MICROSOFT EXCEL (MS EXCEL) (LEARNING AREA)**

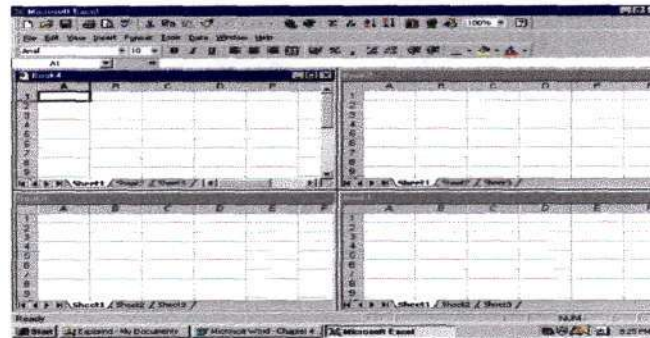
They perform the following tasks.

- 4.1.4.1 They opened the Ms Excel book using mouse and the keyboard.
- 4.1.4.2 They wrote on the spreadsheet and use F2 to edit data on the cell.
- 4.1.4.3 They renamed, delete and drag the sheet to new position.
- 4.1.4.4 They learnt how to select a range of cells using mouse, Shift, Ctrl and Arrow keys.
- 4.1.4.5 They resized the columns and rows to fit longer data and aligned it in the cell.
- 4.1.4.6 They used different Tabs of cell format menu (number, alignment, font, border and pattern).

4.1.4.7 They aligned spreadsheet topic across many selected cells.

4.1.4.8 They use header / footer option.

4.1.4.9 They arranged multiple book of excel (Tiled Figure 29, horizontal and cascade).



**Figure 29 (Tiled Wordbooks)**

4.1.4.10 They used Multiplication, Subtraction, Division and Addition signs. They included if statement and Sum function. The lecturer told the learners to use Average, Maximum, Minimum and Count functions at their own time.

### **4.1.5 MICROSOFT POWER POINT (MS EXCEL)**

They performed the following tasks:

4.1.5.1 They opened Ms Power Point new and existing files (were previously saved in their disks) and arranged the presentation files.

4.1.5.2 They inserted the clipart, resized and moved it. They changed colour and line of the object using AutoShapes format menu.

4.1.5.3 They inserted 'Smiling Face' (Figure 30) from Drawing Toolbar AutoShapes.



**Figure 30 (Smiling Face)**

4.1.5.4 They use Slide Sort view to arrange, delete the slides.

4.1.5.5 They formatted the slide with text, clipart, and background, apply design and used View show of slide show to present information.

4.1.5.6 They were told how to print the slides (one slide and six slides at a time)

They were doing all these tasks by following the lecturer's instructions, but they did not have any chance of doing these tasks on their own. They did not do any animation or transition part.

#### 4.1.6 WINDOWS NT EXPLORER

The lecturer first told them about data files and text files. They performed the following tasks

4.1.6.1 They opened Windows Explorer and its toolbar view menu (Figure 31) and observed different Tabs or buttons.

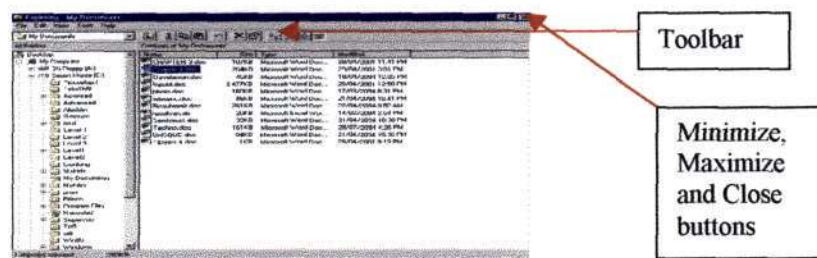


Figure 31 (Windows Explorer)

4.1.6.2 They saved files Notepad and Word pad files and observed them in the list of the Windows Explorer.

4.1.6.3 They created folders and sub-folders, renamed, moved and deleted files. They also used F2 to rename the file.

#### 4.1.7 INTERNET EXPLORER

The lecture told the learners about computer viruses and types of Internet connections. They then performed the following tasks:

4.1.7.1 They were told to double-click Internet Explorer Icon to observe the Internet.

4.1.7.2 They visited M web, SABC and USA NET sites.

4.1.7.3 They were told how to send message using the E-mail, but they did not send any message.

The pace of the lecturer was slow in such a way that the prescribed time was always exceeded at least by one-and-a-half hour every day. But, still other parts were not covered, because of the time factor. This means that the learners had to organize and work on their own to cover the remaining parts.



## **4.2 CASE STUDY TWO**

Case Study two was similar to the first one except that it had new other areas that were covered in addition to the above mentioned areas. Almost all the specific outcomes were covered either theoretically or practically, because the two lecturers used fast pace in their teaching. They even covered the custom animation and slide transition as well as the use of search engines. They applied for the E-mail addresses from 'www.usa.net' site and used 'www.ask.com' search engine.

## **4.3 CASE STUDY THREE**

This group was just visited for one session. It was discovered that the lecturer used only the first four hours to teach and then the other four hours out of eight hours are used for the assignment. The lecturer and the tutors helped the learners to finish assignments. Although students became passive, but they armed with tools that they had to use during the examination, because assignment follows the examination format.

The lecturers of all the three cases were using similar technology in education (hardware and software) and technology of education (methods).

## **5. CONCLUSION**

The outcomes of the course are now described in this chapter, which answers critical question 'A' and 'B'. The next chapter answers critical question 'C' by testing the outcomes or competencies of the course.

## CHAPTER 5

### DATA ANALYSIS (CRITICAL QUESTION C)

#### 1. INTRODUCTION

Data analysis is based on assignment results, theory examination results, practical examination results (each question was observed and analyzed). It is also based on the questionnaire questions. Assignment and theory examination questions were observed, but access to each question was denied, because of some limiting factors. However, the overall result of each assignment and the overall results of theory examination were accessible.

Final results of the examination were also analyzed in order to conclude the study with accurate results. The final result consists of 15% of assignment portion, 25% of theory examination portion and 60% of practical examination portion. Therefore, this means that if a student fails the practical examination section she / he fails the examination.

#### 2. QUESTIONNAIRE QUESTIONS

##### 2.1 HIGHEST ACADEMIC QUALIFICATIONS OF THE LEARNERS.

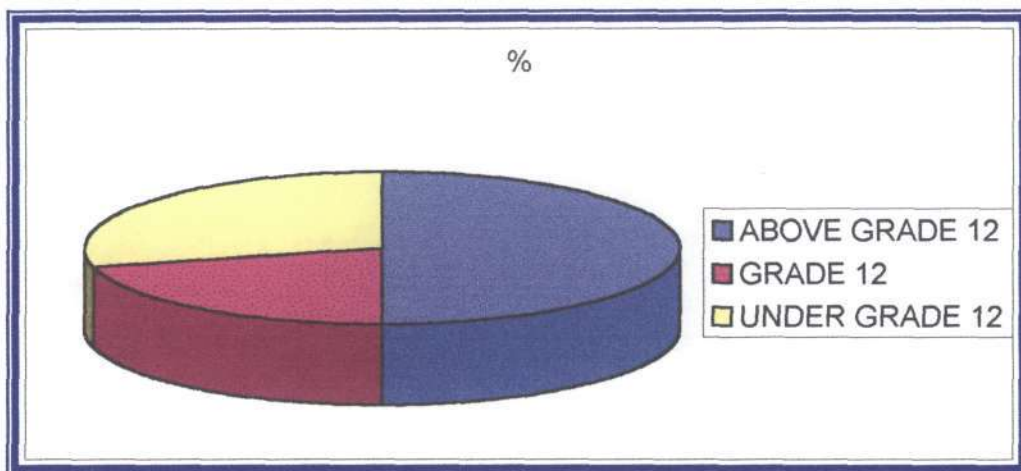
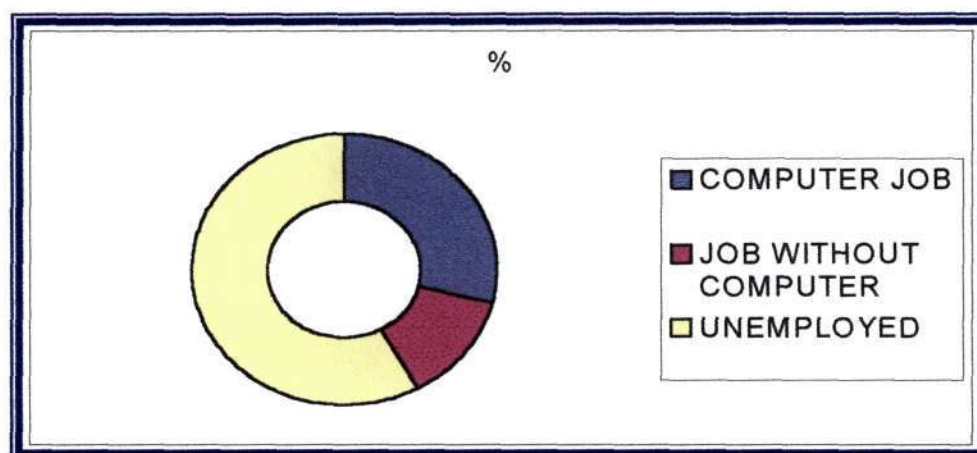


FIGURE 32

Figure 32 indicates that 50% of the learners had grade 12 plus other qualifications, 21% had grade 12 only and 29% were under grade 12. Therefore, most of them were expected to understand English, because of their qualifications.

## 2.2 EMPLOYMENT OF LEARNERS, REASONS FOR DOING THE COURSE QUESTIONS AND COMPUTER ACCESS.

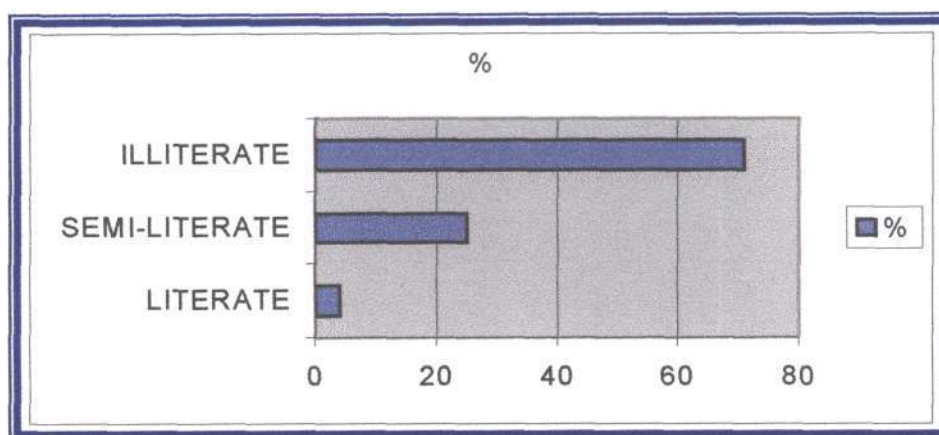


**FIGURE 33**

Figure 33 indicates that 58% of learners were unemployed, 29% were employed (their jobs include computer) and 13% were also employed, but their jobs did not include computer usage. Most of the 58% unemployed learners mentioned that one of the reasons, which motivated them to attend the course, was that they wanted to acquire computer knowledge and skills that could help them to get jobs. Most of the 29% learners were mostly doing the course, because their jobs depended on the computer knowledge and skills. Most of the 13% learners did the course mostly, because they wanted computer knowledge and skills, that might help them if they get new jobs, which might included the computers or promotion. Other mentioned that they doing the course get certificate, because they are computer literate. Most of the 58% also indicated that they did not have access to computers for practice, they only attended UniSchool practice sessions only if the had R10 for one hour session. They also had to book for the practical sessions, which became a problem for them, because sometimes they booked and failed to get R10 to pay for the session.



## 2.3 COMPUTER LITERATE, SEMI-LITERATE AND ILLITERATE QUESTION.



**FIGURE 34**

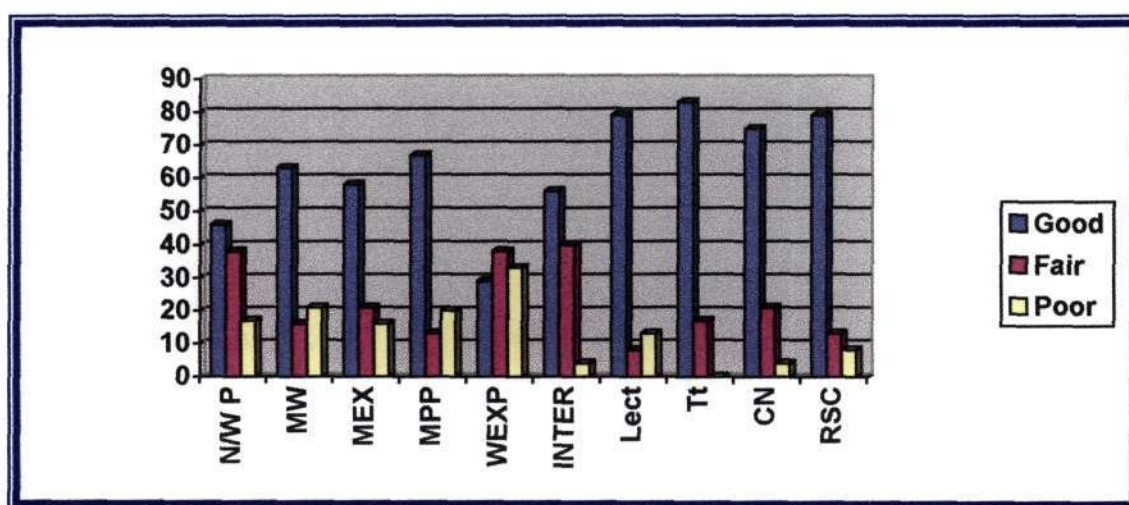
Figure 34 shows that 75% of the learners were illiterate, 25% were semi-literate and 4% of the learners were literate. This means that most of them should start from basic skills, while other were bored, because they were literate and others semi-literate.

## 2.4 TABLE 7 SHOWS MULTIPLE CHOICE QUESTIONS OF THE QUESTIONNAIRE, RATED 'GOOD, FAIR OR POOR'.

**TABLE 7**

MODULE CODE	QUESTION
Notepad / Word Pad (N/W P)	How well can you use Notepad /Word Pad?
Ms Word (MW)	How well can you use Microsoft Word?
Ms Excel (MEX)	How well can you use Microsoft Excel?
Ms PowerPoint (MPP)	How well can you use Microsoft PowerPoint?
W EXPLORER (WEXP)	How well can you use Windows Explorer?
Internet (INTER)	How well can you use Internet?

Lecturer (Lect)	How well can you use the information and instruction given by the lecturer?
Tutors (Tt)	How do you rate help given by the Tutors?
Course Notes (CN)	How do you rate the notes used for the course?
Resources (RSC)	How do you rate resources used by the lecturer?



**FIGURE 35**

### **2.4.1 NOTEPAD / WORD PAD QUESTIONS**

Figure 32 indicates that 46% of learners were good in Notepad / Word Pad, 38% were fair and 17% were poor. 44% stated that Notepad / Word Pad is used to create text files and others did not know the functions of the Notepad / Word Pad. Therefore, 56% did not know.

### **2.4.2 MICROSOFT WORD (MS WORD) QUESTIONS**

Figure 35 indicates that 63% of the learners were good, 16% fair and 21% were poor in Microsoft Word. 69% of the learners stated that functions of Ms Word are to write notes, letters and create documents, while 31% did not know the correct answers or did not answer the question totally.



### **2.4.3 MICROSOFT EXCEL (MS EXCEL) QUESTIONS**

Figure 35 indicates 58% of the student were good, 21% fair and 16% were poor. For the factual question 68% stated that Ms Excel is used for calculations, budgets and spreadsheet for numbers, but 32% did not know the correct answers or did not write the answer.

### **2.4.4 MICROSOFT PowerPoint (MS PowerPoint)**

Figure 35 indicates that 67% were good, 13% fair and 20% were poor. The first question of the Ms PowerPoint 52% stated that it is used for slide presentation and graphic presentations, but other 48% did not know or answer the question. But, this means more than half of the learners attained the intended outcomes (competencies).

### **2.4.5 WINDOWS NT EXPLORER (WINDOWS EXPLORER) QUESTIONS**

Figure 35 indicates that 38% of the learners were good, 33% fair and 29% were poor. In the first question of Windows Explorer 58% of the learners stated that is used to delete, move, copy and rename files or folders as well as to create folders and manage your files. This percentage indicates that only few of them could manage the files.

### **2.4.6 INTERNET QUESTIONS**

Figure 35 indicates that 56% were good, 40% fair and 4% were poor. All other questions of the Internet indicated that 60% of the learners had gained the intended outcomes, because 60% is for those who answered the questions correctly. Other 40% did not answer the questions correctly or they not even try to answer.

### **2.5.7 QUESTIONS ABOUT THE LECTURERS**

Figure 35 indicates that 79% of the learners were happy about the lecturers, 13% rated them as fair and 8% were not happy, because they rated them poor. Reasons for rating them good were: They use of slow pace in teaching, use simply English, friendly, patient and know the subject.

Reasons for rating them poor were: They are fast in teaching as if the learners know the computer. 62% indicated that it would better if the literate ones were not



combined with the beginners, because they were disturbing them. But, other 38% did not have any other comment in this regard.

#### **2.4.8 QUESTIONS ABOUT TUTORS**

Figure 35 indicates that 83% of the learners were happy about the tutor and only 17% rated them fair with 0% poor. The reasons for rating them good were: They were friendly, knowledgeable, punctual, always will to help and use language that you could understand. Reasons for rating them fair were not mentioned.

#### **2.4.9 QUESTIONS ABOUT COURSE NOTES**

Figure 35 indicates that 75% of rated the course notes as good, 21% fair and 41% rated them as poor. They added that they rated them good, because they a clear and have the steps that they could even use them easily. This means the learners were happy about the course notes.

#### **2.4.10 QUESTIONS ABOUT TEACHING RESOURCES**

Figure 35 indicates that 79% rated them good, 13% fair and 8% rated them poor. "They are good, because they are used with relevant materials, which cannot confuse us". Therefore, teaching the resources were good according to the learners.

#### **2.4.11 FURTHER STUDY AND OTHER PROGRAMS QUESTIONS**

46% of the learners wished to study further and study Information Technology and other computer courses. They suggested that courses like computer programming, database and desktop Publisher should included in the course.

About 30% of learners were expecting UniSchool to get them jobs or give them guidance of what other courses that they could do, which are relevant to Information Technology. Others did not even have comments.

#### **2.4.12 VIRUS MODULE**

Virus module shows only 20% of learners could give the correct answers the virus questions and other 80% did not answer or write the incorrect answers.

### 3. PRACTICAL EXAMINATION QUESTIONS

Practical examination questions were testing four (4) modules or learning areas. Those modules were Ms Word, Ms Excel, Ms PowerPoint and File management (Windows Explorer and Notepad / Word Pad).

#### 3.1 MS WORD QUESTIONS 30 MARKS FOR 72 MINUTES

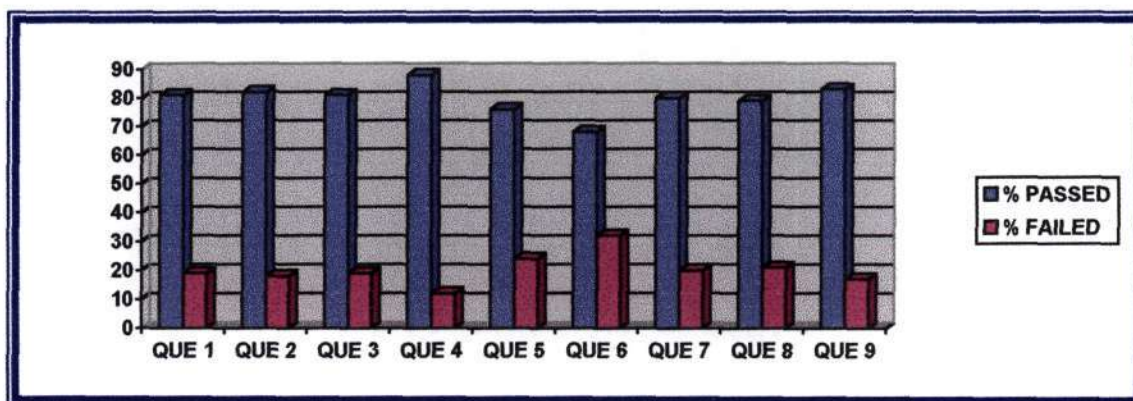
Table 8 below shows questions, marks allocated for each question and outcomes that were tested.

**TABLE 8**

QUESTION	Marks	Outcomes
1. Open the file <b>WordExam.doc</b> to look exactly like <b>Example 1</b> in <a href="#">Appendix I</a> . The file is the letter, which must be formatted with Arial font, Size 12, 1,5 line spacing and 3cm left and right margins.	3	3.1.2.1 3.1.2.3 3.1.2.7 3.1.2.12 3.1.2.14
2. The following changes were expected, so that the letter could look like the one in <a href="#">Appendix I example 1</a> .		
2.1 Set address to the right,	1	3.1.2.2
2.2 Main heading be <b>Bold</b> , Size 16 and Centre aligned,	3	3.1.2.8
2.3 Sub-heading be <b>Bold, Italic</b> and centre aligned	2	3.1.2.9
2.4 Use table borders, square bullets, 25% gray pattern and right align headings of the table,	5	3.1.2.10 3.1.2.11
2.5 Enter your name at the end of the letter (use indicated space of <a href="#">Appendix I</a> letter)	1	3.1.2.18
3.1 Change the case of the paragraph that starts with "The newly founded school..." to upper case.	1	3.1.2.2 3.1.2.7
3.2 Change the font colour of the same paragraph to red.	1	3.1.2.21
3.3 Insert the symbol ♣ in front of the word "The" of the same paragraph.	1	
4. Add page numbering to the top left of the page of your document.	2	3.1.2.15
5. Add the following header to your document: UniSchool Word Exam.	2	3.1.2.16



6. Find all occurrences of the word “for” and replace it with “OF” in the upper case.	3	3.1.2.20
7. Insert a page break before the sentence that starts with “Here is some information...”	1	3.1.2.15
8. Indent the paragraph that starts with “The degree, which takes four years...” with 4cm from the right and 3cm from the left.	2	3.1.2.9
9. Copy the paragraph that starts with “The degree, which takes four years...” beneath your name.	2	3.1.2.3 3.1.2.4 3.1.2.20



**FIGURE 36 (Ms WORD GRAPH)**

Figure 36 indicates that the intended outcomes of question were tested successful, where 81% of the learners passed the module and only 19% of students failed. In question 2 of Ms Word 82% of learners passed and 18% of the learners failed. For question three (3) 81% passed and 19 failed, for question four (4) 88% passed and 12% failed, for question five (5) 76% passed and 24% failed. In question 6 there were 68% who passed and 32% who failed, question seven (7) 80% passed and 20% failed, question eight (8) 79% passed and 21% failed as well as 83% passed and 17% failed for question 9. The overall percentage was 80%.

All Ms Word results indicate that almost all the intended competencies were attained.



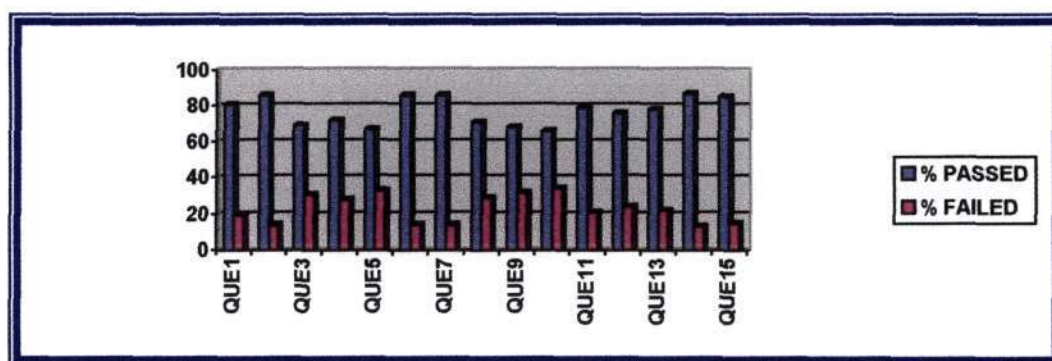
## 3.2 MICROSOFT EXCEL (MS EXCEL) PRACTICAL EXAMINATION QUESTIONS 30 MARKS FOR 72 MINUTES

Table 9 shows Ms Excel Practical Questions marks for each question and numbers of the intended outcomes.

**TABLE 9**

QUESTION	Marks	Outcomes
1. Open the spreadsheet ExcelExam.xls (refer <a href="#">Appendix II</a> ) which is saved on your examination disk, write your name and make the following changes and save the spreadsheet as ExcelExam.xls.		3.1.3.6 3.1.3.7 3.1.3.11 3.1.3.13
1.1 Bold the heading in row 4,	1	3.1.3.14
1.2 Centre align columns D to N,	1	3.1.3.15
1.3 Change the font of the whole spreadsheet to Arial,	1	3.1.3.16
1.4 Change the Size of the font to 12,	1	3.1.3.20
1.5 Resize all the columns so that the total content of each cell is displayed.	1	3.1.3.21 3.1.3.24
1.6 Format the heading in row 3 to font Size 16, Bold and Italic and Centre it across A—N.	1	3.1.3.30
2. In the final mark column make use of the shortest method to calculate the final for student. The final is calculated by adding the assignment component and the examination component together. Write down the formula or function that you used _____.	2	3.1.3.12
3. In the “Pass / Fail column, use the “IF” function to determine if a student has passed or failed. When a student’s final mark is 50% or more, it should display “Pass”. If the examination mark is less than 50% it should display “Fail” in the cell. Write down the function you used: _____.	2	3.1.3.12
4. In the “10% of the final mark” column, make use of % in cell B24, to calculate what 10% of the final mark in column M would be. Write down the formula you used: _____.	2	3.1.3.12
5. In the Average Mark row, enter a function (in D21) to	2	3.1.3.12

calculate the average of each assignment for all the students. Copy the function across the columns. Write down the formula you entered: _____.		3.1.3.15
6. In the Highest Mark row; enter a function (D22) to calculate the highest mark of all the assignments for all the students. Copy the function across the columns. Write down the formula you entered: _____.	2	3.1.3.12
7. In the Lowest Mark row, enter a function (in cell D23) to calculate the lowest mark of all the assignments for all the students. Copy the function across the columns. Write down the formula you entered: _____.	2	3.1.3.12
8. Use line drawing to put single lines around all your cells containing information and a thick outline.	2	3.1.3.25
9. Change the format of column K and L so that it shows three decimal digits after the decimal point.	2	3.1.3.24
10. Use shading to shade all the headings in row 4.	1	3.1.3.21 3.1.3.25
11. Rename sheet 1 to "Marks"	1	3.1.3.19
12. Hide column C.	1	3.1.3.26
13. Delete Row 2.	1	3.1.3.18
14. Change Page orientation to landscape and prepare your spreadsheet in such a way that it will be printed to fit 1 page (refer <a href="#">Appendix II</a> )	2	3.1.3.29 3.1.3.32
15. Copy column A on the first sheet to column A of sheet 2.	1	3.1.3.19



**FIGURE 37 (Ms Excel graph)**



Figure 37 indicates that 81% of the learners passed Question 1 and 19% failed, 86% passed Question 2 and 14% failed. For Question three (3) 69% passed and 31% failed, for Question four (4) 72% of the learners passed 28% failed. For question five (5) 67% of the learners passed and 33% failed; Question six (6) 86% of the learners and 14% failed; for Question seven (7) 86% of the learners passed and 14% of them failed. For Question eight (8) 71% passed and 29% failed; for Question nine (9) 68% of the learners passed and 32% failed; for Question ten (10) 66% passed and 34% failed. In Question eleven (11) 79% of the learners passed and 21% failed; in Question (12) 76% of them passed and 24% of them failed; 78% of the learners passed and 22% failed Question 13. 87% of the students passed Question 14 and 13% failed; for Question (15) 85% of them passed and 15% failed.

The overall percentage of Ms Excel Practical examination was 77%.

All the results of Ms Excel indicate that the intended outcomes were successfully attained.

### 3.3 MICROSOFT PowerPoint (MS PowerPoint) PRACTICAL EXAMINATION 30 MARKS FOR 72 MINUTES

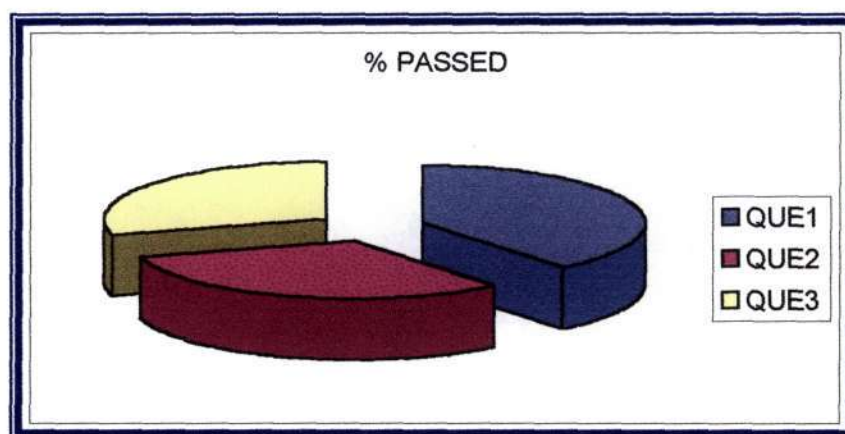
Table 10 shows Ms PowerPoint questions, Mark for each question and numbers of the outcomes tested.

**Table 10**

QUESTION	Marks	Outcomes
1. Make use of the guidelines and create the slides on the next page in PowerPoint (refer <a href="#">Appendix 1 Page 7</a> ).	20	3.1.4.1
1.1 The design to be used is called "Notebook".		3.1.4.2
1.2 For Slide 1 the slide layout to be used is called "Bulleted list".		3.1.4.3
1.3 The background of the slide must be changed to burgundy.		3.1.4.7
1.4 All the fonts to be used must be Arial.		3.1.4.8
1.5 Make use of the Slide master and ensure that the "Master Title Style" is in Arial font, size 28.		3.1.4.9
1.6 Insert a slide number.		3.1.4.10
		3.1.4.11
		3.1.4.12
		3.1.4.14



1.7 Insert any picture on each of the slides.		
1.8 If the picture on the first slide is not available use any other picture.		
2. Apply the following slide transitions to all the slides in your presentation:	8	3.1.4.16 3.1.4.17
2.1 The slides must blind in vertically and slow.		
2.2 The transition must be set to occur automatically after every 10 seconds.		
3. Apply animation to the picture on the first slide so that it flies in from the top right corner of the slide.	2	3.1.4.16 3.1.4.17



**FIGURE 38 (Ms PowerPoint)**

Figure 38 shows that 80% of the learners passed the first Question and 20% failed; 64% of them passed Question 2 and 36% failed as well as 60% of them passed Question3 and 40% failed.

The overall results of Ms PowerPoint indicates that the intended outcomes were successfully achieved.

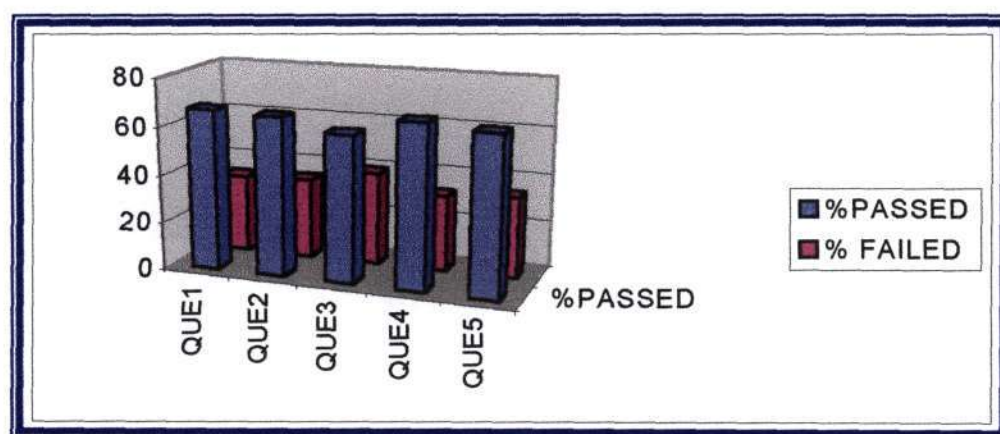
### 3.4 WINDOWS NT EXPLORER AND NOTEPAD / WORD PAD

#### QUESTIONS 10 MARKS FOR 24 MINUTES

Table 11 Questions, Marks for each question and the outcomes numbers that are tested by each question.

**TABLE 11**

QUESTION	Marks	Outcomes
1. Create an "Exam" directory on your disk, using Windows Explorer.	2	2.2.2.3 2.2.2.6
2. Move the file Test.com on your disk to the Exam directory you've created.	2	3.2.2.2 3.2.2.4 3.2.2.5
3. Delete the file Test.htm from your disk.	2	3.2.2.2
4. Rename the file Test.com in the directory to Test.new.	2	3.2.2.2
5. Open the Notepad application from accessories in the start menu. Writes the following sentence: "This is part of the UniSchool exam" save the file as UniExam.txt in the Exam directory on your disk.	2	3.1.1.2 3.1.1.3 3.1.1.4 3.1.1.5 3.2.2.2



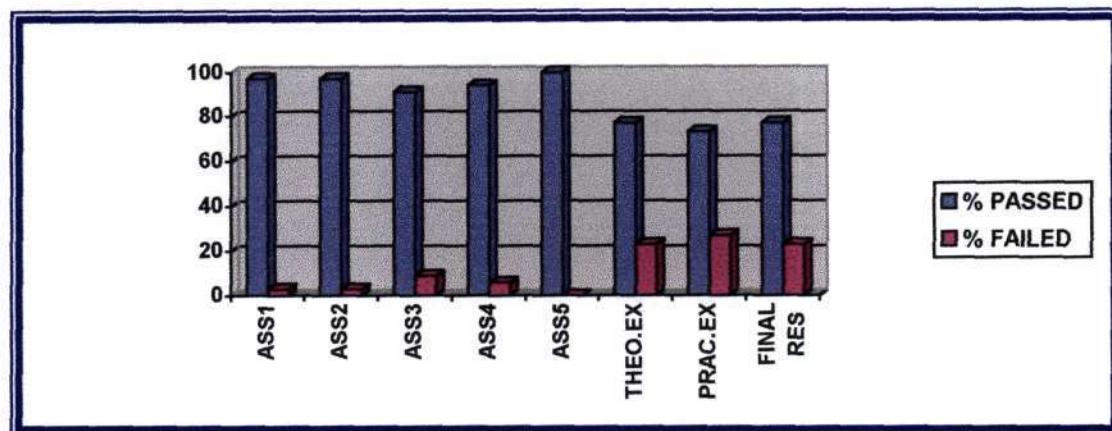
**FIGURE 39 (WINDOWS EXPLORER & NOTEPAD GRAPH)**

Figure 39 indicates that 67% of the learners passed Question 1 and 33% failed; 66% passed Question 2 and 34% failed; 61% passed Question 3 and 39% failed; 68% passed Question 4 and 32% failed; 66% passed Question 5 and 34% of them failed.

The results of those who passed is lower than that of other modules as they ranged from 61% to 68%.

#### 4. ASSIGNMENTS, THEORY AND PRACTICAL EXAMINATION RESULTS

Figure 40 shows the collective results of each assignment, theory and practical examination.



**FIGURE 40 (RESULTS FROM ASSESSMENT CRITERIA)**

Figure 40 indicates that 97% of the learners passed assignment 1 & 2 and only 3% failed; 91% passed for assignment 3 and 9% failed; 94% passed assignment 4 and 6% failed; they all passed assignment 5 (100%). Examination consists of theory and practical sections. For theory examination 77% of the learners passed and 23% failed; for practical section 73% passed and 27% failed.

Students who wrote the examination passed the computer course were 77% and 23% failed. The final result consists of 15% of the 5 assignments, 25% of the theory examination and 60% of the practical examination. The results indicate that most of the learners did attain the most of the intended outcomes of the course. To pass the course the student should get a final mark of 50%.

These results does not include the analysis of each question of the theory examination and assignment, but I observed each question without recording it, I only recorded the



total mark of each assignment and theory examination. This was due to some limiting factors.

## **5. CONCLUSION**

After the analysis of all the results, it is now safer to state that almost all the intended outcomes (competencies) were achieved. Therefore, the next chapter concludes the study and provides some recommendations based on findings.

# CHAPTER 6

## CONCLUSION, RECOMMENDATIONS AND LIMITATIONS

### 1. INTRODUCTION

This chapter evaluate the finding of the report in order to help readers who do not have time to read the whole report. It also includes specific and practical suggestions of what can be done to improve the learning and teaching situation.

### 2. CONCLUSION

The results of the questionnaire, assignments and the examination indicate that Ms Word is the most successful module followed by Ms PowerPoint and Ms Excel. It may possible that learners concentrate more on the three modules, because they are so popular. They achieved well even if they were tested to the parts that they did not cover in the classroom. For example, group 1 (case study one) did not learner the slide transition and animation, but they organized the relevant information on themselves. This indicates that they were demonstrating attainment of the second critical cross-field outcome, which is about organizing their activities. No one told them to do their CVs, but they simply organize themselves. As a result of the Internet modules they ended up communicating with Cellular Phones using the computer Internet.

However there are some elements, which indicate that they did not get sufficient practice or access to the computers, because of different reasons. One of the reasons the mentioned is that most of the are unemployed, therefore they can not afford to pay an extra R10 for one hour practical. Others were staying as far away as Mandeni, Empangeni and other areas. They were coming only to attend the course on Saturdays only, because it was not possible for them to come the practice sessions. This means that they real need a support that can help such students.

The Ms PowerPoint examination results were also good, but they did that much good in answering the PowerPoint questions of the questionnaire. Therefore, it may be possible that there is gab between what they learn in the classroom and what they

should apply. They may be learning only to pass the examination only, not much on the application side.

### **3. RECOMMENDATIONS**

#### **3.1 REVISION**

Revision session should be increased in order to accommodate those who cannot manage the practice sessions, because of different reasons.

#### **3.2 ACCESS TO COMPUTERS**

Access to computer without booking on Sundays and Wednesdays should be re-instated. This may help the students to finish their assignments and practice whatever that they learn in the classroom.

#### **3.3 TECHNICAL SUPPORT**

On-line lesson should be introduced to support learners. This suggests at least one 3.5 floppy disk, which is programmed for the learner to use it even at home. It should be a step-by-step program that teaches the learner even in the absent of the lecturer / tutor.

#### **3.4 DEMONSTRATION**

Each module should be demonstrated to the students to show them how it works in a certain context of practical situation. For example, if I am teaching PowerPoint, it may be important for me to use Video Projector in order to motivate the learners. By so doing I may be stimulating them to go and used the PowerPoint application effectively.

#### **3.5 CAREER GUIDANCE**

Presentation of other courses should be conducted. Such presentation should not be limited only to UniSchool courses, but it must include course for further studies from other institutions that can give credits to the students who completed this course. It should also include some loans / bursaries / sponsorships, because other students



mentioned that they were expecting that UniSchool would tell them where to go for further studies / employment after they finished the course.

### **3.6 OUTCOMES**

Lecturers, tutors and learners should be given all the outcomes of the course that has to be achieved, before the course starts. This would help them to see which of those outcomes are not achieved, and then work on them. The outcomes (competencies) go beyond the book content, because they specify even the behavior of a learner after completing any module.

## **4. LIMITATIONS**

- 4.1 Learners might try to give the researcher only positive answers, in order to impress him, because he was one of their tutors.
- 4.2 Researcher had to play a double role (observer & tutor) during observation. Therefore, he had to record the whole observation at the end of the lesson.
- 4.3 Lecturers and course co-ordinators might have felt that the researcher was trying to expose their weaknesses and then felt uncomfortable.
- 4.4 Lecturers and learners might use that opportunity to express themselves if there were something that they were unhappy with. Such information may be a misleading information, which may not answer the critical questions.
- 4.5 Funds for the project limited the quantity and quality of pictures (Plates and Figures) for illustration.
- 4.6 It was not easy to get each question of assignments and theory examination, but they were only observed and final results were then recorded for analysis.
- 4.7 The numbers of students to respond were fluctuating between 72 and 120, but the sample had 120 learners.
- 4.8 The semi-structured interviews for lecturers had to change, because the lecturer did not have any criteria, which they used to assess the learners. So, assessors were different from the lecturers or tutors.

## **5. CONCLUSION**

The study took about 10 months is now concluded. It involved 90 students for 2 groups and another 30 student who were only visited for one module in order to triangulate data collected from the 2 groups. Even if they had some other commitment they responded very well, because I never had less than 72 respondents.



# **UniSchool Training**

## **Computer Literacy CERTIFICATE**

### **Practical Examination**

<b>Student Number</b>	
<b>First Name</b>	
<b>Surname</b>	

#### **INSTRUCTIONS**

1. This paper consists of 5 sections:

Section 1 - Word-processing	- 30 marks - 72 mins
Section 2 - Spreadsheets	- 30 marks - 72 mins
Section 3 - Presentations	- 30 marks - 72 mins
Section 4 - File Managing	- 10 marks - 24 mins

2. Answer all 4 sections.

3. Answer all questions in each section.

4. Allocate your time according to mark value.

#### **For Office Use Only**

<b>Section</b>	<b>Mark</b>
WP	
Excel	
PowerPoint	
Windows	



**WORD PROCESSING SECTION****(30 MARKS)**

You are the personnel officer at a major company. After browsing the Internet you discovered information about the School of Information Technology at the University of Pretoria. After reading the page you decided to send a letter to your manager informing him about the school and other courses at the University of Pretoria that you are interested in.

Perform each of the tasks as set out in the following question parts and remember to save your work on the exam disk you have been given.

**Word processing Question 1****(3 marks)**

Open the file **WordExam.doc** (which is on your exam disk). All changes that you make on this document should also be saved. You must save all the changes using the same filename 'WordExam.doc' on your exam disk.

Your letter must be formatted with the following settings:

- The entire document must be in Arial font, size 12
- Line spacing 1.5 lines
- Set the left and right margins to 3cm

**Word processing Question 2****(12 marks)**

Change the document **WordExam.doc** to look exactly like Example 1. Please make sure you type in your name at the point you are told to do so:

**Example 1**

The Manager  
Human Resources  
Save Me Solutions  
Stellenbosch  
2001

1 Mark
--------

Dear Sir or Madam:

**SCHOOL FOR INFORMATION TECHNOLOGY**

3 Marks
---------

*A first in South Africa in the new millennium!*

***Baccalaureus in Information Technology (BIT)***

2 Marks
---------

The newly founded School for Information Technology at the University of Pretoria will offer a brand-new degree in information technology from the year 2000.

This degree, which takes four years, is known as a Baccalaureus in Information Technology. It is an answer to the growing need in the market and consists of courses from the following departments: Informatics, Information Science and Computer Science. It

thus offers an extremely balanced education, ensuring a graduate of a career-orientated profession.

Any queries may be directed to the School for Information Technology. The telephone number is (012) 420-3008. The e-mail address is SIT@cs.up.ac.za.

Here is some information on other courses offered at the University of Pretoria:

Course	Code	Cost
▪ Accounting Sciences	07130042	R7500.00
▪ Banking	07130231	R8500.00
▪ Business Management	07130062	R5200.00
▪ Informatics	07130172	R10000.00

5 Marks

For more information on the School for Information Technology, you could visit the website at <http://www.sit.up.ac.za>.

Yours sincerely  
(ENTER YOUR NAME HERE)

1 Mark

### Word processing Question 3

(3 marks)

- 3.1. Change the case of the paragraph that starts with: "The newly founded School ..."  
to upper case.
- 3.2. Change the font colour of the same paragraph to red.
- 3.3. Insert the symbol ♣ in front of the word "The" of the same paragraph. (Tip: The font name to find this symbol is: symbol).

### Word processing Question 4

(2 marks)

Add page numbering to the top left corner of each the page of your document.

### Word processing Question 5

(2 marks)

Add the following header to your document: UniSchool Word Exam

### Word processing Question 6

(3 marks)

Find all occurrences of the word "for" and replace it with "OF". Please note that the word "OF" must be replaced in upper case, otherwise no marks will be allocated.

**Word processing Question 7****(1 mark)**

Insert a page break before the sentence that starts with: "Here is some information..."

**Word processing Question 8****(2 marks)**

Indent the paragraph that starts with "This degree, which takes four years..." with 4cm from the right and 3cm from the left.

**Word processing Question 9****(2 marks)**

Copy the paragraph that starts with "This degree, which takes four years..." beneath your name.

**SPREADSHEET SECTION****(30 MARKS)**

You are required to produce a spreadsheet based on the questions set out below. Please follow the steps and provide written answers on the page where required to do so.

**Spreadsheet Question 1****(6 marks)**

Open the spreadsheet **ExcelExam.xls** (which is on your exam disk). Type your name next to the indicated cell. You must save all the changes using the same filename **ExcelExam.xls** on your exam disk.

Format the spreadsheet as follows:

Bold the headings in row 4

Centre align columns D to N

Change the font of the whole spreadsheet to Arial

Change the size of the font to 12

Resize all the columns so that the total content of each cell is displayed.

Format the heading in row 3 to font size 16, Bold and Italic.

**Spreadsheet Question 2****(2 marks)**

In the Final Mark column make use of the shortest method to calculate the final mark for a student. The final mark is calculated by adding the Assignment component and the Exam component together. Write down the formula or function that you have used:

---



**Spreadsheet Question 3****(3 marks)**

In the "Pass/Fail" column, use the "If"-function to determine if a student has passed or failed. When a student's Final Mark is 50 or more, it should display "Pass". If the Exam mark is less than 50% it should display "Fail" in the cell.

Write down the function you used: \_\_\_\_\_

**Spreadsheet Question 4****(2 marks)**

In the "10% of Final Mark" column, make use of the percentage in cell B24, to calculate what 10% of the Final Mark in column M would be.

Write down the formula you used: \_\_\_\_\_

**Spreadsheet Question 5****(2 marks)**

In the Average Mark row, enter a **function** (in cell D21) to calculate the average of each assignment for all the students. Copy the function across the columns.

Write down the formula you entered:

\_\_\_\_\_

**Spreadsheet Question 6****(2 marks)**

In the Highest Mark row, enter a **function** (in cell D22) to calculate the highest mark of all the assignments for all the students. Copy the function across the columns.

Write down the formula you entered:

\_\_\_\_\_

**Spreadsheet Question 7****(2 marks)**

In the Lowest Mark row, enter a **function** (in cell D23) to calculate the lowest mark of all the assignments for all the students. Copy the function across the columns.

Write down the formula you entered:

\_\_\_\_\_

**Spreadsheet Question 8****(2 marks)**

Use line drawing to put single lines around all your cells containing information and a thick outline.

**Spreadsheet Question 9****(2 marks)**

Change the format of column K and L so that it shows three decimal digits after the decimal point.

**Spreadsheet Question 10****(1 mark)**

Use shading to shade all the headings in row 4.

**Spreadsheet Question 11****(1 mark)**

Rename sheet1 to "Marks".

**Spreadsheet Question 12****(1 mark)**

Hide column C.

**Spreadsheet Question 13****(1 mark)**

Delete Row 2.

**Spreadsheet Question 14****(2 marks)**

Change the Page orientation to landscape and prepare your spreadsheet in such a way that it will be printed to fit onto 1 page.

**Spreadsheet Question 15****(1 mark)**

Copy column A on the first sheet to column A of sheet2.

**POWERPOINT SECTION****(30 MARKS)**

Create a presentation using the questions as guidelines. Save the presentation on your disk as PowerPointExam.ppt

**PowerPoint Question 1****(20 marks)**

Make use of the guidelines and create the slides on the next page in PowerPoint:

1. The design to be used is called "Notebook"
2. For Slide 1 the slide layout to be used is called "Bulleted list"
3. The Background of the slide must be changed to burgundy
4. All the fonts to be used must be Arial
5. Make use of the Slide master and ensure that the "Master Title Style" is in Arial font, size 28
6. Insert a slide number.
7. Insert any picture on each of the slides.
8. If the picture on the first slide is not available use any other picture

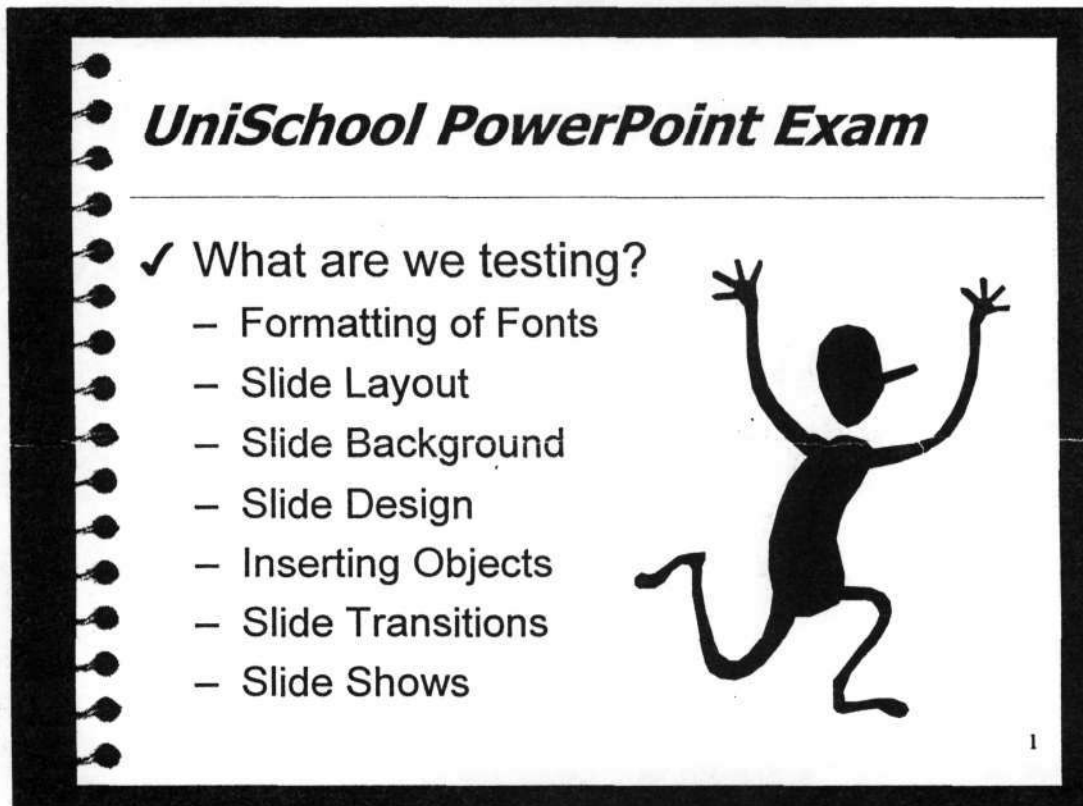
**PowerPoint Question 2****(8 marks)**

Apply the following slide transitions to all the slides in your presentation:

1. The slides must blind in vertically and slow
2. The transition must be set to occur automatically after every 10 seconds

**PowerPoint Question 3****(2 marks)**

Apply animation to the picture on the first slide so that it flies in from the top right corner of the slide.





## UniSchool Exam Continues...

In this Presentation it is expected from a student to create a slide show.

On Completion (s)he will be able to pass the exam!!!



## **FILE MANAGING SECTION**

**(10 MARKS)**

### **File Managing Question 1**

**(2 marks)**

Create an "Exam" directory on your disk, using Windows Explorer.

### **File Managing Question 2**

**(2 marks)**

Move the file Test.com on your disk to the Exam directory you've created.

### **File Managing Question 3**

**(2 marks)**

Delete the file Test.htm from your disk.

### **File Managing Question 4**

**(2 marks)**

Rename the file Test.com in the Exam directory to Test.new

### **File Managing Question 5**

**(2 marks)**

Open the Notepad application from Accessories in the Start menu. Write the following sentence: "This is part of the UniSchool exam". Save the file as UniExam.txt in the Exam directory on your disk.

**Exam Total Marks: 100**

EXAMINATION RESULTS														
SURNAME	INITIALS	REG.NO	ASS1	ASS2	ASS3	ASS4	ASS5	ASS6	ASS7	ASS8	ASS9	F.MARK	PASS/FAIL	10%F.MARK
BBB	BE	220 1	56	78	78	77	70	75	77	78	79			
CCC	UE	332 1	58	54	75	72	60	70	71	78	78			
DDD	SA	658 1	83	87	98	99	98	97	99	99	98			
FFF	DR	789 1	58	56	56	58	65	60	61	60	61			
GGG	RT	238 1	65	66	53	68	66	63	62	65	64			
HHH	VD	321 8	35	39	58	45	40	45	43	46	49			
PPP	NH	456 0	34	36	54	49	45	44	41	43	45			
SSS	BE	987 9	53	55	54	57	50	60	59	60	61			
WWW	CD	675 1	56	54	57	55	55	60	58	61	66			
XXX	DS	453 8	54	58	52	59	60	61	59	62	60			
YYY	CS	657 7	57	58	65	58	62	54	61	63	62			
ZZZ	BS	341 7	54	59	49	55	51	61	55	54	60			

AVG MARK

HIGH.MARK

LOW.MARK

10%



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