

B.Ed (1.5 Years)

COMPUTER IN EDUCATION

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Faculty of Education
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FOREWORD

All fields of Endeavour have been touched by the computer revolution. Technological break through have not changed only the design of computers and software but have also brought have not changed in the social context in which computers are used. This is as true for education as it is valid for industry, scientific research, health organizations, etc. Of special significance is the emergence of Internet, which has brought all the databases, information services, encyclopedia, libraries, journals, newspapers to the table tops of all the teachers and students. More importantly Internet is emerging as a major instrument of teaching and is likely to revolutionize the Distance Education.

Computer is potentially a valuable teaching aid right across the curriculum and all teachers should know enough about it to be able to decide whether, and if so when and how, to use computer in the teaching learning process. The use of computers has been given as multitude of names, e.g. Computer Assisted Learning, Computer Assisted Instruction, Computer Based Education, and Computer Based Instruction. All these illustrate the range of applicability of the computers in different subjects. Besides discussing these, practical considerations like selection, purchase, management and provision of resources are also dealt with in this course due to their relevance to the teachers.

The course on Computers in Education is a component of B.Ed. program of Allam Iqbal Open University. Launching such a course is a reflection of our aim to meet challenges and changes which are taking place in the science of pedagogy. This course is just a struggle to keep our teachers abreast with the latest development and methods which are continually taking place in the world.

This course is the outgrowth of our aspiration to develop a new educational environment where there is provision of rich and exciting facilities which as computer provides. It is hoped that this attempt will facilitate the transmission from the traditional methodology to a smooth running computer-conscious educational environment.

My special gratitude goes to Professor Dr. Nasir Mehmood , Dean Faculty of Education, who provided leadership in the whole program in general and specifically the course development coordinator who produced such an integrated worthwhile version. My special thanks are also due to Dr. Muhammad Ajmal Chaudhry, for his contribution interims of constant support. Any suggestion from the experts and teachers will be welcomed to further improve this study guide.

(Professor Dr. Shahid Siddiqui)
Vice-Chancellor

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The Allama Iqbal Open University and the author is grateful to all those scholars within and abroad and publishers of various books, reports, and journal, whose work has been used as reference material in this course. The quotations taken from their works are gratefully acknowledged.

It may be pointed out for general information of all whose works have been quoted in this course that AIOU is a non-commercial educational institution which provides educational facilities to the masses at large, particularly to the under privileged remote areas through distance education.

The writer is grateful to the Vice Chancellor who provided me a challenge of developing the course and facilitated the work. Special thanks go to Dr. Muhammad Ajmal Chaudhry Chairman Department of Distance Non Formal and Continuing Education for his contribution interims of constant encouragement, scholarly ideas, and suggestions.

Finally we are thankful to all those who assisted in any form to complete the course.

Prof. Dr. Nasir Mahmood
Dean F/o Education

INTRODUCTION TO THE COURSE

Today's world is an ultra-modern world where new ways of communication are being explored continuously. Communication in distance education involves multidimensional interactions which are basically divided into face to face, writing-reading communication and visualizing observation. Either of these types is supported by machines. Most innovative is computer, correctly known as thinking man's machine.

The main aim of this course is to explore the possibilities using computers effectively in our teaching. Particularly teachers who do not teach science subjects should understand the potential of the computer as a tool for their use. Here teachers are assumed to be programs not skilled technicians, but they may apply computer to their instruction after a little practical training.

Computers are coming rapidly into the classroom elementary, secondary and advance level. Parents feel that role of computer in education is becoming necessary as no one wants that their children should be left behind. Same is the argument of AIOU that our trained teachers should cope with this advancement and thus AIOU has launched this course. This course in general is for teachers who might have very little orientation of the computer or meeting computer for the first time. Computer is a machine which can be programmed to accept raw data (input) and process it into useful information (output). This book is especially designed and organized to meet the needs of teachers. Our efforts are to cover:

1. Computers themselves: The organization function, capabilities, and Limitations of the equipment in computer systems.
2. What computer do: Application of computer in education is treated. Focus is generally on Computer Assisted Instruction (CAI) and Computer Managed Instruction (CMI).
3. How computers are put to work: In this classroom management of computers is treated.

Now have a look at the book. Unit No. 1 introduces computer as machine and provides an overview of computer. Unit No. 2 orientates the students with the working of the computer. Operating system, application software, self-developed program and program languages are discussed in Unit 3 Unit No. 4 defines Computer Assisted Instruction, its uses and limitations. Unit 5 is in continuation of unit 4 which introduces tools and packages used for CAI. Unit 6 deals with the Computer Managed Learning. Unit 7 focuses on computer education and teacher training. Role of computer in education has been discussed with reference to different modes of education in Unit 8 Unit 9 concentrates on the problems of using computer in education along with evaluation of the computer usage in the education.

Allama Iqbal Open University will welcome comments and suggestions from the teachers and the public for the improvement of the course.

(Mamonah Ambreen)
Course Development Coordinator

OBJECTIVES OF THE COURSE

Hopefully, on the completion of the course, the student will be able to:

1. Define computer
2. Discuss the function of various kinds of computers
3. Describe the system working of computer
4. Apply computer assisted instruction (CAI) to teaching learning process
5. Select appropriate package for use in CAI
6. Develop a rational of computer managed learning
7. Appreciate the role of computers in education
8. Plan to implement computer in education

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Unit 1

INTRODUCTION OF COMPUTER

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1.1 Introduction

This unit presents a broad survey of concepts and terminology related to computers. The idea of computer literacy is introduced. You discover what a computer is and what it does. You learn about the components of a computer, the power of computers, computer software, and networks and the Internet. Categories of computers are identified, including personal computers, minicomputers, mainframe computers, and supercomputers.

You discover how people employ computers, from home users to large business users. Finally, you learn how people use computers to provide information. Reading and understanding the material in this unit should help you better understand these topics as they are presented in more detail in the following units.

1.2 Learning Outcomes

After study this unit, you will be able to,

1. Explain the importance of computer literacy
2. Define the term computer
3. Identify the components of a computer
4. Explain why a computer is a powerful tool
5. Differentiate among the various types of software
6. Explain the purpose of a network
7. Discuss the uses of the Internet and the World Wide Web
8. Describe the categories of computers and their uses
9. Identify the various types of computer users
10. Understand how a user can be a Web publisher

1.3 The Importance of Computer Literacy

Computers have touched every part of our lives: the way we work, the way we learn, the way we live, even the way we play. It almost is impossible to go through a single day without encountering a computer, a device dependent on a computer, information produced by a computer, or a word that was introduced or whose meaning has changed with the advent of computers. Because of the significance of computers in today's world, it is important to be computer literate. Being **computer literate** means you have knowledge and understanding of computers and their uses.

1.4 The Term Computer

A **computer** is an electronic machine, operating under the control of instructions stored in its own memory that can accept data, manipulate the data according to specified rules, produce results, and store the results for future use. Computers process data to create information. **Data** is a collection of raw unprocessed facts, figures, and symbols. **Information** is data that is organized, meaningful, and useful. To process data into information, a computer uses hardware and software. **Hardware** is the electric, electronic, and mechanical equipment that makes up a computer. **Software** is the series of instructions that tells the hardware how to perform tasks.

1.5 The Components of a Computer

Computer hardware components include input devices, output devices, a system unit, storage devices, and communications devices. An **input device** is any hardware component that allows a user to enter data and instructions into a computer. Six commonly used input devices are the keyboard, mouse, microphone, scanner, digital camera, and PC camera. An **output device** is any hardware component that can convey information to a user. Three commonly used output devices are a printer, a monitor, and speakers.

The **system unit** is a box-like case made from metal or plastic that protects the internal electronic components of the computer from damage. The system unit contains the central processing unit and memory. The **central processing unit (CPU)** is the electronic device that interprets and carries out the basic instructions that operate the computer. **Memory** is a temporary holding place for data and instructions.

A **storage device** records and retrieves data to and from a storage medium. Six common storage devices are a floppy disk drive, a Zip[®] drive, a hard disk drive, a CD-ROM drive, a CD-RW drive, a DVD-ROM drive, and a DVD+RW drive. A **communications device** enables computer users to communicate and exchange items such as data, instructions, and information with another computer. A **modem** is a communications device that enables computers to communicate usually via telephone lines or cable.

1.6 Computer Is a Powerful Tool

A computer is a powerful tool because it is able to perform the information processing cycle operations (input, process, output, and storage) with amazing speed, reliability, and accuracy; store huge amounts of data and information; and communicate with other computers. Computers allow users to generate correct information quickly, hold the information so it is available at any time, and share the information with other computer users.

1.7 Differentiate Among the Various Types of Software

There are two categories of computer software: system software and application software. **System software** consists of the programs that control the operations of a computer and its devices. Two types of system software are the operating system and utility programs. An **operating system (OS)** coordinates all activities among hardware devices and contains instructions that allow you to run application software. A **utility program** performs specific tasks, usually related to managing a computer, its devices, or its programs. You interact with software through its user interface.

Application software consists of programs that perform specific tasks for users. Popular application software includes word processing software, spreadsheet software, database software, and presentation graphics software. Application software can be **packaged software** (copyrighted software that meets the needs of a variety of users), **custom software** (tailor-made software developed at a user's request), **freeware** (copyrighted software provided at no cost), **public-domain software** (software donated for public use with no copyright restrictions), or **shareware** (copyrighted software distributed free for a trial period).

1.8 The Purpose of a Network

A **network** is a collection of computers and devices connected together via communications devices, such as a modem, and communications media, such as cables, telephone lines, cellular radio, and satellites. Networks allow users to share **resources**, such as hardware devices, software devices, data, and information. Most business computers are networked, either by a local area network (LAN) in a limited geographic area or by a wide area network (WAN) in a large geographical area.

1.9 Uses of Internet and the World Wide Web

The world's largest network is the **Internet**, which is a worldwide collection of networks that links together millions of businesses, government agencies, educational institutions, and individuals. Users connect to the Internet to send messages, access information, shop for goods and services, meet or converse with other users, and access sources of entertainment and leisure. Most users connect to the Internet through an Internet service provider (ISP) or an online service provider (OSP). The World Wide Web is a popular segment of the Internet that contains billions of documents called Web pages. These documents can contain text, graphics, sound, video, and built-in connections, or links, to other Web pages stored on computers throughout the world.

1.10 Categories of Computers and Their Uses

The six major categories of computers are personal computers, handheld computers, Internet appliances, mid-range servers, mainframes, and supercomputers. These categories are based on differences in size, speed, processing capabilities, and price. A **personal computer** can perform all of its input, processing, output, and storage activities by itself. Personal computers include desktop computers and notebook computers. A **desktop computer** is designed so the system unit, input devices, output devices, and any other devices fit entirely on or under a desk or table. Variations of desktop computers include **tower models** (computers with tall and narrow system units that can sit vertically on the floor), **all-in-one computers** (less expensive computers that combine the monitor and system unit into a single device), and **workstations** (more expensive and powerful computers designed for work that requires intense calculation and graphics capabilities).

A **notebook computer** is a portable personal computer small enough fit on your lap. Notebook and desktop computers are used at home or in the office to perform application software-related tasks or to access the Internet. A **handheld computer** is a small computer that fits in your hand. Handheld computers can perform specific, industry-related functions, or can be general-purpose.

A **PDA (personal digital assistant)** is a handheld computer that provides personal organizer functions, such as a calendar, appointment book, and notepad. An **Internet appliance** is a computer with limited functionality whose main purpose is to connect to the Internet from home. A **mid-range server** is more powerful and larger than a workstation computer. Users typically access a mid-range server through a personal

computer or a **terminal**, which is a device with a monitor and a keyboard that usually has no stand-alone processing power.

A **mainframe** is a large, expensive, very powerful computer that can handle hundreds or thousands of connected users simultaneously. A **super computer** is the fastest, most powerful, and most expensive category of computer.

1.11 The Various Types of Computer Users

Computer users can be divided into five categories: home user, small office/home office users, mobile users, large business users, and power users. A **home user** spends time on the computer for personal and business communications, budgeting and personal financial management, entertainment, and Web access. A **small office/home office (SOHO)** user includes any company with fewer than 50 employees, as well as self-employed people that work out of their home. A **mobile user** travels to and from a main office or school to conduct business, communicate, or do homework. A **large business user** works for a company that has a large number of employees and computers usually connected to a network. The **power user** – such as an engineer, architect, or desktop publisher – typically works with **multimedia**, which combines several media elements into one application, and requires the capabilities of a workstation or other powerful computer.

1.12 How a User Can Be a Web Publisher

In addition to being a recipient of information, Internet users have the ability to *provide* information to other connected users around the world. Users can create a Web page with word processing software or with Web page authoring software. **Publishing** a Web page is the process of making it available on the Internet.

Here you will find additional information that will expand and enhance your knowledge beyond that contained in your textbook. Compare this information to what may be provided in a tutorial classroom by your instructor or peers.

Computer Literacy

It is difficult to think of a field in which computers are *not* used. In addition to general-purpose computers, special-purpose computers are used in everything from automobiles to electric razors. Consider how computers have influenced our daily lives, both positively and negatively.

Activity

List ways in which computers are being used today. What is the most common use? What is the most unusual use? As a result of the expanding use of computers.

Computer

Although computers are thought of as a relatively recent innovation, the term *computer* has a long history. Prior to 1940, “computer” was a job title that referred to anyone performing calculations.

Consider how data is different from information. Data is *processed* into information. Clifford Stoll – lecturer, computer security expert, and author of *Silicon Snake Oil: Second Thoughts on the Information Superhighway* – notes a wide gap between data and information. Stoll insists that information has a pedigree, or lineage. Its source is known, whether by a respected professor or a seventh grader. “The Internet has great gobs of data,” Stoll maintains, “and little, little information.”

The first three operations in the information processing cycle — input, process, and output — are performed to process data into information, while the fourth operation — storage — refers to a computer’s electronic reservoir capability. Think about how we perform each phase in the information processing cycle in the “human computer” (i.e., the human brain) while completing a common task, such as learning a telephone number.

Computer Components

Different types of input devices are designed to transmit different types of data or to transmit data in different ways. Think of other input devices (joysticks, scanners, digital cameras, and so on) and the different types of data they transmit or the different ways they transmit data.

Because it is more lasting than output from a monitor or speaker, the printer’s output often is called hard copy. Think of other output devices with which you are familiar (data projectors, computer output microfilm, and so on).

Some computer components are considered internal, while others are considered external. External components are called **peripherals**. Input, output, and communications devices often are peripheral devices.

The difference between the temporary character of memory and permanent nature of storage will be made painfully clear the first time you experience a power failure while working on a computer. Think of other examples of storage devices (magnetic tape, PC Cards, and so on).

The capability to communicate may be one of the most significant factors influencing how computers are used now and in the future.

Computer Power

In one billionth of a second, an electronic signal travels almost 12 inches. This means that today’s supercomputer (the fastest, most powerful, and most expensive category of computers) can perform 1.8 trillion operations per second. If a person did one arithmetic operation a second without stopping, it would take more than 31,000 years to perform the number of operations a supercomputer can do in one second. Researchers predict that one day computer speed will be measured in exaflops, or one quintillion (1×10^{18}) calculations per second.

The reliability of computer components often is measured in MTBF (mean time between failures, in hours). A typical component might be rated 10,000 MTBF.

Although the term “computer error” is widespread, most computer errors can be traced to human mistakes. Consider instances of computer error with which you are familiar. How might human blunders have resulted in the computer error? Why are people apt to blame computers?

Supercomputers have more than 600 gigabytes of memory, meaning that they can store more than 600 billion letters, numbers, and special characters, and have 2 terabytes (2 trillion bytes) of disk space. Equally important is the speed at which data can be retrieved, processed, and stored again.

Connected computers can share each operation in the information processing cycle. To recognize the value of communication, imagine trying to solve a problem individually, and then trying to solve the same problem with the assistance of several classmates.

Computer Software

The difference between computer hardware and computer software is important. A 3½-inch floppy disk is hardware; however the programs stored on it are software. Programs or software, like data, are input into the computer.

Because you interact with it directly, you may be more consciously aware of application software than system software. Remember that system software determines *how* you interact with application software. Popular operating systems include DOS (Disk Operating System), Windows 3.x (technically, not an operating system but an operating *environment* that makes DOS easier to use), Windows 95, Windows 98, Windows 2000, Windows XP, Mac OS, OS/2, UNIX, Linux (rhymes with *cynics*), and NetWare. DOS was developed by Microsoft for IBM personal computers. DOS started Microsoft’s climb to the top of the software world -- at one time, versions of DOS were used worldwide by more than 100 million people. DOS has a command-line interface, meaning that people have to memorize and type instructions.

Today, operating systems with a graphical user interface, such as Microsoft’s Windows, are far more popular.

Most application software packages are designed to be used with specific operating systems. Much of the software with which you are familiar is packaged software. Because of their complexity, most software programs are written by teams of programmers working together. Just as people understand a variety of spoken languages (English, French, Chinese, and so on), computers recognize a number of programming languages.

Networks

A network with which you might be familiar is the school computer lab. Consider resources that can be shared on a network. For example, the school computer lab may share a single printer. Think of advantages of sharing resources. Why is most organization’s computers part of a network?

The Internet

Estimates claim that more than 50 percent of homes are connected to the Internet, and more than 13 million do so through an online service provider. Although the growth rate of the Internet and online services has slowed, the growth rate still is around 20 percent annually. Surveys show the number of Web site visitors continues to expand rapidly, practically doubling every year. Interestingly, surveys show that teenage boys and girls are accessing the Internet for different reasons. While boys seem to focus on entertainment, girls use the Internet more for schoolwork and chat.

Computer Categories

In addition to differences in size, speed, processing capabilities, and price, other factors, such as the size of main memory and number of peripheral devices, also can be considered when categorizing computers. Rapid changes in technology make it difficult to define categories precisely. As a rule of thumb, today's PCs have about as much memory and processing power as the mainframes of a decade ago.

Think of personal computers with which you are familiar. How is the computer used? What factors influence the choice of a personal computer? In addition to such obvious considerations as processing speed and amount of memory, less apparent factors, such as available software or even the computer's "footprint" (the amount of space it occupies on the work surface) also may be important. A desktop computer monitor often is placed on top of the system unit case. This sometimes can be an ergonomic problem, forcing users to look up. Server computers often are used in academic environments. What features of server computers would make them particularly attractive to schools? In today's mobile society, notebook computers have become indispensable tools. Since 1993, sales of notebook and smaller computers have rivaled sales of larger systems, partly because of their enhanced capabilities and increased use by field sales forces. The capabilities of handheld computers also continue to expand. Visor, a new handheld computer from Handspring, is an electronic organizer but also offers video games, a cell phone, a modem, an MP3 player, and a two-way pager. Visor uses the Palm operating system, which is the same operating system used by the Palm Pilot, a popular handheld computer from 3Com, and is available.

The growing movement toward decentralization in business, coupled with the increasing power of mid-range servers, has led to a recent trend away from mainframe computers and toward mid-range servers. What advantages might mid-range servers have over mainframe computers for a business?

Organizations that deal with huge, constantly changing collections of data accessed simultaneously by many users, such as banks, insurance companies, universities, and government agencies, often use mainframe computers. Despite this, mainframe sales are declining approximately 10 percent per year.

One of the most important features of supercomputers is their capability to create complex, three-dimensional images almost instantaneously. Television networks often use

supercomputers to generate complicated images and then give viewers the sense of “going through” the image. Due to their size and expense, only large businesses and government agencies use supercomputers. IBM’s Option Blue supercomputer was used by the Department of Energy to simulate nuclear explosions, allowing the effects of aging and adverse conditions on nuclear weapons to be explored without underground detonations.

Types of Computer Users

A major concern related to the home user is the **digital divide**, which is the idea that the people of the world can be separated into two distinct groups: those that have access to technology with the ability to use it and those that do not have access to technology or are without the ability to use it. Recent reports suggest that the digital divide exists on several levels:

- Individuals in higher income levels have greater access to the Internet than people in lower levels and the gap may be growing.
- Women are under-represented in today’s computer classes and technology jobs.

A number of efforts are being made to narrow the digital divide.

Networks have changed the face of both small and large business. In the 1970s, executives usually worked with monthly reports; in the 1980s, they used weekly reports; today, daily or even hourly reports are available. How have computers affected the efficiency of businesses? What impact have computers had on the “interpersonal” side of business (i.e., employee and customer relationships)? How have computers changed people’s jobs? Have computers cost any people their jobs?

Web Publishing

With today’s Web page authoring software, children as young as 10 years old, and sometimes younger, can create and publish their own Web pages. If you created a Web page, what type of information would you provide? Why? Would you be interested in seeing someone else’s Web page? Why or why not? If you have created a Web page, what type of software did you use? What was the most difficult part of creating your Web page?

1.13 Exercise

- Q.1 Explain the importance of computer Literacy
- Q.2 Define the term computer
- Q.3 Identify the components of a computer
- Q.4 Explain why a computer is a powerful tool
- Q.5 Differentiate among the various types of Software
- Q.6 Explain the purpose of a network
- Q.7 Discuss the uses of the Internet and the World Wide Web
- Q.8 Describe the categories of computers and their uses
- Q.9 Identify the various types of computer users
- Q.10 Understand how a user can be a Web publisher

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Unit 2

THE INTERNET AND WORLD WIDE WEB

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2.1 Introduction

This unit introduces one of the most significant innovations of the past half century – the Internet. The Internet is defined, and the history of the Internet is detailed. You discover how the Internet works and learn about Internet service providers and online services, connecting to the Internet, how data travels the Internet, and Internet addresses. The World Wide Web, search engines, and multimedia on the Web are explained. You become familiar with Webcasting, electronic commerce, Web publishing, and other Internet services including e-mail, FTP, Telnet, newsgroups, mailing lists, chat rooms, and instant messaging. Finally, netiquette, the Internet code of acceptable behavior by users, is described.

2.2 Learning Out comes

After study this unit, you will be able to,

1. Discuss how the Internet works
2. Understand ways to access the Internet
3. Identify a URL
4. Search for information on the Web
5. Describe the types of Web pages
6. Recognize how Web pages use graphics, animation, audio, video, and virtual reality
7. Define Webcasting
8. Describe the uses of electronic commerce (e-commerce)
9. Explain how e-mail, FTP, newsgroups and message boards, mailing lists, chat rooms, and instant messaging work
10. Identify the rules of netiquette

2.3 How the Internet Works

The **Internet** is a worldwide collection of **networks** that links millions of businesses, government offices, educational institutions, and individuals. Data is transferred over the Internet using **servers**, which are computers that manage network resources and provide centralized storage areas, and **clients**, which are computers that can access the contents of the storage areas. The data travels over communications lines. Each computer or device on a communications line has a numeric address called an **IP (Internet protocol) address**, the text version of which is called a **domain name**. Every time you specify a domain name, a **DNS (domain name system) server** translates the domain name into its associated IP address, so data can route to the correct computer.

2.4 Ways to Access the Internet

You can access the Internet through an Internet service provider, an online service provider, or a wireless service provider. An **Internet service provider (ISP)** provides temporary Internet connections to individuals and companies. An **online service provider (OSP)** also supplies Internet access, in addition to a variety of special content and services. A **wireless service provider (WSP)** provides wireless Internet access to users with wireless modems or Web-enabled handheld computers or devices.

Employees and students often connect to the Internet through a business or school network that connects to a service provider. For home or small business users, dial-up access provides an easy and inexpensive way to connect to the Internet. With **dial-up access**, you use a computer, a modem, and a regular telephone line to dial into an ISP or OSP. Some home and small business users opt for newer, high-speed technologies. **DSL (digital subscriber line)** provides high-speed connections over a regular copper telephone line. A **cable modem** provides high-speed Internet connections through a cable television network.

2.5 Identify A URL

The most widely used service on the Internet is the World Wide Web. The **World Wide Web (WWW or Web)** consists of a worldwide collection of electronic documents called **Web pages**. A **browser** is a software program used to access and view Web pages. Each Web page has a unique address, called a **URL (Uniform Resource Locator)**, that tells a browser where to locate the Web page. A URL consists of a protocol, domain name, and sometimes the path to a specific Web page or location on a Web page. Most URLs begin with **http://**, which stands for **hypertext transfer protocol**, the communications standard that enables pages to transfer on the Web.

2.6 Search for Information on the Web

A **search engine** is a software program you can use to find Web sites, Web pages, and Internet files. To find a Web page or pages, you enter a relevant word or phrase, called **search text** or **keywords**, in the search engine's text box. Many search engines then use a program called a **spider** to read pages on Web sites and create a list of pages that contain the keywords. Any Web page that is listed as the result of the search is called a **hit**. Each hit is a link that can be clicked to display the associated Web site or Web page.

2.7 The Types of Web Pages

There are six basic types of Web pages. An **advocacy Web page** contains content that describes a cause, opinion, or idea. A **business/marketing Web page** contains content that promotes or sells products or services. An **informational Web page** contains factual information. A **news Web page** contains newsworthy material including stories and articles relating to current events, life, money, sports, and the weather. A **portal Web page** offers a variety of Internet services from a single, convenient location. A **personal Web page** is maintained by a private individual who normally is not associated with any organization.

2.8 How Web Pages Use Graphics, Animation, Audio, Video, and Virtual Reality

Many exciting Web pages use multimedia. **Multimedia** refers to any application that integrates text with one of the following elements: graphics, sound, video, virtual reality, or other media elements.

A **graphic** is a digital representation of information such as a drawing, chart, or photograph. Two common file formats for graphical images on the Web are **JPEG (Joint**

Photographic Experts Group) and **GIF (Graphics Interchange Format)**, which use compression techniques to reduce the size of graphics files and thus speed downloading. **Animation** is the appearance of motion created by displaying a series of still images in rapid sequence. One popular type of animation, called an **animated GIF**, uses computer animation and graphics software to combine several images into a single GIF file.

Audio is music, speech, or any other sound. A common format for audio files on the Web is **MP3**, a popular technology that compresses audio. More advanced Web audio applications use **streaming audio**, which transfers audio data in a continuous and even flow, allowing users to listen to the sound as it downloads. **Video** consists of full-motion images that are played back at various speeds. Video files often are quite large in size. The **Moving Pictures Experts Group (MPEG)** defines a popular video compression standard. **Streaming video** allows you to view longer or live video images as they are downloaded.

Virtual reality (VR) is the use of computers to simulate a real or imagined environment that appears as a three-dimensional (3-D) space. A **VR world** is an entire 3-D site that contains infinite space and depth.

2.9 Define Webcasting

Pull technology is a method of obtaining information that relies on a client such as your computer to request a Web page from a server. On the other hand, **Webcasting**, also called **push technology**, is a method of obtaining information in which a server automatically downloads content to your computer at regular intervals or whenever updates are made to the site. Webcasting saves time by delivering information at regular intervals and allows users to view Web content when they are **offline**, that is, when they are not connected to the Internet.

2.10 Uses of Electronic Commerce (E-Commerce)

Electronic commerce (e-commerce) is a financial business transaction that occurs over an electronic network such as the Internet. Today, there are three types of e-commerce. **Business to consumer (B-to-B or B2C) e-commerce** consists of the sale of goods to the general public. Customers visit an online business through an **electronic storefront**, which contains descriptions, graphics, and a **shopping cart** that allows customers to collect their purchases. **Consumer to consumer (C-to-C or C2C) e-commerce** occurs when one consumer sells directly to another. An **online auction** is an example of consumer to consumer e-commerce. **Business to business (B-to-B or B2B) e-commerce**, which is the most prevalent type of e-commerce, takes place between businesses, with businesses typically providing services to other businesses.

2.11 How E-Mail, FTP, Newsgroups and Message Boards, Mailing Lists, Chat Rooms, and Instant Messaging Work

A variety of services are used widely on the Internet, including e-mail, FTP, newsgroups and message boards, mailing lists, chat rooms, and instant messaging. **E-mail (electronic mail)** is the transmission of messages and files via a computer network. You use an e-

mail program to create, send, receive, forward, store, print, and delete messages. To receive messages, you need an **e-mail address**, which is a combination of a username and a domain name that identifies a user.

FTP (File Transfer Protocol) is an Internet standard that allows you to upload and download files with other computers on the Internet. An **FTP server** is a computer that allows you to use FTP to upload files to, and download files from, an **FTP site**. With **anonymous FTP**, anyone can transfer some, if not all, available files. A **newsgroup** is an online area in which users conduct written discussions about a particular subject. The computer that stores and distributes newsgroup messages is called a **news server**. You use a program called a **newsreader** to access a newsgroup, read previously entered messages (called **articles**), and add (**post**) messages of your own.

A **thread** consists of the original article and all subsequent related replies. In a **moderated newsgroup**, a **moderator** reviews articles and posts them, if appropriate. A **message board** is a popular Web-based type of discussion group that does not require a newsreader and typically is easier to use than a newsgroup. A **mailing list** is a group of e-mail names and addresses given a single name. To add your e-mail name and address to a mailing list you **subscribe** to it; to remove your name, you **unsubscribe**.

A **chat** is **real-time** (meaning everyone involved in the chat is online at the same time) typed conversation that takes place on a computer. A location on an Internet server that permits users to chat is called a **chat room**. Some chat rooms support **voice chats** and **video chats**, where you can hear or see others and they can hear or see you as you chat. A **chat client** is a program on your computer that allows you to connect to a chat server and start a chat session. **Instant messaging (IM)** is a real-time Internet communications service that notifies you when one or more people are online and then allows you to exchange messages or join a private chat room.

2.12 The Rules of Netiquette

Netiquette, which is short for Internet etiquette, is the code of acceptable behaviors users should follow while on the Internet. Rules for e-mail, newsgroups, and chat rooms include:

- Keep messages brief and use proper grammar and spelling.
- Be careful when using sarcasm and humor.
- Be polite and avoid offensive language.
- Avoid sending **flames** (abusive messages) and **spam** (unsolicited junk mail).
- Do not use all capital letters, which is the equivalent of SHOUTING!
- Use **emoticons** (such as :) for smile) to express emotion.
- Use abbreviations (such as BTW for by the way) for popular phrases.
- Clearly identify a **spoiler**, which is a message that reveals a solution to a game or an ending to a movie or program.
- Read the **FAQ** (frequently asked questions) document.
- Do not assume all material is accurate or up-to-date.
- Never read someone's private e-mail.

Activity

Here you will find additional information that will expand and enhance your knowledge beyond that contained in your textbook. Compare this information to what may be provided in a tutorial classroom by your instructor or peers.

The Internet

The Internet has had a profound effect on the world of computers. Microsoft CEO Bill Gates claims, “The Internet is pervasive in everything we’re doing.” The Internet also has assumed an increasing prominence in the world at large. Today, the letters “www” seem an omnipresent part of advertisements on buses, billboards, and magazines.

The Internet, as it is known today, was born in 1983 when **ARPANET** was split into two interconnected networks: ARPANET and MILNET. The size of the Internet doubled when **NSFnet** joined the Internet in 1986.

The Internet has proven to be a reliable means of transmitting data. Occasionally, however, transmission problems do occur. For 30 minutes in the spring of 1995, all of the **traffic** destined for MIT was sent through a small wire in Florida, a situation described as equivalent to routing all of the flights bound for O’Hare to a driveway.

Accessing the Internet

National ISPs include AT&T, Earth link, and WorldCom. Two popular OSPs are America Online (AOL) and the Microsoft Network (MSN). Some online services supply specific types of information. For example, Dow Jones provides financial and business news, and Imagination offers games and entertainment. WSPs include OmniSky, and SprintPCS. The role of WSP is expected to grow. Industry analysts predict that by 2003, more than 60 million people will use wireless Web-enabled devices to connect to the Internet. The CEO of Amazon.com goes even farther, projecting that in 10 years all Internet connections be wireless.

Although most ISPs charge a standard fee for dial-up access, to attract users (who view advertisements on an ISP’s home page) some ISPs now are providing free service. Following this lead, a California-based DSL recently advertised free, high-speed Internet access to users who agree to ads aimed at their demographic group.

URLs

On a Web page, a **link** is a built-in connection to another related Web page or part of a Web page. A link can be a word, phrase, or image. URLs make it possible to navigate using links, because each link is connected to a URL. When you click a link, the Web site or document associated with the URL is displayed. Some people refer to this activity of jumping from one Web page to another as **surfing the Web**.

URLs are registered for a standard fee .To acquires an appropriate URL, some companies are willing to spend a great deal more for a URL that already has been registered.

Recently, e-Companies paid an entrepreneur for a Web address. This more than doubled the previous record – Compaq’s purchase of altavista.com.

Searching the Web

The World Wide Web is an incredible source of information on almost any topic. There are almost 2.5 billion Web pages. Exploring this vast reservoir for the answer to a search engine user’s query, which usually is expressed in just a few keywords, is a daunting task. No wonder an engineering head at AltaVista described search engines as a combination of “wizardry and witchcraft.”

Often, simple search queries yield an overwhelming number of results. This is attributed to several factors:

- *The limitations of search engines.* A query about mustangs on the American plains might produce results involving Southern Methodist University’s football team and the Ford car.
- *The nature of queries.* While a traditional researcher, such as a librarian, uses queries averaging 14 words, the typical Internet query is just over one word.
- *The creators of Web pages.* Developers of commercial Web pages sometimes distort results by repeating frequently requested keywords in the background, where spiders see them but people do not.

Despite these difficulties, search engines are among the most popular sites on the Web. When choosing a search engine, experts suggest that novice users, and users looking for obscure information, turn first to the larger search engines (AltaVista, Yahoo!, Lycos, and so on) because they are easiest to use and cast the largest net.

Types of Web Pages

Advocacy Web pages established for political candidates, called “e-campaigning,” has become an important part of politics. Surveys show that more than 50 percent of Internet users turn to the Web for information about political topics.

Business/marketing Web pages used for shopping on the Internet are increasingly popular. Educational institutions frequently publish informational Web pages. Today, most colleges have Web sites that offer course descriptions, information about the student population, and registration costs and deadlines. News Web pages are the most popular Web sites with access to the Internet. Although these Web sites often are associated with newspapers, magazines, television stations, or radio stations, some are published only online, without a related print or broadcast media.

Portal Web pages often offer the following free services: search engine, news, sports and weather, free personal Web pages, reference tools, shopping malls, e-mail, instant messaging, newsgroups, and chat rooms. The dictionary defines a “portal” as a door or gateway. Portal Web pages are gateways to a host of services.

How Web Pages Use Multimedia

Multimedia can bring a Web page to life, increase the types of information available on the Web, expand on the Web’s potential uses, and make the Internet a more entertaining

place to explore. Because Web pages with multimedia take longer to download, most browsers allow users to turn off some multimedia elements (such as graphics) and show a text-only version, speeding the display of a Web page.

Webcasting

Some people use Webcasting to download copyrighted material, such as music, from Web sites. Many young, unknown musicians see music Web sites as a way to gain exposure, but some already-popular musicians see sharing music on Web sites as little more than theft. The heavy metal rock band Metallica sued Napster (a music Web site) for copyright violations.

E-Commerce

Today, more than 50 percent of Web sites are commercial. Online product sales increase twelve-fold increase in just five years. Business to consumer e-commerce often allows buyers to purchase directly from businesses, eliminating the middleman and thus providing goods and services at lower costs. Other advantages of e-commerce include:

- twenty-four hour access
- global presence
- two-way communication
- decreased costs
- lower product display and storage costs
- reduced salesperson costs

Businesses advertise with their own Web site or on another company's Web site. The most successful Web advertisements are on popular sites, such as search engines. In terms of audience, advertising on the Web is expensive. Yet, Web advertisements do offer advantages:

- Unlike traditional media advertising, which is passive (and often ignored by the audience), Web advertising is interactive. The audience expresses an interest in the product by clicking a hyperlink and *choosing* to view a Web advertisement.
- For many products, Web users are the ideal customers. Web users tend to be students or highly educated consumers in their late 30s.

Web Publishing

Deciding upon the purpose of the Web site and the audience for whom it is intended will make it easier to determine what should and should not be included on the Web site. Web publishing is an increasingly commonplace Internet activity. With the assistance of word processing packages, Web page authoring software, or Web sites that assist in the creation of Web pages, even elementary school children are developing personal Web pages.

Internet Services

It is estimated that the number of e-mail users has increased 300 percent during the past five years, and the number of e-mail messages sent per day has increased 400 percent. While its growth has been phenomenal, not everyone is happy with e-mail's ever-increasing use. In a business setting, some feel that e-mail can be counter-productive. They contend that employees spend too much time writing and reading e-mail on inconsequential topics – subjects they never would commit to paper. In a social setting,

some wonder if e-mail is fitting in every situation. Although e-mail is suitable for casual messages, most believe it is inappropriate for more serious or formal communication, such as a wedding invitation. How do you feel about these reservations regarding e-mail? Many files on anonymous FTP sites are public domain software, freeware, or shareware. Public domain software is not copyrighted and therefore can be distributed at no cost. Freeware also is available at no cost but, because it is copyrighted, it cannot be resold. Shareware can be downloaded and tried for free, but a license fee must be paid if the software is kept. Shareware users who pay the license fee may receive a manual, notification of new releases or tips, and access to technical support. The quality of freeware, public domain software, and shareware varies greatly.

The real-time character of chat makes chat rooms different from newsgroups or mailing lists. The extent to which a chat room is monitored varies. In some chat rooms, particularly those aimed at adults, a monitor's presence hardly is noticed. Chat rooms intended for minors, however, often are monitored closely. Chat rooms can be an invaluable experience for children, letting them share thoughts and ideas with people their own age from around the country, or even around the world. Yet, to ensure that content is appropriate, parents may want to oversee a child's first few chat room visits.

Netiquette

Netiquette can be applied to all aspects of the Internet. Which netiquette rules are most important? Which rules are least important? Why? What rules, if any, would you add? In her book, *Guide for the Turn-of-the-Millennium*, syndicated columnist Judith Martin (Miss Manners) offers guidelines for use of the Internet and other technological innovations. Web sites such as <http://www.fau.edu/netiquette/netiquette.htm> also offer advice on Internet manners.

Activity

Choose a topic for a Web page, such as your school or your class. How could multimedia enhance the page? What multimedia elements would you use? How?

2.13 Exercise

1. Discuss how the Internet works?
2. Explain ways to access the Internet?
3. How you can identify a URL?
4. Search for information on the Web
5. Describe the types of Web pages
6. Explain how Web pages use graphics, animation, audio, video, and virtual reality?
7. Define Webcasting
8. Describe the uses of electronic commerce (e-commerce)
9. Explain how e-mail, FTP, newsgroups and message boards, mailing lists, chat rooms, and instant messaging work
10. Identify the rules of netiquette

2.14 Activities

1. Visit the main branch of any bank of your city. Interview computer operator and list the input devices he uses.
2. Have a chance to visit computer dealer. What type of output devices are there and make a note on their function for your Principal who wants to buy a computer.
3. Locate an office that has a computer, make groups of your class and demonstrate them the functions of the key.
4. Survey five such institutions of your locality which have computers. Compare the printing devices they have on the criteria of type, speed, print quality and cost.
5. Interview with professional programmer to find out the main constraints to computer performance? The CPU? The peripherals?

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Unit 3

APPLICATION SOFTWARE

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3.1 Introduction

This unit discusses the role of the system software with respect to application software. It then presents an overview of several productivity software applications, graphic design/multimedia software applications, home/personal/educational software applications, and communications software applications. The unit then identifies various Web applications. Finally, learning aids and supports tools within application software products are presented.

3.2 Learning Out comes

After study this unit, you will be able to,

1. Define application software
2. Understand how system software interacts with application software
3. Identify the role of the user interface
4. Explain how to start a software application
5. Identify the widely used products and explain the key features of different software applications
6. Identify various products available as Web applications
7. Describe the learning aids available with many software applications

3.3 Application Software

Application software consists of programs designed to perform specific tasks for users. Application software can be used as a productivity/business tool; to assist with graphics and multimedia projects; to support home, personal, and educational activities; and to facilitate communications. Specific application software products, called **software packages**, are available from software vendors. Although application software also is available as shareware, freeware, and public-domain software, these usually have fewer capabilities than retail software packages.

3.4 How System Software Interacts With Application Software

System software consists of programs that control the operations of a computer and its devices. System software serves as the interface between a user, the application software, and the computer's hardware. One type of system software is the operating system. Before application software can be run, the **operating system**, which contains instructions that coordinate the activities among computer hardware devices, must be loaded from the hard disk into the computer's memory.

3.5 The Role Of The User Interface

The **user interface** controls how you enter data or instructions and how information displays on the computer screen. Many of today's software programs have a graphical user interface. A graphical **user interface (GUI)** combines text, graphics, and other visual images to make software easier to use.

3.6 How to Start a Software Application

Both the Microsoft Windows and the Apple Macintosh operating systems use the concept of a desktop. The **desktop** is an on-screen work area with common graphical elements

such as **icons**, **buttons**, menus, links, windows, and **dialog boxes**. A software application can be started by clicking its program name on a **menu**, or list of **commands**. Clicking the program name instructs the operating system to transfer the program's instructions from a storage medium into memory. Once started, the application displays in a window on the desktop. A **window** is a rectangular area of the screen that is used to show the program, data, and/or information. At the top of the window is a **title bar** that contains the window's name.

The Key Features of Widely Used Products

- productivity/business software applications
- graphic design/multimedia software applications
- home/personal/educational software applications
- communications software applications

People use **productivity software** to become more effective and efficient while performing daily activities. **Word processing** software allows users to create and manipulate documents that contain text and graphics. With word processing software, you can insert **clip art** into a document; change **margins**; **find** and **replace** text; use a **spelling checker** to check spelling; place a **header** and **footer** at the top and the bottom of a page; and vary **font**(character design), **font size** (character scale), and **font style** (character appearance).

With **spreadsheet** software, data is organized in rows and columns, which collectively are called a **worksheet**. The intersection of a row and column, called a **cell**, can contain a **label** (text), a **value** (number), or a **formula** or **function** that performs calculations on the data and displays the result.

Database software allows you to create and manage a database. A **database** is a collection of data organized to allow access, retrieval, and use of that data. A **query** is used to retrieve data according to specified **criteria**, which are restrictions the data must meet.

Presentation graphics software is used to create presentations that communicate ideas, messages, and other information to a group through a **slide show**. You can use a **clip gallery** to enhance your presentation with clip art images, pictures, video clips, and audio clips.

A **personal information manager (PIM)** is software that includes an **appointment calendar** to schedule activities, an **address book** to maintain names and addresses, and a **notepad** to record ideas, reminders, and important information. A software **suite** is a collection of individual applications sold as a single package.

Project management software allows you to plan, schedule, track, and analyze the progress of a project. **Accounting software** helps companies record and report their financial transactions.

Power users often use software that allows them to work with graphics and multimedia. **Computer-aided design (CAD) software** assists in creating engineering, architectural, and scientific designs. **Desktop publishing (DTP)** software is used to design and produce sophisticated documents. DTP is developed specifically to support **page layout**, which is the process of arranging text and graphics in a document. **Paint software** is used to draw graphical images with various on-screen tools. **Image editing software** provides the capability to modify existing images. **Video editing software** and **audio editing software** can be used to modify **video** and **audio** segments.

Multimedia authoring software is used to create electronic interactive presentations that can include text, images, video, audio, and animation. Web page authoring software is designed to create Web pages and to organize, manage, and maintain Web sites.

Many software applications are designed specifically for use at home or for personal or educational use. **Integrated software** combines several productivity software applications that share a similar interface and common features into a single package. **Personal finance software** is an accounting program that helps pay bills, balance a checkbook, track income and expenses, follow investments, and evaluate financial plans. **Legal software** assists in the creation of legal documents and provides legal advice. **Tax preparation software** guides users through the process of filing federal taxes. **Personal DTP software** helps develop conventional documents by asking questions, presenting predefined layouts, and supplying standard text.

Photo-editing software is used to edit digital photographs. A **clip art/image gallery** is a collection of clip art and photographs that can be used in all types of documents. **Home design/landscaping software** assists with planning or remodeling. **Educational software** teaches a particular skill and exists for about any subject. **Reference software** provides valuable and thorough information for all individuals. **Entertainment software** includes interactive games, videos, and other programs designed to support a hobby or provide amusement.

One of the main reasons people use computers is to communicate and share information. **E-mail software** is used to create, send, receive, forward, store, print, and delete **e-mail (electronic mail)**. A **Web browser** is a software application used to access and view Web pages. A **chat client** is software that allows you to connect to a **chat room**, which permits users to chat via the computer. A **newsreader** is a software program used to participate in a **newsgroup**, which is an online area on the Web where users conduct written discussion about a particular subject. An **instant messenger** is a software program installed to use **instant messaging (IM)**, a real-time communications service that notifies you when one or more people are online and then allows you to exchange messages or files. **Groupware** is a software application that helps groups of people on a network work together and share information. A **videoconference** is a meeting between two or more geographically separated people who use a network or the Internet to transmit audio and video data.

3.7 Various Products Available As Web Applications

A **Web application** is a software application that exists on a Web site. To access the Web application, you visit the Web site that offers the program. Some Web applications are free; for others, you pay for use, service, support, or when a certain action occurs. **Web-based training (WBT)** is a type of CBT (computer-based training) that uses Internet technology. Many Web sites offer WBT to the general public. An **application service provider (ASP)** is a third-party organization that manages and distributes software and services on the Web.

3.8 The Learning Aids Available With Many Software Applications

Many software applications and Web sites provide learning aids. **Online Help** is the electronic equivalent of a user manual. Usually integrated into an application software package, online Help often is **context-sensitive**, meaning that the Help information is related to the current task being attempted. Most online Help also provide links to Web sites that have a FAQs page. **FAQs** (Frequently Asked Questions) supply answers to common queries. Many books are available to help you learn to use the features of a personal computer application package. A **wizard** is an automated assistant that helps complete a task by asking questions and then performing actions based on the answers.

Here you will find additional information that will expand and enhance your knowledge beyond that contained in your textbook. Compare this information to what may be provided in a traditional classroom by your instructor or peers.

Application Software

Popular types of application software can be categorized by their general use: productivity software, graphics design/multimedia software, home/personal/educational software, and communications software. An application can belong to more than one category. For example, an e-mail program can be considered both productivity software and communications software.

System Software

Many application programs are designed to run with a specific operating system. When shopping for an application software package, buyers must make sure they have a compatible operating system. A software package designed to be used with the Macintosh operating system may not work with the Windows operating system. The operating system version also is important. An application designed for Windows XP may not work with Windows 3.1. Yet, because most operating systems are downward compatible, software written for earlier versions of an operating system (such as Windows 98) usually can be used with recent versions of the operating system (such as Windows XP).

The User Interface

The user interface plays a key role in application software. Studies have found that GUI users generally complete tasks more accurately, work faster, are more productive, and feel less fatigue than users of a text interface. The Macintosh operating system – the first

popular GUI – actually was developed from an earlier GUI-based operating system created by Xerox.

The first version of Windows (1985) imitated the Macintosh's GUI (Apple sued Microsoft, unsuccessfully, for copyright infringement). Although some users still feel the Macintosh interface is superior, today some form of Windows is used on almost 90 percent of personal computers. Because of this, even competitive products often use similar features, such as the same menu names.

Starting an Application

To **click** an object on the screen, you move the pointer to the object and then press and release a button on the mouse. Often, applications also can be started by double-clicking the icon that represents the application.

When an application is started, the right-hand corner of the application window title bar usually displays three buttons:

- **Minimize**  – When clicked, this button reduces a window to a button on the taskbar.
- **Restore**  – When clicked, this button returns a window to its initial size. When a window does not fill the desktop, the Restore button is replaced by a Maximize button  that, when clicked, enlarges the window so it covers the entire desktop.
- **Close**  – When clicked, this button closes the window. The Close button removes the window from the desktop and its button from the taskbar.

A dialog box can contain option buttons, check boxes, text boxes, and command buttons. Option buttons stipulate desired alternatives; check boxes turn specific capabilities on or off; text boxes allow text to be entered; and command buttons immediately perform an action, such as implementing (OK) or ignoring (Cancel) the choices made in a dialog box. Shortcut menus can change depending on where the pointer rests when the mouse is right-clicked. Dimmed commands on a menu or shortcut menu are unavailable.

Some applications use automatically display a smart tag when you perform a certain action. Clicking the smart tag displays a menu of commands related to the action.

Software

Word processing software is used for creating, editing, formatting, saving, and printing documents. In the modern office, word processing software has replaced the typewriter for almost all written work. The editing capabilities of word processing software have altered the creative process. The freedom to express yourself without reservation, knowing you easily can revise what you have written, can improve the quality of written work. It is good practice to save a document before printing it. When a document is saved, it exists as a file, or named collection of data, instructions, or information. A file name uniquely identifies each file. Restrictions on file names once were severe; file names could be no more than eight characters long, and many characters, including spaces, could not be used. In Windows XP, however, a file name can have up to 255 characters, including spaces.

Some spreadsheet programs offer more than 200 internal functions. When creating a spreadsheet, formulas and functions usually must be preceded by a special character (such as =, +, or @) to distinguish them from labels or values. Formulas use cell references, or addresses, of cells that contain values. When formulas are copied from one cell to another, the cell references change to reflect the new location. This update is called relative referencing. Another powerful capability, called goal-seek, finds what value is needed to reach a specified goal.

While spreadsheet packages can manage data tables of a few thousand records, database software can efficiently handle much larger data tables. In a database, common data types include text, numeric, currency, date, memo, hyperlink, and object. When identifying data types, numbers treated as text (such as zip codes, Social Security numbers, or telephone numbers) sometimes are referred to as alphanumeric data because they are not used in calculations. The results of a database query are placed in an ANSWER table.

Although introduced years after word processing and spreadsheet software, presentation graphics software has had almost as great an impact on business, and on how people do business, as either of the older applications. Presentations often include an outline with the text from each slide, audience handouts that can be distributed to the audience and a notes page with additional notes for the presenter. Some presentation graphics packages offer templates for various presentations (company meeting, financial report, marketing plan, progress report, employee orientation, training, and so on).

PIMs essentially are “free style” database managers. They are very popular with people who spend much of their time in business travel. These people, often called road warriors, find PIMs a valuable part of the arsenal they bring to their daily battles. Like a daily planner, PIMs must be reviewed regularly to be effective.

Unlike word processing software, DTP software increases hardware requirements. Because of its relatively low and the speed, control, security, and flexibility offered by desktop publishing, many companies are using DTP instead of outside printing firms for their publishing needs.

Paint software and image editing software have had a tremendous impact on commercial art. Commercial artists praise the capabilities offered by these applications. At the same time, many feel these applications have led clients to demand more, both in terms of time and expectations. As a result, some commercial artists believe their income, actually has dropped because of graphic software.

Most software for home, personal, and educational use is relatively inexpensive. It still pays to shop around. Prices for some software for home/personal use, such as integrated software, can vary greatly for the same brand depending on the vendor. Some personal finance packages can prepare reports on income and expenses, budget, net worth, taxes, and investments.

Personal finance software wizards (automated assistants) can help to balance accounts, prepare budgets, plan mortgages, calculate savings, and arrange retirements. Legal software is designed to facilitate creation of standard documents; unusual circumstances might still demand the services of a lawyer. Tax preparation software also is best used by people in fairly common circumstances.

For some students, educational software is a welcome alternative to traditional classes, allowing them to work privately at their own pace. Reference software articles often include links that, when clicked, display related articles. Because referenced material can change frequently, some reference software packages can be updated via the World Wide Web.

Computer communications touch everyone's life. Consider the ATM that "knows" a bank balance even though it is located 500 miles from the bank. Many e-mail programs allow users to send "registered mail" with a return receipt guaranteeing the recipient received the message. E-mail and personal information management (PIM) software sometimes also are considered part of groupware. Although e-mail has assumed an important role in business messages, traditional paper letters and memos still are used. In fact, some maintain that the amount of paper correspondence has increased.

Web Applications

Web applications can be a better buy than packaged applications. Antivirus program can be replaced by a Web application that costs less, is updated frequently, and uses less space on a hard disk. In addition, packaged software might include features you will never use, which increases the cost of the package. Often, you can use the standard version of a similar Web application for less money or even for free, and only pay more for the additional features you want. Web applications can save businesses money with reduced installation, upgrade, and maintenance costs. Some social analysts believe that the lower cost of Web applications also can help close the "digital divide."

For Web application vendors, benefits include easier updating and debugging (error correcting), removal of packaging and distribution costs, and elimination of software piracy (the illegal copying and selling of software). Despite their advantages, analysts point out those Web applications may not be right for everyone. For some consumers, paying a monthly fee ultimately costs more than the one-time purchase of packaged software. Also, many households do not have the fast Internet connection needed for certain Web applications to run smoothly. Finally, some people worry that files stored at a Web application site can be infected with viruses. Web application vendors believe these worries are groundless and that Web applications benefit both buyers and sellers.

Learning Aids

In many applications, an audible "beep" indicates an error, and the last entry should be reviewed. Function key F1 often is used to activate the Help feature. Some applications have a Help button that, when clicked, changes the mouse pointer to a Help arrow. This arrow can be used to obtain help on a command, button, or bar by pointing at the item and clicking. Many software developers have eliminated user's manuals in favor of

extensive online Help. Computer stores occasionally carry a few trade books, but entire aisles of computer-related books can be found in most large book stores.

For some applications, other learning aids, such as tutorials or keyboard templates, are available. Tutorials are step-by-step instructions using real examples that show how to use an application. Tutorials can be printed, software-based, or Internet-based. Keyboard templates (plastic sheets that fit around a portion of the keyboard) illustrate the keyboard commands for various tasks. Wizards can be used to help create memorandums, meeting agendas, fax cover sheets, flyers, letters, resumes, charts, forms, reports, awards, pleadings, calendars, postcards, envelopes, mailing labels, newsletters, and Web pages. Some applications also offer document templates, which are special documents that provide basic tools for shaping a final document. The availability of learning aids and support tools is an important consideration in selecting an application package.

3.9 Activities

1. Survey the schools and colleges of your locality or nearby to get information what types of computer software they use, and prepare a report for tutorial.
2. While surveying (Activity No. 1) also ask the computer operators, what language/ languages they are using.
3. Locate a professional in education department who is using operating system. Ask him what difficulties, he faces in using this software.
4. Visit any institution of computer education. Discuss with the Professors of that institution why new program languages are being developed. Prepare a report for discussion in tutorial meeting.
5. Visit the computer dealer and prepare a report on what training facilities they provide on use of programming language.

3.10 Exercise

- Q.1 Define application software
- Q.2 Understand how system software interacts with application software
- Q.3 Identify the role of the user interface
- Q.3 Explain how to start a software application
- Q.4 Identify the widely used products and explain the key features of different software applications
- Q.5 Identify various products available as Web applications
- Q.6 Describe the learning aids available with many software applications

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Unit No. 4

**COMPUTER ASSISTED
INSTRUCTION**

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4.1 Introduction

Computers have become the most versatile tools of teaching profession. Computers and communication technology has made imaginative approaches of teaching practicable, and motivating teachers and students to try new ways of having information and learning.

Computer assisted instruction is one of these new styles. According to Blissmer (1991, p.439) computer assisted instruction (CAI) is “use of computer system to provide instruction and drill and practice in basic computation and language skills”. Now-a-days, the CAI has been extended to nearly every subject area of study. The basic philosophy of CAI involves a direct link between student and software and transfer of basic instructional decisions from teacher to curriculum developer. CAI does not involve only the teaching about computers but computers are used as an aid in the classroom instruction of a particular subject-matter. It is mainly a system of individualized instruction that uses a program presented by a computer as the learning medium. In CAI, information is presented on computer’s display, students are asked to respond, and their response is evaluated. If student is correct, he/she moves further otherwise similar problems are presented until the right response is achieved.

Those who advocates the CAI, argue that students who have not mastered the basic skills can benefit from drill and practice. Students can be motivated by the use of CAI. This gives teacher with some free time and this time can be utilized by the teacher in planning and providing individual instructions. CAI is being made more intelligent by developing intelligent programs.

Computer is a machine which is able to deal with many kinds of information at high speed and in large quantities. At the same time, it has the capacity to manipulate these quantities of information. This quality of information processing is utilized in the field of education as computer is used as a teacher.

4.2 Objectives

After the study of this unit, you will be able to:

1. Define CAI
2. Describe the purpose, objective and use of CAI
3. Critically analyse the different forms of CAI
4. Organize the class according to specific needs and resources available
5. Elaborate the advantages and limitations of CAI
6. Appreciate the role of computer as a teacher

4.3 Computer Assisted Instruction (CAI)

As mentioned in the introduction of the unit CAI, refers to the use of computers to deliver instruction and lectures. CAI according to Sanders (1983, P.477), has roots in the field of educational psychology and instructional technology. It was 1950, when educational psychologist began to experiment with programmed instruction. This divided course content into “frames” which enabled the students to master the content in a specific sequence. Psychologist B.F. Skinner is known as an early champion of programmed instruction.

Most of the CAI strategies are computerized version of teaching techniques which are usually performed by persons/teachers. The oldest instructional application of computer is CAI which provides instruction and drill and practice in basic computation and language skills.

In CAI, information is presented on computer’s display, students are asked to respond, and their response is evaluated. If response is correct, student moves ahead, if incorrect, similar problems are presented till correct response is elicited. CAI software is purchased as a package or may be written by the classroom teacher by using some packages available in the market. The program of study is presented on CRT screen. This type of programming is essentially stimulus response sequence. Teachers may have designed CAI logic and made content decisions, which were translated into a program of study by a CAI system. In early days of CAI, BASIC and Pascal were used by these general purpose languages do not suit. Now new languages have been developed, such as extended version of Pascal called UCSD Pascal. These languages have made it “easier to process words, clauses, sentences, lines, curves, and also student answers; the overall effect has been to improve CAI software”. (Hussain and Hussain, 1989, P.171). LOGO is another language which is favourite for CAI as this has graphic capabilities.

Programs for CAI can be written in a variety of modes. Hussain and Hussain classify (1989, P.169) these into:

- Tutorial mode
- Drill and practice mode
- Discovery mode
- Problem solving mode
- Modeling mode
- Simulation or role playing games

Sanders (1987, P.478) classify CAI by its use into: drill and practice, dialogue, problem solving, simulation, game or discovery learning. While Iqbal (1996, P.12) has enlisted drill and practice, dialogue, testing, problem solving, games, simulations and discovery learning as teaching strategies of CAI. Let us study briefly of some of these.

Drill and Practice

It is instructional strategy suited to acquisition of basic knowledge which requires memorization but at the same time it is also useful in more complex learning as acquisition of complex knowledge also requires repetitive practice. Sanders (1987, P.478) divides a drill program into item selection, item delivery, and record keeping. In presentation and tracking of drills, computer can work in detail and sophistication which is very difficult to have by human tutor.

Dialogue

Dialogue between student and teacher is basic concept of two days education; in CAI computer is taken as tutor. Dialogue may be of two forms: tutorial dialogue and inquiry dialogue. The biggest problem is analyzing the student answers because it is not possible to enlist all possible responses of the students.

Problem Solving

In math and science, key ability is problem solving. Packages of problem solving allow students to formulate a correct solution without getting involved in calculations. It is usually considered more important that a student may collect and organise information and set up the solution to the problem than to carry out manually all the calculations involved.

Simulations

This provides students an opportunity to do exercises which are closely related with real world experience. These are particularly useful where aim is to get first hand experience. Simulations allow the students to explore relationship in real-life situations. Most types of simulations are: Task performance simulation, system modelling simulations and Experience/encounter simulations.

Games

Games are usually believed to be valuable in shaping mental processes. But connection between learning and games is not always very clear. To identify and select games with instructional value is not an easy task. Games may be divided into cooperation and competition.

Discovery Learning

Discovery fosters new insights by presenting information to students and asking them to draw conclusions. This encourages to have knowledge by trial and error. Discovery mode may state a principle and then asks students to choose fitting examples.

For further and deeper understanding of CAI, go through these referred pages:

4.4 Organisation of Classroom for Use of Computer

Using computers in classroom require organisation of computers accordingly. Possible availability of the computers may be as:

- a)
 1. One computer for the whole class;
 2. One computer for small group; or
 3. One computer for each student; and
- b) Computer (s) may be available for only a set of time during a week or available for whole time.

For a (1) major types of uses are i) electronic black board, ii) focus for class discussions, iii) individual occasional use and iv) part of project circuit.

Woodhouse and Mcdoughall (1986, P.283) have identified a (2) computer for small group as follows:

1. "Many simulation programs are best used in small groups..."
2. Work involving data base and reference can be carried out...
3. Group project work requiring occasional use of computer is also relevant. This includes group programming projects, and the use of word processor to produce a group magazine or newsletter.
4. 'Competitive' games can be played within the group."
 - Whole class may work on the same thing or different students may work on different thing in a (3)
 - a(1) seems to have a computer laboratory, moved to the class as per schedule, in this student have not ready access to the computer in their room.
 - In b(1) situation, a number of computers are there in the class, scope of use is wide.

While organising class for computer use, it is also important to consider the security, power plugs, equipment and reference material also.

Ideally, organisation of classroom should be designed to meet the needs of the students. In practice, organisation is generally carried out whatever space is available. "To make best use of classroom facilities" is challenge to our teachers. To design a personal computer training centre for 20-30 students, it is better to have a space of 1000 square feet or more. (Hall-Sheehy, 1986, P.198). Most popular organisations of classroom are:

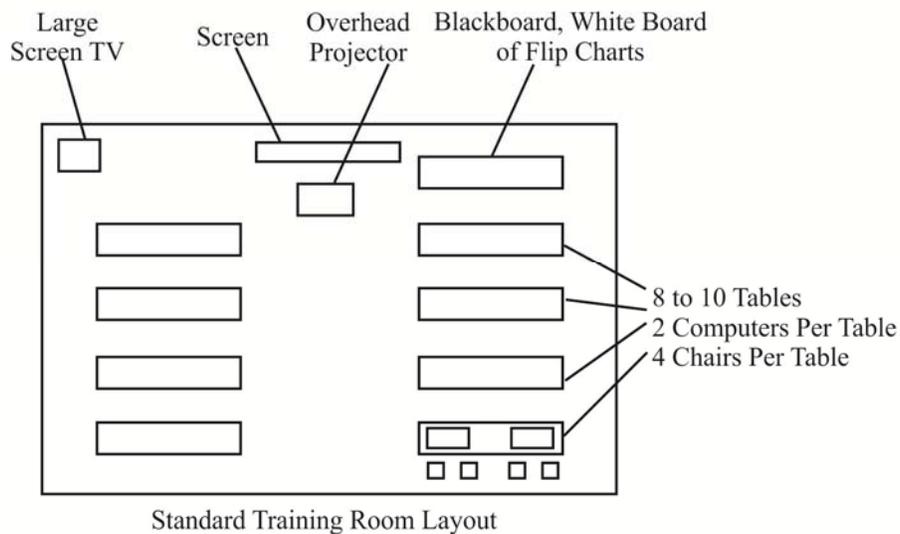
- Traditional arrangement in which every student faces the front of the room.

U-Shape

- An amphitheatre setting

Traditional arrangement offers symmetry and uniformity. As every student is facing in the same direction, it is easy for teacher to address, guide and manage the activities of the students. This arrangement is shown in the diagram.

Fig.4.1

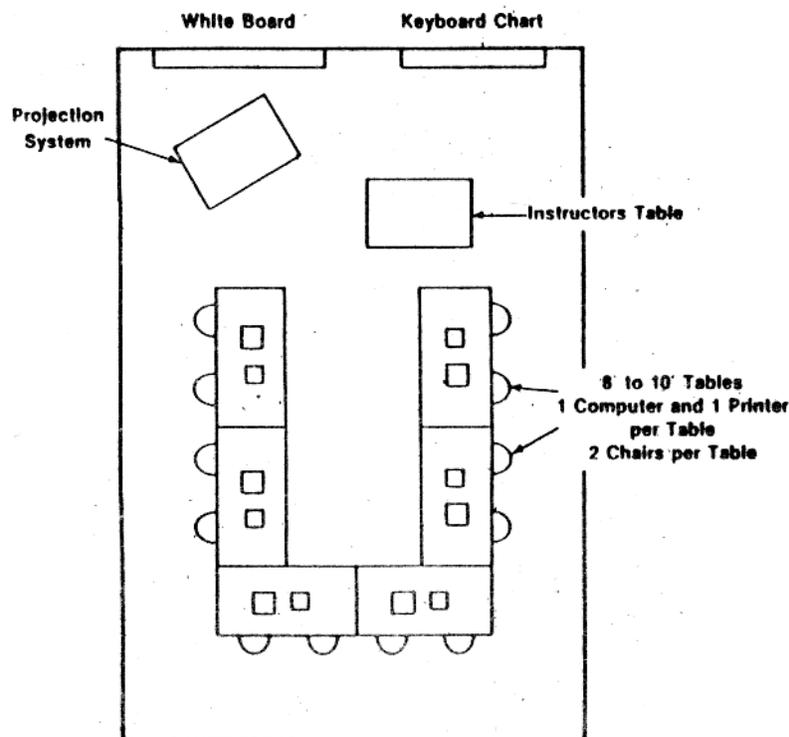


Source: Hall-Sheehy J. (1986). Computer Basics for Human Resources Professionals. New York: John Wiley & Sons. P.199.

Disadvantage with this arrangement is that it restricts the movements of teacher between the tables.

U-shape is remedy for this difficulty, more over U-shape organisation allows the students to have interaction with each other more easily but sometimes, teacher may loose management control over the class, moreover student feel difficulty in having attention in demonstration.

Fig 4.2

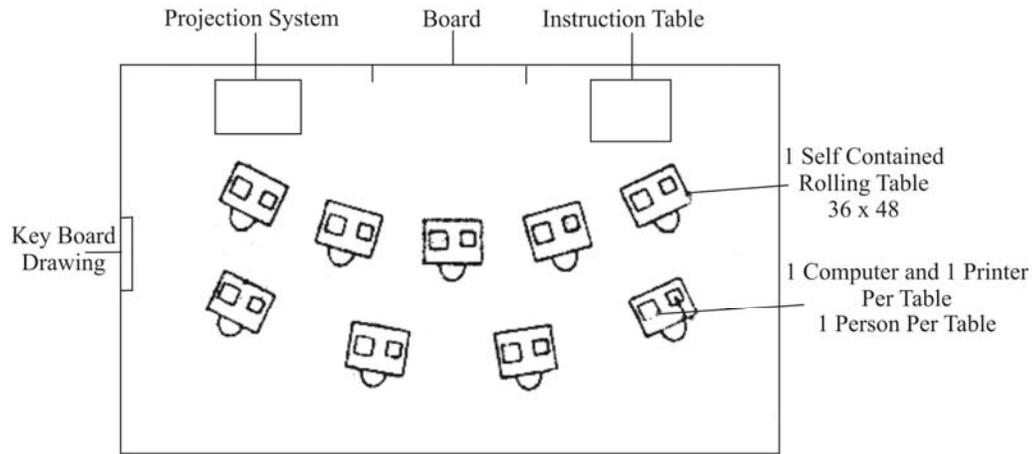


**U-Shape
Training Room Arranged in a U-Shape Layout**

Source: Hall-Sheehy J. (1986). Computer Basics for Human Resources Professionals. New York: John Wiley & Sons. P.200

Amphitheater arrangements require more space and furniture than other arrangements. Contradictory to first two layouts, here teacher has more freedom of movements and students have less interaction facility. The advantage of this organisation is that it allows everyone to spread out and feel as if they have space for themselves.

Fig 4.3



Training Room Arranged in the Lecture Format Style

Source: Hall-Sheehy J. (1986). Computer Basics for Human Resources Professionals. New York: John Wiley & Sons. P.201

DiGilio (1987, PP.68-72) has sketched the layout in somewhat different a modified from. His arrangement is differentiated by the letter of alphabet. I-Ii formation suggests:

- "I" arrangement
- "E" arrangement
- "O" or "U" arrangement
- "H" arrangement

Whatever the organization of class is made teacher should keep following points in his mind.

- Ample room for teacher and assistant to move freely in the room.
- Location of electrical outlets
- Location of telephone outlet if modems are to be used
- Student viewing angle
- Ventilation
- Storage space for classroom materials

Space for overheads projectors, slide projector, large screen p system, flip chart, or podium (Hall-Sheehy, 1986, PP.200-20 1).

4.5 Computer as Teacher

Much of early use of computer in education is classified as instructional computer instigate and control learning. This is referred as CAI. In computer programs instruct students through an interactive dialogue. TV educational application packages

incorporate interesting and colourful graphic hold student's attention and include programs to increase reading comprehension, improve spelling, build vocabulary and develop thinking and other special skill.

A tutorial comprises of three interacting components: the subject, student and teacher - what, who, how components (O'Shea and Self, 1984, P. 127). Similarly a computer program to conduct tutorials should be designed based u the contents of the topics, the way of teaching. The desire to build an intelligent computer tutor is not easy to achieve. This cannot be only done by the principles which are behind most of the teaching programs. The actual difficulty lies in educational psychology as we do not know exactly how students learn, and artificial intelligence, for we must try to build computer programs able to use their expertise. Programs developed for this purpose have highlighted the following issues:

“To what extent do we need to understand a student's reasoning processes to be able to help the student to modify them?

How can we induce a student's misconceptions from what he says and does?

How can human expertise be transferred to a student?

What is the nature of tutorial dialogue?

How does a good tutorial take account of a student's interests and aptitudes?"

(O'Shea and Self, 1984, P.171)

These types of questions direct our attention towards the study of complex behaviours more typical of learning situations than the conventional laboratory-type experiments. Actual implementation of intelligent computer tutors remains problematic.

As a computer is a device which can work at very high speed after giving some instructions drawing upon large memory. It can be programmed with set of rules or guidelines - enabling it to draw certain types of conclusions based on the input it receives. For this reason, the ability of computer to "think" and "reason" like humans is referred as an artificial intelligence (AI). Today four main areas of AI are expert systems, natural languages, vision version system, and robotics.

We are interested here in expert systems. These are programs which provide that type of advise which are normally expected from a human expert i.e. tutor/teacher.

According to Blissmer (1991, P.272) expert system is a "Computer program which solves specialised problems at the level of a human expert". These are used interactively, the system promotes a user for information about a problem and then solves problem, draws a conclusion, suggests a treatment, makes a prediction and if desired to explain the reason. It is of our interest if we study the difference between data processing systems and expert system as listed by Blissmer (1991, P.274).

Data Processing System	Expert System
Uses algorithms or problem solving in a predetermined finite number of steps	Uses heuristics or rules of thumb that guide or lead to a likely satisfactory solution
Uses processing in searching for a calculating answers	Uses inferencing to reason toward a hypothesis
Uses databases or files of predetermined facts	Uses knowledge bases that include beliefs and assumptions gathered from humans
Processes at a raw data level of a problem	Processes at a semantic or pragmatic level of a problem
Data retrieval follows a Boolean matching patterns	Data retrieval follows a rule-based matching based on threshold probabilities.

Expert system has at present some drawbacks, too. Major one are: it can only function in limited domains where accumulated experience can be easily translated into a knowledge base, inability to handle the novel or unique situations, etc. But at the same time, it is hoped that gradual progress will continue. We at present can conclude that, pedagogical problems, financial constraints and negative attitude of traditional teachers, these will not hinder to a large to introduce computer as teacher.

For further comprehension, please study the work of Shea and Self (1984).

4.6 Uses and Limitations of CAI

Educators agree that CAI can be effectively used as learning. CAI claims that it can produce accelerated skills acquisition over traditional learning methods but it is controversial. In a typical setting, students sit at a microcomputer or an on-line terminal and communicates with the programs in the CPU. This interaction may be in the form:

- Computer may present information and questions.
- After study of this, students responses to information, questions.
- Computer accepts, analyses and provides feedback to the student response.
- Maintains the record of students performance for evaluation.

So basic advantage of CAI is its interaction. Sanders (1983, P.617) enlists the uses and advantages of CAI as:

- Individual help is available to the student who might otherwise ignored in a classroom.
- Student can privately move at his own speed.
- Computer is impartial, patient, and objective and student gets immediate feedback to answer given.

CAI is now generally regarded as being based on inappropriate educational philosophy (Howe and DuBoulay, 1979, PP.240-246). It is interesting to mention here that term "drill and practice" has changed to "structured reinforcement" but does not reduce the criticism.

- Individualization which is one of the major uses and advantages may not achieved,

individual instruction often means only individual access not specific teaching for students' strengths and weakness.

- CAI program may not be precisely right for a particular class, may not easily modifiable.
- Drill and practice program often fail to respond appropriately to wrong answers.
- CAI is inconsistent with many syllabi.
- Drill and practice shares possible recessive effects that such questions may have when used in other contexts.
- CAI is impersonal in its nature.
- Many schools do not have enough budgets to computerize.
- Usually our teachers-are not fully trained to use CAI.
- Selection range of CAI packages for education is limited, at least in Pakistan.

The incentive to develop appropriate CAI program is not present in our school.

In spite of all these problems and limitations the use of CAT will increase. New language and hardware with expanded capabilities will overcome these disadvantages and problems.

Now for further comprehension, go through these referred pages.

4.7 Activities

1. Drill and practice is the most used strategy of CAI. Visit a school which has a computer and enlist subjects in which drill and practice is used.
2. Prepare a note elaborating the simulation, discuss with your colleagues, and record their reactions for tutorial.
3. Visit a library and identify three examples of computer usage in education that have not been discussed in this unit. Research these examples and present a report in the tutorial class.
4. Get a problem-solving package from any source, list benefits and present to a semi-seminar and discuss it.
5. Brief your colleagues about the "computer as a teacher". Record their reactions and try to dissolve their phobia if any.

4.8 Exercise

1. Define CAI.
2. Enlist different modes of CAI.
3. What is drill and practiced? Why drill and practice is so popular?
4. "Simulation is controlled representation of real world phenomena". Discuss.
5. What is problem solving? Discuss its elements.
6. Discuss advantages and limitations of CAI. Keep in view Pakistani perspective.
7. "Difficulty increases as the subjects become less about facts and more about procedures". Elaborate in the context of computer as teacher.

8. Discuss program competence.
9. Define tutorial strategy. Discuss their range.
10. DeGilio (1987) has suggested four different arrangements of layout of a computer centre. Analyse “H” arrangement.

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Unit 5

TOOLS AND PACKAGES USED FOR CAI

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5.1 Introduction

The introduction of computers into our school is an immediate goal as we have recognized the importance of introducing computer schools. This new technology offers us an opportunity to have an equal footing with industrialized nations. There are four possible application areas in education.

1. remedial programs for students who have fallen behind in their studies. This is a use of CAI.
2. simulation programs or combined tutorial - simulation program in science teaching to replace rather costly laboratory equipment.
3. higher education programs in which there is very low teacher to student ratio or there is no qualified teacher.
4. development of special-purpose microprocessor-based devices.

It is clear from the above that introducing a computer into a school is not simply a matter of purchasing one and placing it in the classroom. There are many factors that must be considered before a school even orders a computer. In our schools, usually rural ones, there may be few who understand the significant cost or value of a computer. They need guidance which may be three fold. This is according to Wayth (1983, P.21) may be as:

1. Teachers must be helped to overcome fear of modern technology.
2. Create understanding what a computer can do that a well trained experienced teacher cannot do.
3. Feasibility of using a computer in the classroom.

Teachers will need training in the use of computers as it is a very versatile tool and must be used as such. In a class of heterogeneous abilities, the same program cannot be used for gifted and slow learner students. Here a teacher is required to know which program is to be used for which group of children. The teacher must be familiar with the objective of each piece of work.

It is wise to discuss the merits and demerits of a computer not being used in other schools. The overriding factor in choosing a machine is that schools within the same area should buy the same machines. This will help users to exchange the experiences and programs. Also training of teachers will be facilitated by having one type of computer.

Educational software offers the possibility of good pedagogy at low cost. The characteristics of educational software are as follows:

1. It is user - friendly.
2. It is multipurpose.
3. It does not usually depend upon language ability

The three characteristics of software listed above are educationally important. But at the same time good software is complex to develop, to use in the classroom, even to teach teachers. These are used as supplementary. Some packages may require the presence of a teacher while others are self instructional and highly interactive. Success or failure of CAI depends upon the programming. Usually CAI programs are written by programmers.

Teacher may design CAI logic and make content decisions but content and logic is translated by the professionals. This will help the teacher to adjust computer to local requirements.

5.2 Objectives

After the study of this unit, you will be able to:

1. Describe the devices used to prepare output and filmed.
2. Summarize the characteristics of the devices used to display graphic information.
3. Identify the factors which influence the use of computer in educational institutions.
4. Discuss the role of computer in self-learning.

5.3 Computer Graphics

For more than a decade, computer graphics have been a part of the field known as CAD/CAM. (Computer aided design/computer aided manufacturing). In this, computers are used to create two and three-dimensional pictures by using hand tools and tracers.

5.3.1 Graphic Input Device

There are many ways to produce and interact with screen graphics. Besides mouse which has been discussed already. Some of these devices can also be used for input not related to graphics.

5.3.2 Digitizer

An image whether a drawing or photo can be scanned by digitizer. Digitizer can convert image into digital data. This digital data can accept and represent on the screen by digital tablet, one can create his own images. This device has special styles. With the help of this style, one can draw or trace images. After that these images can be converted to digital data which can be processed by the computer.

5.3.3 Light Pen

Light pen is pointing device which can be used to choose a displayed menu options. It is versatile to modify the screen graphics or make a in selection. The pen consists of a photo cell placed in a small tube. When user moves the Lip of pen on the screen surface, pen detects the light coming f limited field of view. The light from screen causes the photo cell to respond the pen is pointed directly at a lighted area. This electrical response is transmitted to a processor, which identify the menu options. Thus the pen tells the comp where to enter or modify pictures or data on the screen.

5.3.4 Touch Screen

Touch screen accepts input data simply by direct human touch: fin scanner on the edges of screen pinpoints the touch location and c correspondence response on the screen.

5.3.5 Scanners

Scanners are basically input devices that are capable of recognizing mar s or characters. Scanners can produce images; they vary in their ability to scan text. Files created by the scanning can be used like any other file. Teachers can sc in the text in books for use in the class room.

Graphics Output Devices

Popular output device is a plotter. A plotter can draw hard copy graphics output. This output may be in the form of maps, bar charts, and engineering drawings even two or three dimensional illustrations. Plotters are available in drum or lat bed paper holders. When drum device is used, paper is placed over a drum that rotates back and forth to produce an up and down motion. A carriage holding more are more pens moves the carriage moves horizontally across the drum. The pen(s) can move along this carriage to produce motion across the paper. Carriage and drum movements jointly produce a picture. When flat-bed (table) plotter is used, paper does not move, pen holding mechanism must provide all the motions.

5.4 Computer and Adapting to Local Requirements

CAI Software system includes CAI course material and program inserted into the computer which tell the computer what to do. According to Rodgers (1970) a CAI program should:

1. allow the instructor to load actual CAI material
2. can request performance data
3. allow revision of course material
4. allow the student to identify himself, the course he is in, to select the point where he will start the course.
5. process a student's responses and choose the subsequent stimulus display.
6. present stimulus display and receive the student's responses.
7. Collect, summarize, and print out the performance data.

This program must be inserted into the computer before a user begins the course material for CAI. While using computers in education, five questions are there which are basic while we talk of adaptations to local requirements:

1. Who should use computers in education and how should they use them?
2. What uses should be made of computers in education and what is needed to support the uses?
3. Where in the educational process should computers be used?
4. When will it be possible to make significant use of computers in education?
5. Why bother to use computers in education at all? (Garland, 1974 P.7)

The existing computer resources should be used. There are two basic reasons for use of existing computer resources in schools:

1. "difficulties involved in expecting any real change to occur in the established teaching and learning procedures present in schools.
2. an appropriate or unproductive view of educational computer usage itself' (Collis, 1988, P.4).

Computers can be used in schools if teachers want to use. A study conducted by Goodlad (1983) found that teachers across grades and subject areas relied on two dominant instructional strategies.

1. Lecturing or demonstrating to the whole class.
2. Directing students to work along at seatwork or homework, using their textbooks or worksheets. Goodlad observed that only less 86 than six percent of communication

went beyond established class procedures. Next is resistance to change, teaching learning process is highly resistant to change. This resistance may also be due to familiarity with routine.

Computers first arrived in schools not because of its curriculum related value or because teachers wanted them but because of surge that students needed to become computer literate. Parents of upper class became concerned with computers and expected their schools to supply computer literacy to their children. Computers become machine for survival for these schools. In the beginning, each such school purchased one or two computers and adjusted to curriculum by providing drill and practice to their children.

Cost is one deterrent to have a computer in our class on average. Normally its cost is around Rs.30,000/- which is beyond the budget of potential use. Although trend is in the favour of purchase of computers especially educational purposes. This trend is growing as rapid innovations have lowered the prices of machines.

Cost of computer is major problem to limit CAI implementation in most of our schools. Although cost effectiveness of CAI is improving itself, one must not forget the expense of course development, teacher training, overhead costs like electricity and space etc. But it is also a fact that if one rupee is spent on hardware two or three are required to be spent on support.

Effective implementation of CAI means that teachers must be trained to use computers. This will raise such questions. Will all teachers be required to take computer courses? Who will pay for teacher training? Moreover some teachers dislike machines and resist the introduction of computers in the classrooms. How this resistance will be overcome?

Another issue to be resolved yet is with wide spread implementation CAI is control of CAI content. Will this control be with the persons? Basic questions in adapting to local needs are as follows:

- Who design and write program?
- Will these persons be educators or technicians?
- Will the school shape their curriculum according to availability of CAI materials?

Finally in Pakistan, selection of CAI software for educational institutions is still limited. More emphasis is placed on developing programs for home education than for school market. Usually a group of institutions buy a single CAI program, then make copies of this for classroom use.

To protect illegal copying of CAI, many software houses are using copy protected formats with copyright. The disadvantage of copy protection is that it prevents parents/teachers from making legitimate backup copies needed to replace worn or damaged diskettes. Another remedy is to get a licensee permitting unlimited copies to schools. Second remedy is to develop competency in teachers to program a CAI. But when they program for schools, they must be paid for their efforts. Program authors should get royalties.

5.5 Self Learning

“How can computer help in education?” Was a question posed in the late 1950s, and a number of possibilities arose in the response. An early attempt at computer was Individually Prescribed Instruction (WI) Project. In America where a computer was programmed to provide daily tests and lesson assignments for student. Teachers were made free to think what and how students learn. This also raises the question of effectiveness: Criteria used for effectiveness was "amount of learning, rate of learning, cost of learning; the thoroughness of learning as measured by tests at a later stage, change in attitude towards computers the drop-out rate or simply the fact of construction of educationally oriented computer based materials".

(Woodhouse and McDougall, 1986, P.17)

CAI is used to refer that situation where students and computer interact and where learning takes place. This is a learning situation where the student interacts with computer through a course of study aimed at achieving certain instructional goals. In a typical CAI setting, students sit at an online device and communicate with the program in computer. Interaction may take place in the following way.

1. The computer presents instructional information and questions
2. Student studies information or instruction presented, answer the questions, and perhaps ask questions of his or her own; and
3. The computer then accepts, analyze, and provides immediate feedback to student's responses, and it maintains records of the students performance for evaluation purposes. (Sanders, 1987, P. 489 Y.

The basic philosophy of CAT involves a direct link between students and software and transfer of basic instructional decisions from teacher to curriculum developer.

Student who has not mastered basic skills can benefit from drill a practice, computer also motivate students and frees the teacher to provide individual instruction. Some says that drill and practice can be carried out by using flash cards or by some other forms of drill. In response to these educators have developed intelligent CAI program in which students interact with I computers rather than respond to it in a predetermined manner. Intelligent C can help the student to generate and solve problems, store, retrieve data, diagnose his misconceptions, and carryout dialogue with program.

Computer facilitate self learning as it:

- provides individual help to the student who might otherwise ignored
- helps student to learn at his own pace
- is impartial, patient and objective
- provides immediate feedback

5.6 Activities

1. Your neighbourhood school has a computer, visit that school and see what type of the display of format of CRT screen available. What a number of characters that can be displayed.
2. Visit nearby electronic market and survey the available computers. List the models.
3. Discuss the advantages and disadvantages of each model with your colleagues and select one for your institution and justify the selection.
4. Survey the video shops of your area and make a list of educational packages. Identify some mathematic and language packages which you feel suitable to the students of class VI.
5. Your institution wants to develop software on atomic structure. Select content and logic and discuss it with programmer so software may be prepared. You can even choose topic of your own choice.

5.7 Exercise

- Q.1 Discuss computer aided design.
- Q.2 How a digitizing tablet is used for creating images.
- Q.3 Explain the advantages of touch screen over light pen.
- Q.4 List criteria that are important to consider when purchasing computer for educational institution and justify it.
- Q.5 Elaborate the purposes served by electronic spreadsheets.
- Q.6 What types of graphical images one can construct with presentation graphic software.
- Q.7 Discuss basic entering and editing operations.
- Q.8 Discuss functions of presentation graphic software and differ types of packages.
- Q.9 According to Collis (198) there may be two reasons for using computers in schools. Discuss these.
- Q. 10 Enlist and discuss the ways in which computer helps self learning.

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Unit 6

COMPUTER MANAGEMENT LEARNING (CML)

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6.1 Introduction

Computers are affecting the life of our era and will continue do so future. Justifications of computer lie for its use in education because it is able aid teachers and the students so they can do things which they could not do earlier. The computer has to become assistant teacher. Educational value of computer can be seen in Figure 6.1.

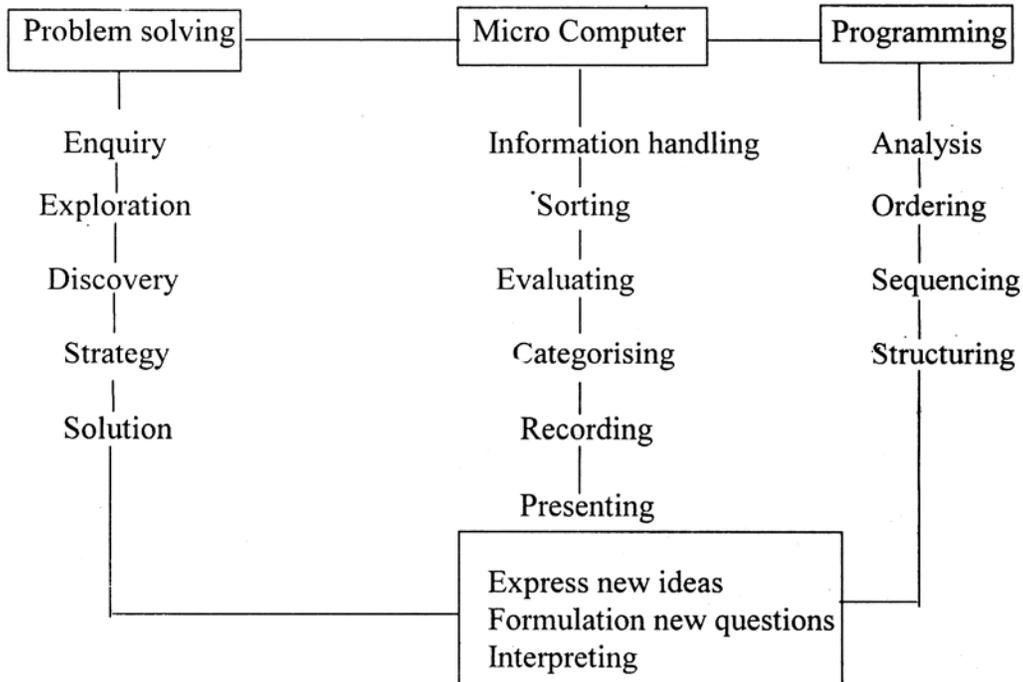


Figure 6.1: Based on the work of Wayth (1983, P.14)

Originally, Computer Assisted Learning (CAL) was thought to be a help' the teacher who was the primary decision maker while Computer Manage Learning (CML) extends to provide self contained instructional range and testing experience for students.

A new range of applications of CAL and CML has emerged which li some feature of both approaches so the demarcation of both has blurred.

Computer Managed Learning (CML) can contribute to the efficiency running educational institution and assist teachers in the classroom, helps school to face the problem of reduced teaching staff and large class size. Moreover, allows self paced individualized learning and flexible scheduling of time instruction. CML can also be used for learning at home.

In test construction, item pools can be stored as computer files. Classification of items can be based on taxonomies of objectives on the "universe" of possible questions. This classification may be on psychometric and technical characteristics or any other base.

Computer can manage and update such pools and retrieve item appropriately.

With the advancement of computer control printing techniques, it has become possible to print items which comprises of complex drawings and pictures. Teacher can scramble the order of questions in a test. This can minimize the possibilities of cheating.

An individually administered interactive criterion-reference test can be administered by a computer. A decision algorithm applied repeatedly during-test sequence determines the sequence of questions to be asked, and perhaps the pointw4ich testing may be discontinued. In interactive testing situations, the computer can be programmed to control a variety of peripheral devices so that test items can be displayed on a cathode ray tube (a television or monitor), on slides, or via sound recordings, and so on. (Lechercq, 1989, P.164).

After administration of tests, students test responses can be fed by various techniques. These may include keyboard, optical mark-sense sheets, bar code reading and direct optical character recognition.

Computer managed testing is usually integrated into systems of CML. Cost is one of the major contributing factor in the use of computer. As the capacities and speed of computer is increasing, cost is decreasing. Lecharcq (1988, P.163) estimates that about 20 percent decrease in the cost each year is there. Use of computers in preparation, administration and scoring the tests is being increased.

6.2 Objectives

After study of the unit, you will be able to:

1. Develop rational of computer managed learning;
2. Discuss impact of computer managed learning;
3. Utilize the impact of computer managed learning
4. Elaborate the capacity of computer in testing.
5. Select appropriate software for local needs from computer resource guide.

6.3 The Rational of Computer Managed Learning (CML)

We have studied CAI, and now are going to learn about CML. The fundamental difference between the two is of control. In CML control of computer lies with students. One of the advantages of using CML is improvement of motivation. Initially children are keen to have their turn and therefore motivation is high. Even after long use of computer, motivation level does I fall. Increased motivation does mean better individual performance.

Information stored in computer data base can be used as resource students as compared with traditional library. The difference is that computer programs retrieve information instead of library check out system. The packages may be purchased from market, get developed by the professionals or even by students and teachers themselves, keeping

their specific needs in mind. It is a possible to get data from remote data through a connection (data base services) computer has become necessity to student in a wide range disciplines at various levels. In science, students make use of computer in variety of ways.

Question "How can the computer help in education?" was posed in 1950s. A number of possibilities came up. First activities which were recognized w the activities which are nearer to activities carried out by computers now-a-days. As computers are being used in commercial application, the possibility of us: computer in learning process seems to be reality. An early attempt of using CML was Individually Prescribed Instruction (IPI) project in which a computer was programmed to provide daily tests and lesson assignments. Woodhouse McDougall (1986, P.17) comments that CML made "teachers freed from record keeping, and from deciding what and how students should learn, were to function as tutors, helping children to maximize the learning from their computer prescribed lessons".

It is a fact that initial applications of computers in education w principally motivated by the presence of computer. But there were sped objectives also. The next question posed is of wider utility of any particular computer. This is question of effectiveness. However, the concept effectiveness is relative and can be defined in many different ways. Woodhouse and McDougall (1986, P.17) include: the amount of learning, the rate of learning, the cost of learning, the thoroughness of learning as measured by tests at a large stage; the change in attitude towards computers; the dropout rate, or simply fact of construction of educationally oriented computer based materials in concept of effectiveness.

Another point to be noted here that many author used Computer Managed Instructions (CMI) and Computer Managed Learning (CML) interchangeably. Woodhouse and McDougall (1986, P.215-216) refers (CML, CMI) to classroom management systems that use computers to help teachers to organize and man, teaching and record keeping for classes. But it is fact that the flexible role testing has made some activities overlapping in CML and CAI. Watson (19 P.29) refers Salisbury who describes CMI as mode: a combination of CAI administrative applications. Under this mode, the instructional material is I stored in the computer, but computer is used to help the student to formulate reasonable goals, develop plans to achieve these goals and take responsibility to carry out these goals. So basic function of CMI is to assist the student in developing a sense of responsibility for his educational, personal and social development.

Computers when used for testing in CML can take a variety of forms. These forms depend upon the role played by the computers. Woodhouse and McDougall (1986, PP.218-219) classify these as follows:

Testing based: off line

In this tests are set either automatically or manually. Computer score the test and decides what learning activity is to take place next. This prescription is computer output which

can be carried out by invoking the specified CAL lesson.

Testing based: on line

Here after setting tests, these are stored in computer. Students take test via a terminal, scoring and analysis are carried out by computer immediately. The next lesson is determined on the basis of result. Another form may as the system can produce next question on the basis of previous performance.

Non-testing based: control of instructional sequence.

Here teacher develops a large number of student assignments, sequence, tests etc. for each student. The student is directed through individualized sequence and machine records their performance. The teacher can review the record at the end of the day, may revise the specifications for the next day. This is closer to individualized instruction than CAL/CAL.

Non-testing based: record keeping

In these students activities are not integrated. Computer is used by teachers as recording machines. This makes easy for teachers to produce term reports etc.

We can conclude that CIVIL is based on behaviourist assumptions and may reduce teacher pupil relationship. If properly used, it can produce many benefits. But maximum benefits can be made if careful planning precedes implementation. CIVIL needs subject matter to be analysed, sequenced with identification of objectives. But it should be seen in the spectrum of communication modes, instructional activities, administrative activities and their interrelationship, so learning may be made more effective.

6.4 Impact of Computer Managed Learning/Training

It is a fact that computers in education are still in their infancy in Pakistan. But its use like CAI, CML in advanced countries has proved its worth. In CML data has to be acquired and entered into the computer which includes both student data and more detailed assessment of their knowledge and achievement. Secondly feedback is provided to the teacher/or student, usually having detailed analysis of the performance. Third CML systems normally provide records or reports for subsequent use.

The power of computer in the shape of CAI/CML is yet to be utilized but Tinker (1987, P.66) views it "a radical new approach in the schools instruction throughout the entire curriculum... As the hardware and the software technology mature, there are new possibilities for broad-scale, technologically enhanced changes in the mathematics and science curriculum".

For most part, CML is supplementing the "old" teaching strategies. If old curriculum and strategies are effective, teacher misses the new opportunities provided by the CML.

CML systems have been largely based on mastery learning principles. The basic mastery learning principle states, according to Woerner, et-al (1991, P.24) that "given enough

time and help, about 95 percent of the learners in any group can come to a complete mastery of the designated instructional objectives" Traditional instruction hold time constant and allows achievement to vary within group. But mastery learning reverses this, which holds achievement constant and time varies. In mastery learning: 1) grouping and scheduling may be difficult; 2 slow learners spend extra time on minimum standards, faster learners may wait progress to higher level achievement. These two problems are met in these ways:

1. Many students need additional time and individualized practice with feedback to meet objectives. Computer programs can provide opportunities to study at times and pace suited to the individual needs.
2. Additional programs can be bought or programmed to master the objectives quickly. These additional programs may provide more intensive study of the content to achieve the objectives.
3. Grade book, record keeping, and other management programs can help teachers to keep track of student performance and coordinate instruction.

Knowledge is hierarchical in its nature, example is Blooms' taxonomy of objectives. Often the best way to have required level of achievement is to identify the pre-requisite skills needed for the current content learning. The computer often fits perfectly into schemes to assess; pre-requisite skills prior to the actual learning. The computer can help either by: 1) performing the assessment 2) delivering remediation or by doing both. If even computerized diagnosis is not made, computer can make a valuable contribution by helping students to develop pre-requisite skills before beginning the instruction.

CML is also significant in this regard, as the diagnosing activity is time consuming activity.

During successful instruction, students must pass through both learning phase (exploration and introduction) as well as practice (application) phase.

Usually individualized instruction is supported by CML but there is also move to support other pedagogies.

Grouping may be made in such a setting:

- When students possess sound initial mastery of skills. They need practice for automatic, individual and appropriate practice. Two or three programs may be used by whole class for appropriate practice.
- After necessary initial mastery of skill through CML for this practice cluster grouping may be made for gifted students.

If CML is used for individualised learning, teachers should be cautious of over use of individual learning. Students are likely to waste a great deal of time by using these programs when they are not guided or skilled teacher is not there.

Another significant effect of CML is on the teacher-student relationship. The role of teacher shifts from traditional leadership to guide, monitor, resource person, strategist,

organizer of learning, and diagnostician. In addition teacher may be an adapter of program to suit the needs of the learners. In this reference it also seems necessary to modify the teacher training program so future teachers may cope with this changed environment. For this Diem (1982), suggests the introduction of communication and information studies into pre-service teacher's curriculum. This may include the use of generic programs - appropriate use of graphics, word processing, databases and spreadsheets - integrated into existing teacher training curriculum.

6.5 Computers and Test Construction

Computers may be seen in at least two ways in education. First as a subject of study because this is gaining more and more attraction in institutions. The second is as a tool in education. As a tool, computer can be used to control the education process.

Probably the most common testing application is the use of computers score objective tests which students have answered. Answers are marked by students with a special pencil. Here a student's progress can be determined quickly. Students can get immediate feedback of their successes and mistakes. At the same time, instructors may be relieved from having the bulk of grading task. Test stored results may be used for error-analysis purposes. The nature of errors made by the students may be analysed, suggestion may be made for eliminating detected deficiencies to students and teachers.

Another use is the standardization of tests, statistically it is incorrect to compare a test or examination mark with a mark from another test or examination even if both are set and marked by the same teacher. Programs exist which can compare unlike with unlike by converting to a comparative scale. It is difficult to compare manually as it demands drawing of graphs and reading these while this can be done very easily by the computer.

Computer, application in educational institutions' can be seen in test generating programs. There are computer testing programs which help the teacher in more efficient delivery of the instruction. For example, the BIOLOGY TEST MAKER (J & S Software) produces tests or quizzes from a bank of 15 questions. The teacher, can mix the questions from different units, randomize question formats, and save tests on disks. DATA TECH MENTOR MASTI (Data Tech Software Systems) is an authoring program suitable for science curriculum. It is menu-driven program. Teacher can construct information section, true/false questions, multiple-choice questions and short answer questions. These can be presented in quiz or game format.

There are number of companies which market test production programs for example CREAT-A-TEST (create-A-Test) system prepares, tests for class distribution, support all the question types, and allows the teachers to organize their own questions banks. This package offers prepared question banks for science topics for grades 6-12. (Woerner, 1991, PP. 187-188).

Heart of computer-based testing system is the item bank. Item bank data base which contains a large number of test questions and statistical history the use of each item. If

one wants to construct a test with such a system, one in select appropriate questions from the item bank. After administration of the test, answer sheets may be submitted to computer for analysis, sheets are graded a student performance is reported for entry in the gradebook. The test is then analysed to determine the behaviour of individual test items. The analysis results \ are entered into data base and are combined with the past history of each item. With the passage of time successful items are maintained, new items are introduced, and unsuccessful items are deleted.

6.6 Computer Resource Guide

Usually computers are arranged in computer lab. Computer lab is networked set of machines so pairs of students may work simultaneously. In addition, we might see computers in classroom. Besides these, there may be teachers' computer resource room with at least one system, complete with printer and modem. While each school in future may utilize computer equipment for administrative purpose also.

For these purposes multiple copies of a basic school applications software bundle - a word processor, a data base management program, a spreadsheet, communication software and a graphic program are available in the market. As already mentioned in previous pages that it is better to use same packages throughout district or division so file transfer procedures are' simplified and consistent throughout the district/division and everyone soon learns how to operate the particular telecommunication components selected. Moreover, software can be borrowed from district/divisional resource centre for local use.

Many developing countries carryout review process of "going software". But this is not usually available in Pakistan. Commercially available evaluations are provided by Educational Product Information Exchange (EPIE) Institute (in USA) and by some other agencies. The computing teacher journal (International Council for Computers in Education, Eugene, Oregon) provides a section on software review in its each monthly issue.

There are many evaluating agencies who use a simple check list to conduct evaluation. Collis (1988, P.318) comments the situation as "these instruments have the advantage of relative ease of use by untrained evaluators but are limited by the criteria used and by the assumption than an objective instrument will yield reliable results".

We should start 'with "What do I want the system to do"? When purpose is determined, we can choose easily among software and hardware alternatives. First thing is to analyse the "Needs". Parker (1993, P.444) refers needs as "requirement that the computer must need. If you are not sure what you want a system to do, you might make an expensive mistake.

Here a list of 'needs' which may help you:

- Word processing
- Spreadsheets

- Organizing, scheduling and mailing
- Desktop publishing
- Preparing slides and presentation materials
- Retrieving information for local and remote database
- Transaction processing
- Learning
- Software development
- Design
- Games and entertainment

Because computer systems which are specially designed to serve certain purposes (games) are often poor at others (such as word processing). When 'needs' are established, next step is to list some alternative systems that in satisfy these needs. Consider software first, then hardware. As software is related with needs. But it is wise to select hardware and software jointly as decisions are interrelated. When list of alternatives is made, evaluate this. It can be examined by 'test driving'. Software package should be evaluated on the specified hardware, e.g. a software that runs smoothly on a Dell 80486-based. Computer system may not run smoothly on Compaq 80386 Chip. Parker (1993, P.447) has enlisted selection criteria in this reference as:

- Product functionality
- Ease of learning and use
- Cost
- Vendor reputation
- Support
- Expandability
- Meets industry standards
- Speed
- Favourable reviews
- Delivery
- Documentation

After this, time is to choose a system and purchase it. People choose between system alternative in a number of ways. Some may make a formal list of selection criteria while some may use less formal approach.

Before closing this discussion, it seems necessary to mention some microcomputer journals and periodicals which may be an excellent resource for use. These journals publish articles, review exiting products, introduce new one and provide tips on using products more effectively:

- Mac World, one of the most widely read journals on the apple Macintosh.
- PC Week, PC World and PC Magazine are largely for users of IBM and IBM-Compatible microcomputers where as MacWorld and MacWeek are for users of

the Apple Macintosh. Infoworld caters to both IBM and Macintosh environments.

- LAN Technology covers local area networks. DBMS and UNIX Review address database management system and UNIX operating system respectively.
- PC and Computer Buyer's Guide and Handbook focus on assistance to buy PCs.
- Computer Blue Book shows what you should pay when buying used one.
- 'Infoworld' regularly evaluate software.
- PC Magazine is well known for comparative evaluations of a very large number of products.
- Many journals have regular columns which give users advice in specific computing areas.

As software and hardware field is being expanding rapidly no resource list can be complete one; a sample list on science software is being presented in referred pages. But it is also advised to search local market also.

6.7 Activities

1. Survey local market of computer software and select software program of the subject of your choice and give justification for selection.
2. In the tutorial, explain CML. Discuss the impact of CML on learning with your colleague students and record the discussion.
3. Have a chance to visit Board of Intermediate and Secondary Education. See how computers are used there.
4. Prepare suggestion list to improve the computer use in the Board of Intermediate and Secondary Education you have visited with the consultation of an educationist and computer programmer.
5. Have a meeting with your Principal. Discuss with him needs of your institution and then develop criteria for purchase of a computer, also search out the possible resources to meet your demand.

6.8 Exercise

1. What is Computer Managed Learning. Differentiate it from Computer- Assisted- Learning.
2. Enlist advantages of CML and look into the impact of these on teaching learning process in specific terms.
3. CML may have some disadvantages also. How these can be overcome (if possible).
4. Develop a rationale for the use of CML in our educational institutions.
5. There may be some advantages of computer managed test construction over teacher test construction. Discuss.
6. There may be some disadvantages of teacher managed test construction over computer managed test construction. Discuss.
7. In some instances computer managed test construction is being used in Pakistan. Discuss its implications on the prevailing system of evaluation.
8. "CML is largely based on mastery learning principles". Discuss.
9. Computers when used for testing in CML can take a variety of forms. Discuss classification of Woodhouse and McDougall (1986).
10. Discuss the importance of computer resource guide. Why it need continuous updating? How can institutions make continuous up-dating?

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Unit 7

**COMPUTER APPLICATIONS IN
CONTENT AREAS**

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7.1 Introduction

Computers are being incorporated in Pakistan in educational system at unprecedented rate. The wave of this interest of educational computing has stimulated a complex set of influences. Computers and its associated developments (e.g. video-disks, digitizing tablets, environmental probes) have brought educational experiences to the class. But this is costly and this cost demands for careful planning of computer education as well as teacher-training program. Planning is the process employed in developing a new program improving existing one (Maher and Bennet, 1984). Basic but determining fact in planning are: its purpose, the staff, objectives, materials activities, schedule a other elements which make jointly the program. Evaluation is also a proc employed simultaneously in four major characteristics:

1. Planning must be care full
2. Planning should be accurate
3. Planning must be practical
4. Planning should be conducted with concern for propriety

Bennet (1986, P.5) summarizes a generic planning and evaluation process as:

Planning and Evaluation Tasks: Identify a purpose for the program Select materials Choose equipment Arrange facilities and staffing Establish program guide lines Train program staff Estimate costs Facilitate and monitor program activities Evaluate program outcomes

As computer education program and teacher training programs exist within the context of various other programs, so it is necessary to consider the environment carefully.

Computer education and evaluating computer programs should consider following:

- * Computer education program needs planning and evaluation
- * Planning and evaluation process is generic
- * School programs exists within a system of inter-related components
- * Planning and evaluation is a team effort

With the change of focus or stage of planning and evaluation process, method, staff and activities will frequently change. Again look into the table developed by Bennet (1986, P.10) which provides framework for planning and evaluating computer-education programs:

Planning and Evaluation Process	Introductory Computer Services Education Programs
Identify a purpose	
Select software	
Choose hardware	
Plan a computer centre	
Plan a curriculum	
Train teacher	
Estimate costs	
Facilitate & monitor activities	
Evaluate outcomes	

So teacher training is very important factor to be considered if we want to introduce computer to their potential in the class.

7.2 Objectives

After the study of this unit, you will be able to:

1. Enlist basic consideration for introducing computers in schools
2. Identify the components of computer education program
3. Detail the components of computer education program.
4. Write the needs for teacher training
5. Outline the aspects of in-service teacher training program.
6. Prepare a comprehensive pre-service teacher training program.

7.3 Basic Considerations

Computer education program, in general, serves to achieve traditional content goals. Students should be taught with computers only if such teaching provides some advantages over conventional methods. This is also due to partial failure of current pedagogical practices. From theoretical perspectives, as discussed earlier computer can individualize learning and instruction to a greater degree than traditional methods, moreover, computers can provide immediate reinforcement and practical experiences which are otherwise impossible. For this application programs may be used. In many schools of the developed countries, word processing programs are database management system.

Teaching students about computers may prepare students for further academic study. So it is necessary to choose purpose for computer education. For this Bennett (1987, PP.20-30) has established a four step strategy for identifying purpose for computer education.

1. *Gather input from all interested parties:*

This will provide broad based support to the program. This information may have human, financial, and physical aspects. It is necessary to build support in early life

of the program. People from these fields can act as a committee computer-education.

2. **Consider the issues raised by various alternative purposes:**

Committee on computer education will determine whether the program will primarily teach about or with computers, what general approach the pro will take, whom it will serve? and what justify it all. Primary among considerations is compatibility with local needs. Second issue related program selection is equity. Third consideration is of resources.

3. **Finalisation of purpose and building the programs:**

Purpose should be kept in view by the designer at every step of plan and implementing.

4. **Evaluate the purpose and adapt it as necessary:**

It is necessary to re-consider the purpose of the program periodically, program. Does the program still capable to achieve the purpose?

When a computer is installed, it is necessary that someone should have responsibility for it so that it may be utilized properly in education. The roll of computer manager is like that of a librarian and following may be his role:

- A staff member hears of a particular program and asks the manager to arrange it.
- A staff member seeks the manager's assessment of a particular program.
- A staff member seeks suggestions for software for a particular purpose.
- The manager obtains software and informs relevant staff members of its acquisition.

Computer manager should arrange an environment in which students and teachers feet to be confident to participate in computer activities. All this requires a lot of time as:

- Computer is a new subject, computer manager must have time for his professional re-training.
- As subject is changing rapidly, he must keep himself abreast of the new developments.
- Manager has to integrate role of teacher, consult, technician and librarian.

Basic consideration for establishment of a computer room is of security, power and equipment, reference material.

Are computers hazardous to human health? Some people are worried about the radiations from video display terminal (VDT). These may cause cataract, cancer, miscarriages, visual problem, stress and sterility, all of these are being investigated. Complaints made by VDE operators are:

- * Eye strains, neck strains, back ache, and fatigue
- * Mental stress

* Emotional and personality changes (Szymanski, 1988. P.506)

Study we have made so far does not reflect any particular ethical code. But requirement of ethical code is there. American Federation of Information Processing Societies (AFIPS) established a code of ethics for its members. (Szymanski, 1988. P.507). AMPS raises these ethical questions regarding computers:

Is it an invasion of privacy to monitor an employee through his or her own computer?

- Is it fair for an employer to use the data collected from electronic work monitoring as the only evidence for evaluating an employee?
- Does a company owe a worker who has been placed by a computer consideration other than that prescribed by labour law or contract?
- Is it right for someone buys a software program to make a copy a friend?
- Should computer operators regard all data they process as completely confidential?
- Is it fair to tap into someone else's computer data files?

7.4 Computer Education

The personal computer and microcomputer (micro processing) have been used in homes, schools and business for many years. This use is due to potential function of computers. This function according to Hawkrige et-al (1990, P.7) may be "integrating systems, improving problem solving and analysis, improving management, developing natural resources, maintaining international communications and national competencies". Use of computer in educational institutions maybe for these four uses:

- "to become aware, at a basic level, of the use and limitations of computers.
- to learn computer programming, usually in Basic but sometimes other language such as PASCAL or LOGO.
- to learn the correct use of 'applications' programs, sometimes called 'productivity tools', for word processing, spread sheet analysis, graphics, process control and information retrieval from database.
- To learn selected topic from school subjects right across the curriculum, with either complementing or temporarily replacing the teacher".

(Hawkrige, 1990, P.7)

Aim of computer education is to make a learner "computer literate", as this will affect their future life. Courses of computer literacy mainly focus on the history of computers, parts of computer and computer programming. Sherwood and his colleague (1986, P.4) emphasis on acquiring information necessary to use computers instead of emphasizing on programming. The important aspects of computer literacy are:

i) Knowledge of General Effects of Technology

Here students should understand the current revolution of computer and its effect

on society. The inventions like calendars, clocks, printing press and automobiles have extremely effected our lives. If we take particularly examples of development of automobiles, this has created millions of new jobs. Industry of buggy were virtually illuminated. Automobiles increased our mobility and freedom over years. People began to build homes in suburbs. Property values in central places of city dropped. In short automobile has made positive and new effects.

ii) *Knowledge of Benefits of Computers*

Discoveries in the field of electronics and physics are being applied in the development of new computers. Inventions like clocks, automobiles, and written language required new types of learning. When these inventions were begun to use, people began to learn: to tell time, drive cars and to read. Similarly people must know to learn computer in order to function smoothly in the society.

Now imagine that someone calls you that "I know I made an appointment to see you within next year but I cannot remember when it is" You have to go through page by page of diary to see the appointment. If you have a computerized version of calendar you can access the required information without wasting t me on search. As computer has capability of accessing information about a number of different categories, moreover, computers can also simplify the task of analyzing data and forecasting projections.

iii) *Appreciation of Different Levels of Understanding*

It is necessary to mention here that teachers and student do not need to know all about computers in order to use them effectively. The type of knowledge required depends upon the purpose for which computers are being used.

Question whether the student needs to understand the details of how a computer works. There are hundreds of people who do not know how a photocopy machine works, or television works but still use it because they do not need to know-how these works. Same is the position of computer education for teachers. Teachers have to focus their attentions on the issues related with the education not with the design of computers. So as teachers, we do not know everything of computer as a machine. Our focus should be on the kinds of knowledge about computers that can be used to help students achieve important educational goals.

In previous units, we have gained required information about input, devices, processing of computer, etc. Now the need is to focus on co education curriculum.

7.5 Teacher Training

The ultimate goal of teacher training is practical. Teachers are expected to use computers to create their own teaching materials, their own programs. For this, computer training should be part of teacher training courses. For in-service teachers, Commonwealth School Commission suggested (1983) the use of:

1. Conferences
2. Broadcast courses
3. Audio-visual tutorials
4. Courses
5. School networks
6. Consultants
7. Action research

The school computer committee should use the contacts established to mediate these to their school staff. Conferences organized will provide opportunities to share experiences among teachers about computers. Broadcast courses maybe made available by open universities. Audio visual courses may be sought from market. These courses are available in various sizes and shapes. Probably topics for short courses maybe:

1. Introduction of micro-computers
2. Computer use in classroom Comparison of computer networks
4. Computer selection
5. Software selection
6. computer use in subject X
7. Programming in language Y
8. Comparison of programming languages
9. Computer application in a specific industry or business
10. Careers with computer

While long courses may address:

1. Computer literacy
2. Concepts of programming and problem-solving
3. Educational software design managing a computer facility

(Woodhouse and McDoughal, 1986, P.273).

Here school network refers to an informal association designed to share knowledge and expertise. It is point to remember that professional begins with introduction of computer, but it continues indefinitely.

The aim of above stated activities is to develop following competencies suggested by Commonwealth School Commission (1983). These competencies are being reproduced from the work of Woodhouse and McDoughall (1 PP.268-270)

Computer Science/Computer studies

1. All the competencies listed for Computer Literacy teachers (below).
2. Working knowledge of relevant curriculum guidelines computer studies, and computer science courses.
3. Teaching skills appropriate for these courses.
4. Familiarity with the competence in using equipment programming languages suitable for schools.
5. Knowledge of available printed, audiovisual and other teaching resources for such curricula, and of sources of information keeping this knowledge up to date.
6. Understanding of current trends in information processing, awareness of developments in both hardware and software.
7. Competence to organize and run a school computer club.
8. Ability to provide advice of a technical nature to other school computer users.

This would require at least two years of undergraduate computer sole study (or equivalent), and a teacher training course including Methods. Practice of Teaching Computer Studies (or equivalent).

Computer Literacy

1. Working knowledge of cog social issues arising from use of information technology; these include discussion, social anal) use of audio visual and other resources for this purpose, setting marking of easy work, etc.
2. Classroom management skills relating to the control, use of, equitable access to equipment, and its integration into lessons.
3. Competence in using hardware and software in both demonstration and small group modes.
4. Skills appropriate for teaching social issues arising from use information technology; these include discussion, social analysis, use of audio visual and other resources for this purpose, setting i marking of essay work, etc.
5. Confidence with equipment, enough to run and assess package a software, to handle simple faults (with power cords, drives, printer connections, etc.), and care of equipment.
6. Knowledge of printed and other resources for teaching computer literacy courses, and of sources for keeping this knowledge up to date.

7. Knowledge of suitable software to support the aims of the courses, and of sources of new software.
8. Skills in selection of suitable software for these courses.
9. Ability to identify and use general sources of current information about computing as it relates to computer awareness courses.
10. Ability to discuss social issues that relate to use of information technology generally, and to educational uses in particular.
11. Enough computer programming skill to be able to teach programming at the level indicated by computer literacy courses guidelines.
12. Understanding of and ability to implement good programming practices.
13. Working knowledge of the use of the computer as an information handling tool.

It is envisaged that a minimum of 60 hours course work would be require.

Other Subject Teachers

1. Awareness of the potential of computing in the teaching of the subject; familiarity with and understanding of the extent and nature of computer use in the subject area outside schools.
2. Minimum knowledge (similar to that suggested for computer literacy teachers) of equipment operation, maintenance and care.
3. Working knowledge of available software, sources of software, and sources of information to keep this knowledge up to date.
4. Software selection skills.
5. Classroom organization skills; integration of equipment use into lessons; use of demonstration and small group techniques.
6. Awareness of changes in curriculum and shifts in emphasis due to new technologies.
7. Ability to discuss the social impacts of information technology as they relate to the subject area.

Primary Teachers

1. Understanding of how computing can affect both the process and content of primary education.
2. Basic knowledge of computer hardware: capabilities, limitations; confidence in setting up and using a micro-computer-system.
3. working knowledge of a computer programming language suitable for use with primary school children, and ability to use it to enhance children's learning (to solve problems, learn mathematics, explore language, etc.)

4. Working knowledge of available software suitable for use with primary children, including information handling and word processing packages, and ability to use these to enhance learning.
5. Skills in software selection.
6. Classroom organization skills which enable the integration of computing into classroom practice.
7. Appreciation of wider social and educational implications of use of information technology.

7.6 Activities

1. Discuss with your colleagues the need of planning a computer C' education program and prepare a report.
2. You have gone through the aims of computer science/computer studies presented by commonwealth School Commission (1983). Circulate the photocopy of these between your five colleagues, then arrange a meeting, prepare aims for Pakistani schools under the umbrella of National Education Policy (1998-2001).
3. Make an appointment with the office holders of teachers association in your area. Discuss and evolve the role of the association with it can play in the training of teachers.
4. Present the plan just evolved (Activity No.3 to D.B.O/Director and find out the possibility of assistance the office can provide in the implementation of teacher training program in the use of computers.
5. Teacher training program needs experts' consultancy. Also arrange these resources and schedule the program for implementation.

7.7 Exercise

1. "The question of software quality is one of the most publicized issues concerning educational computer". Discuss.
2. Discuss the equity issues.
3. You are a teacher in a high school where no funds are available computer purchase. But you feel it is important for your students. What can you do?
4. Elaborate possible means to train in-service teachers for the use computers.
5. Suggest possible purposes for computer education.
6. Outline the curriculum for computer literacy. Make a detailed commentary on:
 - * Data base
 - * Ethics
 - * Careers
7. In the allied material, 12 steps process for establishing computer-based curriculum is suggested. Discuss each step.
8. Develop an example of infusion of computers into Pakistan Studies.
9. The micro computer provides a powerful tool for supplementing problem - solving activities. How?
10. A synthesis of the competency lists developed by Baird (1984), Zalawski (1982) and Moore (1984) is included in your allied material. What sort of curriculum you would like to suggest to develop these competencies in the teachers.
11. Develop a sample in-service training program for teacher.

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Unit 8

ROLE OF COMPUTER IN EDUCATION

CONTENTS

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8.1 Introduction

With the decrease in the cost of computer, more and more, better diversified, learning material for computer is being developed. Thus the use computer in education is increasing. Salomon (1989, P. 168) has raised t questions on which the use of computer rests.

1. What unique questions can computers serve in education?
2. How can use of computers be integrated into curricula and daily school.
3. Activities?

Computer when used as tool has diversified range. This may include

- Computer as calculator
- Statistical calculations
- Numerical methods
- Spreadsheets
- Symbolic mathematics
- Computer as word processor
- Computer as laboratory assistant
- Computer as controller
- Computer as data recorder
- Computer as expert
- Information handling
- Expert systems
- Computer as artist

(Woodhouse and McDcngall, 1986, PP. 45-62)

These can be used in both modes of education i.e. formal and non-formal education. So much of the use of computer in all forms is overlapping. Computer may act as tutor, at the same time its role may be supplementary complementary.

In brief positive attributes of computers, Chaudhry (1996, P 16) has us the following.

The Computer

- is an interactive medium.
- can reduce learning time and increase retention.
- makes learning flexible and suitable to learners.
- can present drill, practice, tutorial, problem solving and simulation.
- provides immediate feedback/result.
- can be interfaced with video tape, audio tape players, video disks.
- can be used to communicate over a telephone or digital line networks)

Limitations of Computers

- high cost of purchase, however it is decreasing.

- suitability of software to the requirement.
- non-availability of operational requirements in distance education institutions.
- inadequacy of teacher's training.
- non-availability of reliable, cost effective and quality telephone infrastructure.

8.2 Objectives

After reading the unit, you will be able to:

1. Enlist the ways in which computers can be used in formal education.
2. Discuss advantages and disadvantages of uses of computer in different modes.
3. Elaborate the use of computer as a tool in formal and non-formal education.
4. Brief the factors, which are specific to computer use in adult education.
5. Analyse the role of computer in literacy programme
6. Propose the role of computer for AIOU.

8.3 Non-Formal and Distance Education

Computer especially micro-computer at home makes a student contact with other students and institutions. The major areas of use are:

1. Entertainment and/or education
2. Processing information (such as maintaining records, accounts, writing letters and data-base management)
3. Communication with other computers

For entertainment and education, a great deal of software is available, e.g. in USA there are about 16,000 pieces of software available for Apple II computer family. To process information, three types of software are required:

1. A word processing program for creating documents etc.
2. An electronic spread sheet program to do calculations or to set up custom accounting and
3. A communication software with a modem. Modem can be connected between computer and telephone wires. This connection makes one self enable the computer to dial up host machines. At present there are many services available that offer access to information stored on their computer for a fee based on "connect time" (Kulkarni, 1989, P. 412)

Possibilities of use of computers in non formal education are use of computers as knowledge archives and organisers. On-line data bases and scholars' workstations provide fresh new media for learning. This capability expense the data communication. It also creates some cost and logistics problems.

As non formal education has a large number of adult clientele, computer has made their access to a large store of information. When there is classroom setting, use of computer is normally as that of formal education when institution and students are at most of the time at a distance, use of it is somewhat different which is being discussed in the coming pages.

Distance education is not only correspondence education. In the last two decades, distance mode is using wide range of technologies. This range includes broadcast radio, television, audiotapes, videotapes, telephones, facsimile machines, electronic mail and computers. (Barker and Taylor, P. 11). As the technology development rate is high and there is increasing pressure to use technology. The influence of technology on distance education was reflected in 1982 at ICDE conference when "Technology is the answer" became immortalized in the conference song. But in some cases it does not even address the basic question. How can we best improve the quality of students' learning experiences in a flexible but cost effective manner? The answer is to improve the quality of distance education pedagogy.

In distance education, where computer based instructions are available, instruction becomes independent of both time and place. Though computer has high potential but not equally used by all distance education systems due to lack of experience, high development cost, and limited resources. From a pedagogical perspective, computer based instruction is not limited to cognitive domain. Students can gain proficiency in intellectual skills by completing questions and assignments that require the student to practice the necessary decision making/problem solving operations. Computer based instruction provides means of providing multiple opportunities for practicing skills and gaining specific performance-related feedback. One of the main features of computers is the ease with which they allow learners to interact with the learning material. Computers can encourage learners to respond to learning material through keyboard or graphics and get feedback on their performance. Computer can also use that information to guide learners to the next appropriate step in their learning. So computers provide interaction with much greater over other media. But-according to Bates (1990, P.28) major weaknesses of computer-assisted learning material is "difficulty of handling a variety of possible interpretations or even different ways of expressing the same correct answer, despite word recognition and flexible spelling facilities."

As much of the role of computers in education is being discussed in his unit. Here in introduction computer-assisted counseling is being briefed which is in its pioneer stage. Computer can carry out number of roles for counseling process.

1. Performing administrative and clerical tasks
2. Collecting information
3. Giving information
4. Making counseling decisions
 - Conducting research and
 - Educating counselors. (Thomas, 1989, P. 165)

Using of computers in substitutions of counselors have brought objection that such a practice violates professional ethics but it seems that devising machines to perform counseling will continue a matter of dispute as computer technology provides increasing sophisticated devices for replacing human functions.

8.3.1 Videodisks

Video disk technology combines television's capacity to provide audio and visual material with computers' capacity for interactivity. It provides possibilities for simulation within controlled instructional settings. Emergence of CDROM (Compact Disk Read only Memory), CD-I (Compact Disk-interactive) and CD-V (Compact Disk-video) has made video disk popular. Video disk has following positive characteristics;

1. Auto frame stop.
2. Frame number.
3. Adjustable forward and reverse timings.
4. Still frame.
5. Interaction
6. VCR less expensive as compared to computer

Limitations of video disk are as;

1. Interactive evaluation is not available.
2. A student cannot solve a question paper on a VDU disk interactivity as he/she can so solve on computers.
3. VDU production cost is high as compared to a computer production, in general.

8.3.2 ELECTRONIC MAIL (E-MAIL)

E-mail is one's personal connection of the world of net. E-mail is a means of communication and computer interaction with other people either one to one or one to many people. Messages are usually prepared off line and sender goes on line to transmit. E-mail uses computers, text, processing and communication tools which provide high speed information exchange services. Following are the advantages of E-mail.

- Adaptability to all kinds of data terminals.
- Can be used to a comprehensive range of interact retrieval
- System
- Speed: document arrives with short span of time send
- Easy to use: promote an increase of dialogue.
- Ability to attach documents such as word processed or spread files.
- Ease of sharing of documents.
- Running cost is much less than the fax. Limitations of E-mail
- Set up cost is higher as compared to fax, Since a fax machine less than a computer.

8.3.3 Computer Conferencing

Computer conferencing is a development of the basic technology of electronic mail. This has created powerful teaching learning tools. Mason and Kay (1989,P.3) claim that computer conferencing will ultimately emerge as a new educational paradigm, taking its place alongside both face to face and distance education, at the same time it will change the nature of traditional multi-media distance education. Computer conferencing is an effective means of:

- breaking isolation of students.

- taking student experience into account.
- high potential for encouraging the adaptation of course and
- teaching the real experiences of the students.

8.3.4 The Internet and World Wide Web

Daniel (1995, P.70) defines Internet as "loose consideration of inter connected networks". Potential of the Internet is linked to two phenomena, first Moores Law: computers capacity and computing power double every 18 months and second Metcalfes Law (Telecom law): utility of a network to a population is roughly proportional to the number of users squared. Students of distance education universities can use its potential for access to libraries. In theory he student can use the World Wide Web to bring data and information from all over the world into home.

Internet is a network of networks and has become synonymous with single global network. It is, at present, most modern information brought scholars and researches closer and changed the world into a global village. It is very essential media for educational institutions. One can acquire sifted and tailored information. It allows the students to interact with combined resources thus facilitates learning.

- It is dialogue atmosphere.
- Can replace existing services.
- Can improve retention rates.

Multi cast conferencing over internet has potential to offer low cost, real life multimedia solution to a wide range of user groups in distance education; sufficient audio quality can be sustained. Hardman et-al (1998, P.74) comments "multicast audio allows groups of users to participate in real time, simultaneous audio conferences, supporting communication that goes beyond the possibilities of telephony or broadcast technology. As multi cast bone (M.bone) can support video and shared look space, collaboration environment can be used to support many distributed user clientele. In distance education, multicast conferencing costs a fraction of the cost of other solutions.

8.3.5 Microfiche

Veaner (1971, P.5) has defined microfiche as an array of micro images, either in positive or negative form, in rows and columns on a transparent sheet of film". It is a micro filmed transparency about the size and shape of a filling card, which may have on it many pages of point. Microfiche is a communication medium. Milan (1985, P.51) has listed following attributes of microfiches.

- (a) They can be produced and mailed cheaply.
- (b) Total, or partial information package can be placed at the user's finger tips for quick reference.
- (c) Can quickly be duplicated in fiche and hard copy form.
- (d) Master copy can be kept on file for future use.

Disadvantages listed by FolCarelli et-al (1982, P.31) relevant to distance education include.

- (a) The number of fiche required to reproduce some documents.
- (b) Lack of standardization
- (c) User fatigue arising from extended use.
- (d) Limited availability of a useful microfiche

Fiche are suitable for recording data of various kinds. This implies that nearly all distance education material may be presented on microfiche. However, a combination of media formats appears more desirable.

8.3.6 Satellite Applications in Distance Education

- i. Satellites have definite advantages in distance education
- ii. entire country can be covered in one step.
- iii. links are extremely reliable and clear.
- iv. reach of radio and T.V. can be increased offer a medium delivery, where land links are in operation.
- v. costs are distance independent.
- vi. several services like telephone, telex, and television can be provided from space.

8.3.7 Formal Education

Computers have brought great changes in education. Computers are encouraged due to these reasons:

- "Children need to be aware of the nature and uses of computer in order to be able to cope with the present and future technological society.
- Computers can help with certain administrative choices, such maintenance of student records and the scheduling of classes.
- Computers can help to improve the learning process. (O'shea Self, 1984, P.1)

It has been accepted that computer must normally accessible to b students and teacher via on-line terminals. In the case of micro computer, I terminal and computer usually form the same unit, while a mainframe may be some distance from terminals.

The rapid spread of micro-computers in the home and the school I raised the possibility of new approach to education.

A primary purpose of using computers as an instructional tool in 1 classroom should be to provide insight and not merely compute numbers process documents. We can say that "an ounce of insight remains worth a ton processing". That we can type faster than can be done by pen. High school student can solve questions faster than Einstein could. But it does not mean that computer can formulate theory of relativity. At present computer can lead improve student performance in thinking logically, formulating problem solution procedures and understanding relationship.

We have already discussed CAI, CML. Here is a brief discussion various usage of computer in planning and decision making in education.

Curriculum Planning:

Computer can serve as tutors, tutees and tools. Until now most usage of computer was restricted to tutor in CAI, to a lesser extend it serviced as tutees when students learned to program in mainly languages of BASIC OR LOGO. In these computers were treated as separate and independent tutors and tutees segreated from all other activities of school. At present trend is to integrate computers in regular activities in the capacities i.e. tutors, tutees and tools

Salmon (1989, P.169) raised two questions what is the nature of this integration and how it is accomplished? The integration means these two components affect each other reciprocally. This relationship takes place on at least at three levels, goals and objectives, pedagogy thought and instructional contents and activities. For first level, change has occurred in the goals towards which computers come to be used. Best manifestation of integration on this level is in the design of new curricula which were difficult in the past and for which computer is best suited for. Such changes need to be accompanied by a change in a pedagogical thought. This thought is rooted in the acceptance of computers which allow more independent exploration, more personally oriented activities, more team work and less didactic instruction.

Reciprocal changes of goals and educational thought may be seen in instructional contents and activities. This is a level at which usually integration of curriculum and computer is realized. This integration appears as the incorporation of computers into the curriculum. The integration can be seen in the unique kinds of student activities with computers.

Computers as Administrative Tool

Educational administrations must work to facilitate the teaching and learning process. But for this purpose sound planning is needed so naturally we as educators will want best returns on investment in hard ware and software. Kinzer et-al (1986, P. 3! 5) searched the research literature on the work of the principal. They enlisted these eight factors.

1. Many activities of short duration
2. Discontinuity caused by interruptions
3. Variability of tasks
4. A hectic and unpredictable flow of work
5. Few attempts at written communication
6. The superceding of prior plans by the needs of others in the organization.
7. Umerous unimportant decisions and trivial agendas; and
8. The preference of problems and information that are specific (rather than general), solvable and currently pressing."

Computers can help in carrying out the functions. General so are developed for business applications can be applied to school administration. For this, three basic kinds of general

software are available in the market. Word processing systems, data base management systems and electronics spread sheet systems. But general software does not always fulfill the purpose of school administration. For this special software are available. The development of special purpose programmes which can be operated by micro-computers is a relatively recent phenomena. Some of these may be of uneven quality, operational problems or so called bugs which interrupt or otherwise negatively affect their functioning.

8.4 Literacy

The importance of literacy is acknowledged since the first words were written. Due to its recognized importance, literacy programmes require careful planning and understanding of the individual being taught. Since learner will probably have variety of problems, in reading, writing and doing arithmetic. So special care may be taken while using computers in literacy programs.

Computers have met the problem of reading and writing with a nature of Skepticism and enthusiasm. For language instruction, there are usually two approaches. Product approach and process approach. The product approach focuses on various discrete skills and allow the language user to generate a successful words, sentence or paragraph. This sub-skills approach is based on the idea that complex processes must be broken into discrete components so focus can be made on each component. Then practice of these is made. Act of learning is largely dependent on knowing the right answer, with the learner being reinforced for mastery of rules, skills and concepts. According to Collis (1988, P. 63) language learning is the product of a stimulus response bonding, where learner essentially depends upon sufficient repetitions of associative practice experiences. This is behavioural model which shapes the learner and that language is a closed system where words means the same to all users of the language.

Many experts view this behavioural approach process approach as outdated and inadequate approach. Process Approach is transactional, or generative approach to language learning and is an alternative model. This approach views that language meaning is dynamic product of the circumstances of word use... and the history of literacy, which the language user brings to the setting. Language continually evolves for each individual. It is based on the results of one's interpretive efforts to find meaning within a given social context. Functional literacy involves the identification of cue complexes surrounding oral or written words. Language requires an active interpreter. Assumption of this approach is that language is open, at the same time it recognizes that openness is constrained by the larger commonly shared language system that constraint it.

Use of computer in language arts instruction comprises of two broad categories.

1. Using commercial instructional software and
2. Using word processing software for essays and creative writing practice.

Other categories include those which have interactive stories, and prewriting "story starter" aids.

Computer provide drill in specific aspects of grammar, punctuation, spelling and vocabulary. Many educators transfer the enthusiasm for tool to the development of writing skills. Riedesel and Clements (1980, P.150) have given following reasons for their enthusiasm.

1. Students are more willing to write
2. It is earlier to get down ideas with a word processor.
3. Student will use of larger vocabulary because of the ease with which spelling can be corrected.
4. Writing speed is increased, once typing is mastered.
5. Neat output is mastered.
6. Much of what is learner is carried out into adulthood".

Another aspect of literacy programs is to make enable one to catty out basic mathematical operations. Usually it is thought in terms of basic facts, calculations, formulas and procedures. Software for strengthening of skills in addition, subtraction, multiplication and division is not only the largest single category of available educational software. At the same time, it is the longest established and most popular type of curriculum based computer application. Collis (1988, P.221) points out four reasons for this.

1. Computation is easily held on one computer.
2. A great deal is known about the progression of skill development in whole-number computation.
3. This type of educational software is probably easier conceptualize and construct programs in any other area and
4. This type of drill in whole number operations is probably easier I teachers to understand and use than most other types of education software and typically requires little or no extra effort on the part the teacher in order for students to use programs.

Software for drill and practice in whole number computation can categorized as: drill, drill/tutorial and drill/game.

8.5 Adult Education

Adult education has acquired greater significance in developing countries. It has occupied an important role in realizing the ideals of human equality a dignity. UNESCO (1976, P.2) defines adult education as "...the entire body organised educational process, whatever the consent level and method, whether formal or otherwise, whether they prolong or replace initial education in school colleges or universities as well as in apprenticeship, whereby persons regarded adult by the society to which they belong develop their technical or professional qualifications and bring about changes in their attitude or behaviour in the t fold perspective of full personal development and participation in balanced a independent social, economic and cultural development."

This reflects that the purpose of adult education is to achieve potential individual as well as development of culture. It is evident that this mutli-dimensional task cannot be met

only through formal institutions. One has to take account of non-formal mode and innovation of computer.

Since so far, we have discussed a range of approaches to the use computers in education, these all are also equally valid in adult education. They may be used to enrich the learning process. But at the same time, adult education has some specific factors to be considered. These factors determine the use of information technology. Graebner (1989, P.175)

- (a) The constraints of organisation structure and funding.
- (b) The educational appropriateness of the various computer-supported learning strategies to the existing range and styles of provision, and
- (c) The potential of computers for extending the diversity of what is understood as organised education for adults".

The most important role that a computer plays in adult education is that it makes communication better. Traditionally telecommunication has been referred to as the transmission of information over long distances by means of telephone, teletype, radio and television while data communication is known as transfer of data between computer-related devices. But at present, the distinction has been blurred as these two have been integrated into information networks where information is processed, and communicated electronically in the form of voice, data, and images over common media. Communication capability must be carefully designed into a computer system and the actual application must be researched thoroughly. As in our society, adults traditionally stay in a particular job for a long period, so the numbers of commands they need to know are large for directing computers. If adults are relatively transient the system must sacrifice some types of performance in exchange for rapid learning and quick attainment of a reasonable skill level. Communication begins when the system is on. The adult must know what command to issue to the system and the system should provide them the required information. A command that consists of several words must be input in a precise sequence.

8.6 Activities

1. Survey five nearby schools and record the opinion of the teachers for using the computers.
2. Interview the heads of the above five schools, record their opinion for the introduction of the computers in their schools.
3. After activities No. 1 and 2 if they have some computer phobia, think of the ways to get rid of this phobia and discuss these in workshop.
4. Visit the nearest regional office of Allama Iqbal Open University: see Director and collect information how computers are being used in the distance education.
5. Search for any private organisation that are running literacy programs. Visit its office, get information how they are using computer (if exists).

8.7 Exercise

1. Discuss micro- computer phenomena with respect to schools.
2. How computer has revolutionised the classroom teaching?
3. What is relevant role of the computer in adult education?
4. Elaborate the potential of new educational resources in adult education.
5. Mention innovative approaches to adult learners and discuss.
6. "Video disk technology combines television's capacity to provide audio and visual material with computer's capacity for interactivity". Discuss.
7. Electronic mail has made possible to have interaction with other people either one to one or too many people in distance education. Elaborate.
8. What is computer conferencing. How it is helpful in distance education.
9. Enlist and discuss some satellite application in distance education.
10. Keeping in view the present situation of use of computer in distance education imagine and sketch the future of Allama Iqbal Open University.

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Unit 9

PROBLEMS OF USING COMPUTER FOR EDUCATION

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9.1 Introduction

Problem of using computers in education starts with the planning phase but these can be seen as opportunities to develop new and better methods, procedures, and computer systems. Blissmer (1991, P.284) divided the system life into three broad phases:

- Definition
- Design and development
- Implementation

In definition phase following series of steps are indicated by Blissmer (1991, P.284):

- Getting to know the application.
- Deciding whether a computer can meet the applications requirements and how it will do so.
- Defining processing requirements, constraints, cost and benefits.
- Developing functional specifications and prototypes.
- Reviewing the specifications and prototypes.
- Design and development has following design tasks:
 - Match software to the requirement
 - Match hardware in appropriate probe range with software needs
 - Consider technical features of the computer system
 - Consider the source (i.e. Computer store, dealer, direct mail, or the follow up service).

Phase III aims at installation of the computer system and make it operative. This involves physical installation of the system, testing the system, documentation and training, conversion, and evaluating the performance of the system. If system is larger, more efforts are needed than personal computer based system. Factors those can considered during site planning may be these:

- Location
- Space and Layout
- Site utilities (Sanders, 1983, P.483)

During testing, Blissmer (1991, P.292) recommends following activities:

- "All programs must be tested, both individually and in their related groups." Technical documentation and user operating procedures must be completed.
- All personnel involved in the day-to-day operation of the system must be trained in the individual job related procedures."

After system design and development phase is completed, technical and user documentation is assembled. The technical documentation is used for maintaining the system while user documentation is used to train personnel who will use it. There may be many ways to train the personnel, one way is to read instructional booklet and experiment with software. Other is to join the user group. Now-a-days, major programs include tutorial which is used for learning. This phase includes conversion: The process of changing from one method of operation to another or from one computer system to another.

Micro computer is sensitive electronic device so it must be kept with care. One of the best device to minimize the chance of unexpected damage is a surge suppresser. This is installed between system and electrical outlet providing the power. It is hardware device which prevents random electrical spike from causing damage to system. Disk care will safe guard data store on them. For diskettes, following measure may be helpful:

- Store disk in preventive envelope when you are-not using these.
- Insert discs gently into the disk drive.
- Do not use rubber band or paper clips on the disks.
- Keep disks away from heat and direct sunlight.
- Keep disks at least one foot away from magnets, motors, telephones, stereo speakers, X-rays.
- Do not bend or fold a disk.
- Do not touch exposed surface or attempt to clear with any fluid.
- Do not place heavy objects on a disk.
- Avoid static discharges when handling disks.
- Do not write on an affixed disk level with a pencil or ball point pen, or use an eraser on an affixed label.

(Parker, 1993, P.456)

If dot-matrix printer is being used, clean the head periodically. As computer is machine, some day it may not work properly, for this, it may need trouble shooting or/and repair. If repair is beyond your potential, it is better to seek help from the retailer from whom you bought the computer.

9.2 Objectives

After study of the unit, you will be able to:

1. Choose appropriate system from the alternatives.
2. Assist professional in development of local area network.
3. Develop positive attitude towards the use of computers in class.
4. Maintain the computer system properly.
5. Appreciate the need of professional development.
6. Evaluate the outcomes of computer use in the class.

9.3 Economic Factor

A large number of computers are available in the market. Choosing appropriate model depends upon a number of factors. These factors according to Hussain and Hussain(1989, PP.272-275) are:

- Cost
- Application
- Features
- Peripherals
- Availability of software

- Documentation
- Guarantee and maintenance
- Terms
- Reputation of Manufacturer
- Hardware
- Software
- Reputation of Vendor
- Human factors (ease of use, comfort)

How much, one has to spend? This is the basic question. When system is tentatively chosen the purchase price must be found. Obtaining necessary finance may be a lengthy official process, so it is advisable to get an approximate figure first and then contact the vendor. Possible sources of raising funds as Wood house and McDougall (1986, P.261) have mentioned are:

- The school administration budget
- The school budget in a particular academic department
- The school council
- The parents' association
- The department of Education or other education authority
- Special government grants
- Community groups, including commercial bodies and charitable foundations
- A computer vendor or dealer
- Any combination of the above

If teacher is enthusiastic and the principal is sympathetic, both can inspire the teacher parents association which can help to buy computer. If request is made to a donor agency, ensure that donation request is reasonable, educational benefits expected must be consistent with the philosophy of the donor agency, language used should be intelligible. It seems advisable to have a verbal contact with the agency before submitting formal request. It will create psychological foundations for the request. Such type can establish you. These may be conducting of tours of schools, making a presentation on computers in schools, etc.

Donation:

Donation is the best reasonable fund source as usually budget does not have capacity to buy a computer. Donation may be from parent's association, special government fund, and creditable foundation. There is another possibility that department of education may provide funds equal to the amount raised locally.

Educational Benefits

If budget is being provided by an organisation other than government, it is with the objective of purchase. These benefits may relate with the future employment of the children e.g. an association on special needs may willingly provides the funds if they feel that computer will meet the special needs.

Benefits to the Donor

A donor may wish to have some returns from the donation. A commercial company may wish to be assured that students will be better trained for their work force. An institution wants to get nursery from the school. A private college of computer science may establish a laboratory in your school as he wants to get students in first year (i.e. F.Sc program). This institution will naturally want to visit the school and be assured that his aims are being achieved.

9.4 Lack of Infrastructure

Lack of infrastructure is limitation to the full use of the computer. Usually where computer is available, this structure lacks. For this, one has to develop Management Information System (MIS). MIS refers "to the system that gathers, condenses, and filters data until it becomes information, and then makes it available on time, and in useful form, for use in decision making at various levels of management with an organisation" (Blissmer, 1991, P.226). This is not only useful in Business; it is equally valid in educational systems. The components of MIS are:

- An Information Centre
- An application development group
- A system group
- An operating group
- A technology planning group

Types of MIS includes

- Personal computing
- Work group computing
- Network computing

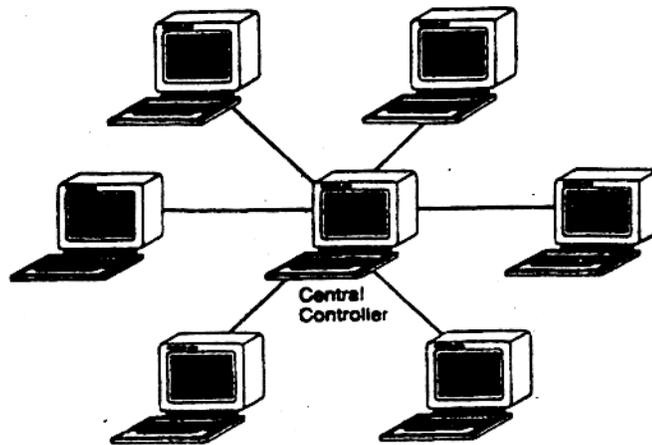
To use computer in education, it is necessary to develop computer networking. Computer networking may assume many forms. A network might be time-sharing central computer connected to many terminals. These terminals may be within school or spread over geographically dispersed educational institutions over a large area. When the ease is this, computer network is called wide area system in which many computers are connected to each other. Local Area Network (LAN) is a communication channel which covers a limited geographic area. Data is transmitted over twisted pair wire, speed ranging from million to 16 million, assigned to network within the building.

Topology according to Blissmer (1991, P.210) is the route that data takes when transmitted from one location to another. Seven different network topologies there: each has its advantages or disadvantages.

Star Network:

In this there is central controller (usually computer) from which communication channels radiate outwards, each is connected to a separate devices e.g. terminal or computer. For example a school system has a large scale or medium scale. Computer which handles administrator's tasks, class scheduling and instructional uses. In this main task is of central controller when it goes, whole network fails.

Fig. 9.1

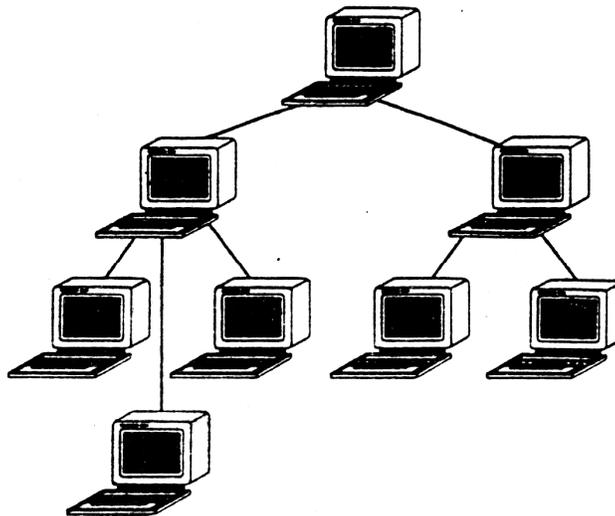


Aster network uses a central controller to which remote terminals or computers are attached. If the controller becomes inoperable, all terminals or computers on the network cease to function.

Source: Blissmer, R.H. (1991), *Introducing computers*. New York: John - Wilay and Sons Inc. P.2 10.

Hierarchical Networks: (Tree-shaped Networks): In this several other computers or nodes are connected to the central computer. Each node has devices such as terminals. Each modem hierarchical order forms star network. Nationwide organisations use this.

Fig.9.2

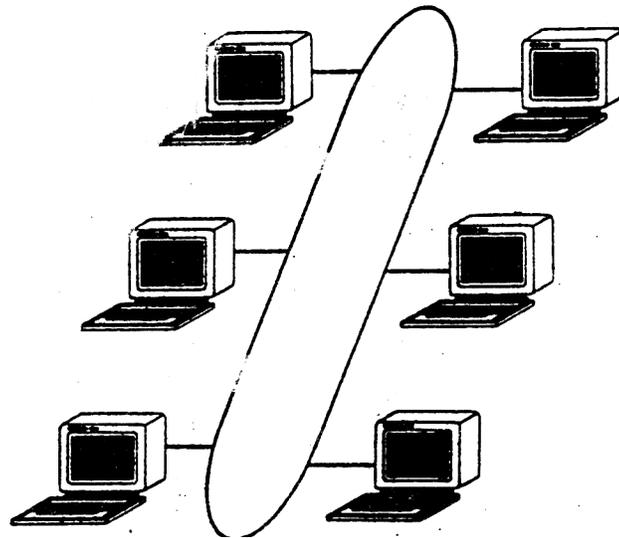


A hierarchical network is essentially a multilevel star network.

Source: Blissmer, R.H. (1991), *Introducing computers*. New York: JohnWillay and Sons Inc. P.210.

Ring Networks: It is completely closed network. There is no central controller. Each computer in the ring has equal status. Each computer handles specific information's. When sharing of information is required, information is passed on over the ring network.

Fig. 9.3



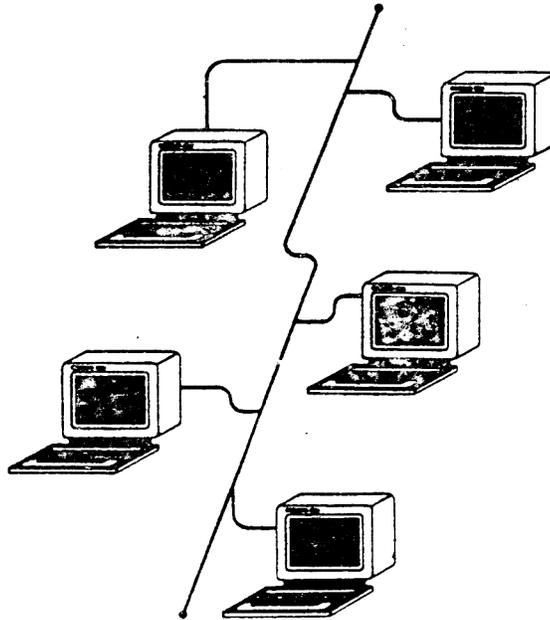
A ring network is a completely closed communication channel with various devices connected to it.

Source: Blissner, R.H. (1991), *Introducing computers*. New York: John Wilay and Sons Inc. P.211.

Bus Networks: This is single communication channel routed along a path in vicinity of each device that must be connected to it. There is no connection between beginning and end of the network so a terminator is placed at each end of bus. No central controller is necessary. Each computer like ring net works has equal status.

There may be another communication Network called Private Branch Exchange (P.B.E) and Wireless Computer Networks.

Fig.9.4



A bus network is common channel to which various devices can be attached. Attaching a new computer to the network or taking one away does not disturb the operation of the rest of the network.

Source: Blissmer, R.H. (1991), *Introducing computers*. New York: John Wilay and Sons Inc. P.211.

9.5 Lack of Educational Software

Where to find educational software:

Woodhoused and McDougall (1986, P.238) have enlisted these five sources:

1. hardware suppliers
2. publishers catalogues
3. computer magazines, especially educational ones
4. other teachers: conferences, seminars and inservice courses
5. education authority support services.
6. Another important source is Internet.

Educational software lacks in our country. But teachers in school, in general, have begun to think of computers. Once it was also (lie same position in developed countries. There was discrepancy between supply and demand. This vacuum gave rise to cottage industry. This

resulted in the large quantity of low equality of software. Smith (1989, P.73) quotes Kurland who described the situation as:

“...often poorly conceived, 'buggy', difficult to use, difficult to integrate with the rest of the curriculum and designed without sufficient regard for the range of needs and abilities of students... the vast majority of software produced for school is amateurish, unimaginative, or both.”

So problem is not only of lackness but also of quality. In many countries, supply of software is major bottleneck which limits the wider application of computer in education. Different countries have tried to tackle this problem in different ways. The reason for widespread famine is complex, but major reason is high cost. Melmed (1982) examined the costs of producing software to provide 30 minutes computer contact per US student per day over 12 years of schooling. His estimate is about \$250,000 per package, a package lifetime of 4-6 years and annual replacement cost of about \$96 million (at the current costs).

Most commercially available educational software is of poor quality. Much of it is based impoverished theories of learning, reflects little programming skills. In a survey which was intended to examine evaluation of existing computer-assisted learning programs for micro computers, Shea and Self (1984, P.219) quote a study where sathple of 100 teachers was taken to consider using any of 91 programs in their classroom teaching. Only fifteen programs were taken up, rest was rejected as these were irrelevant, inflexible, inaccurate or difficult to use. Schall et-al (1986, P.198) work may be useful in this respects. They enlist following 12 characteristics of effective software:

1. Use is flexible
2. Directions are clear
3. Computer response is appropriate and understandable
4. Screen formatting is reasonable
5. No disruptions are caused by system error
6. Level of difficulty is appropriate
7. Student input is simple
8. Correct, clear, concise terminology is used
9. Motivational approach is used
10. Instructional focus is significant
11. Instructional style is effective
12. Graphics, animation, colour are used when appropriate.

It is unwise o allow students to use software without testing and evaluation. Most professional journals now include software review, unfortunately it is not possible to have all such journals and software in Pakistan. For this our teachers may have sound idea about selection of educational software from available ones.

9.6 Attitude towards Computer

Teachers have been seen as providers of knowledge, diagnostician, tutors, and judges of achievements, disciplinarian and so on. Role of individual vary with the level the teacher and

the way teaching is organized Computer may change the situation, may assign new roles for teachers as technicians, selector of course ware, individualizes of instruction, managers, schedulers and advisors. (Hawkrige, 1983, P. 156). It seems that in Pakistan, in most of schools there will be only one computer in each school, although it may be linked to a large monitor. There is a possibility that teacher-class relationship may transfer to teacher-class-computer triangle.

Attitudes towards computers may be optimistic or pessimistic. Optimistic see computers as devices which have provided greater freedom and individuality and more human and personalized society and teaching/learning. Benefits due to computers are more than drawback. For example, CAT and CML have achieved the goals to a better degree. At home, computer may be used to stimulate the analytical and intellectual abilities of the students and teachers. While pessimistic view, that computer usage according to Sander (1983, P.641) will:

- Dominate our lives as society and individuals.
- Sweep us along in a tide over which we - the harassed and exposed victims of a depersonalized and humanized process that place greater value on efficiency than shall have little control.

Sanders (1983, P.642d) sums up the position as:

1. "Computers and technology are an unblemished blessing.
2. Computers and technology are unbridled curse.
3. Computers and technology are undeserving of special attention".

Each of these contain an element of truth but is deficient. The optimists are true when they say that new technology creates new opportunities for society. The pessimists are correct when they say that new problems are often created by new tools. Unconcerned are incorrect when they say that social institutions like schools will temper the effects of technology. Computer has caused displacement but at the same time has created a large number of jobs also.

An objection often cited is that computer will dehumanize student and ecology of educational enterprise-but other side thinks that this issue of dehumanism is concerned with wrong question, Question would be as, is the computer as impersonal as the average classroom, where typically only the top and bottom 5% of students receive personal attention from the teacher.

Attitude towards computers is sometimes termed as "computer phobia". Anxieties attached to computer may be of following categories:

A genuine fear of computer

A fear of somehow damaging the system

Lack of typing skills or a general knowledge of keyboards

A fear of not every being able to learn as much as is needed

Being intimidated by the language (or jargon) (Hall-Sheehy. 1988, P.26).

Another issue is of privacy. The development of computer data banks make it possible to store, retrieve, reproduce information and communicate in such a way which may negatively

affect the individuals privacy and reputation, although these can be used for individuals' benefits also.

9.7 Installation and Maintenance

After selection process, the size and composition depends upon the activities, this relates to both physical and human factors, it is better that classroom should be equipped with the same equipment the student will use in the work environment.

Wires and cables that hang from the back of a system unit to a printer, personal computers may look messy. It is advisable if more than one computer is to be installed in the room plenty of power joints may be made available. Specially with separate outlets or processors and peripherals, and circuit breakers rather than fuses. If supply of electricity is unreliable a voltage regulator should be installed to save the equipment from damage. The lighting both natural and artificial should be adequate without causing any reflections or glare.

Furniture of a computer laboratory or room is a problem. Most of furniture is never designed with personal computers in mind and this affects the training facilities. Many of institutions do not pay attention to this factor that must be paid.

Chairs and tables should be of appropriate heights, white boards, and keyboards and anti-static carpets to avoid the buildup of static electricity which can destroy recorded data. Trolleys for moving computers around the school should have lips to prevent equipment sliding off. The room should contain water and fire resistant data safe.

Comfort is also a genuine concern. Tables may be long enough to accommodate a system unit and printer% may not have enough width for the system unit and keyboard to line up. Often keyboards are placed at an angle which makes it difficult for two people to work comfortably at one system.

Consideration should be given to the noise created by the printers. Six or more printers working at the same time in an enclosed room can make "the howl of a banshee seem quiet by comparison". The furniture should be portable and solid enough to withstand movement over different floor surfaces.

Security:

Security is not only safeguarding what is stored in a personal computer or on data diskettes. It also extends to the equipment and the training facilities. It is wise to have an environment in which each one can trust. For this Sheehy (1986, P.204) enlists following precautions to be observed:

- Constantly monitor the facilities.
- Install locks on all doors leading into the facilities and control.
- Make arrangements for someone to open the doors.
- Do not let the people to check out and remove software.
- Make unscheduled visits to computer room.
- Keep all software and supplies locked up in a file or storage cabinet.

9.8 Planning for Implementation

When computer comes in the school, it is an exciting day. But at the same time, it is also start of another planning. This should be detailed as children will be involved and theory will be converted into practice. The final objective is to lead the children to develop skills which otherwise might have developed more slowly or might not. Each school will have to make decisions about what will or will not happen to the computer. This may be due to many reasons which may include number of classes, the internal organization of the schools and its physical layout.

The question what to do with computer depends upon the staff as they must decide. It is not wise to insist on certain approaches. For better output, it is preferable to involve parents, teachers and administrators throughout the process of introduction computers to school. Woodhouse and McDougall (1986, P.285) have identified three stages of involvement namely as initiation, orientation and development. But this is not final one:

Initiation: It is system selection. Staff is introduced to computers and their use in schools. This introduction may be made by company's representative or expert of computers. This should involve some practical also. After this, information literature may be served to all concerned.

Orientation: This takes place when it is sure that computer will come to school. The first priority is to eliminate the fear or phobia of teachers about computers. These fears may be:

- Redundancy: "The computer will take over my job".
- Inadequacy: "I do not know anything about computers".
- Insecurity: "The children probably know a lot more than I do".
- Indignation: "There is nothing, worrying with my teaching methods".

(Woodhouse and McDoughall, 1986, P.266)

Computer should not be introduced immediately, teacher should get held of a computer for an extended period before introduction in the classroom. Development: Staff development is an extensive and continuous activity. In the existing situation, refresher courses may help in development of skills.

Now look into implementation of a computer-education program. It depends upon effective facilitating and monitoring. This involves according to Canings and McManus (1987, P.145) six basic activities:

Promoting a building-site concept of implementation.

Involving appropriate individuals in the implementing process.

- Defining the role of the principal.
- Defining roles of the school site and
- District level coordinators, facilitating equal access, and monitoring progress implementation.

Program monitoring is next step. It starts with planning stages and continues along the program. It is formative evaluation in its nature. It provides continuous feedback to principles, planners, teachers and manufacturers. Monitoring is documented and the progress is compared with the targets. If discrepancy is there, problem is specified and is remedy is inducted. Problem areas may be hardware, software, accessibility, and staff development and support. But, teacher should tolerate a fair from the program plans, in the form of experimentation with alternative teaching strategies and organization.

9.9 Professional Development

We have discussed teacher training in Unit 7. Actually teachers need to know very little about computers to be able to use them. The more the teacher knows the more meaningful task is. Initially teacher needs to know how to switch on and off the computer and load a computer. But it is agreed fact that pre-service training and in-service development of a teacher is necessary. Computers fail in classroom instruction because teachers do not have required skills. Collis (1988, P.315) is of opinion that planning for development is a formidable challenge because of varying levels of background, experience, interest and apprehension that still characterize most staff. "Becker studied US. teachers in 1985 and found that only five teachers per school used computers regularly I instruction and 10 to 27 per cent of these teachers may be called expert of computer use. What sort of in-service training can be provided that will provide motivation and be helpful in using computers?

Teachers usually receive some in-service training in their schools; usually this is introductory demonstration sessions. There may be teachers who have got training from local computer institutions. General orientation courses vary in scope and reflect particular orientation of their instructors. There is also variation as BASIC programming, logo, software evaluation, and general machine handling competencies.

What may be the components of staff development. It developed countries emphasis has been increased on exposing teachers on programming. Now, while planning for professional development one has to differentiate between specialists and non-specialists training.

Now, let us have a look on the training plans which principals and computer consultants should implement:

- Identify each individual teacher's concern,
- Provide opportunities for local teachers exchange depending oil level of particular teachers.
- Provide some incentive for time and effort.
- Organize a place where teachers can learn and plan together.
- Let teachers take computers home to build confidence and prepare lesson materials.
- Choose a school target for a year... and supervise the collaboration that need to occur.
- Evaluate teacher's effort and growth in computer applications, being deceptive to level each teacher is act, (Collis, 1988, PP.317-318).

It is important that teacher is most important factor in effective in effective consequently

professional development of teachers should be carefully planned, implemented and evaluated.

9.10 Evaluation

In many countries, evaluation of software is ongoing process but for teachers in Pakistan, there is no ready vehicle to have such updated information. The computing teacher journal (International Council for Computers in Education, Eugene, Oregon) is an example. to discriminate between good and bad features of software is a difficult task. It takes time, experience to administer tools: Usually teacher makes selection from catalog or on the basis of interaction at publishers display at conferences. Before selection of any soft, teacher should ask at least two questions:

1. "Do my students have an educational need that this software seems to address?"
2. What does this program supply that I could not do in some other, nor available way?

(Collis, B. 1988, P.319)

Evaluation is to make against criteria which was laid down at the time of planning. System analysts are not always the best people to evaluate their own specification. The teacher or student is good source for evaluating the functional specification because he will challenge any wrong assumption. Review is usually done by a peer review, called structured walk through. In this proposed specification are presented to other analysts, programs, or system developers for feedback, comments and criticism.

In evaluation of system, the analyst should keep in touch. With persons who are using the system. The purpose of this to discover problems with hardware, software, the operating procedures, or the training. Blissmer (1991, P.293) suggests to carryout post implementation study from three to six months after new system is installed. This provides users to have a chance with new system before analyst evaluates the impact of the system and assesses the need for any changes.

Evaluation is a process of gathering information, placing value and reporting information to answer questions of interest. The information according to Stecher B. (1987, P.163) may include "such things a student's" feelings about big computers, changes in achievements or performance associated with the use of computers, or different kinds of problem-solving behaviours that emerge in students use of computers. Has students' writing improved as a result of use of word processing software? What impact has computer-based drill and practice had upon the achievement of remedial students? How have students interaction and collaboration been affected by peer tutors who answer questions in the computer laboratory? First step in evaluation process is to clarify the elements that make the program. If the program is well established enlist the components like input, procedures and outcomes. The choice of technique/techniques is made. These may include tests, questionnaires interviews, observations and documentation analysis. If there is suspicion that outcomes are not due to computer-education programmes then control groups, comparison groups and longitudinal data collection strategies may be used.

9.11 Activities

1. Economic factor is a major factor in purchasing and use of a computer system. Visit the computer vendors and make a comparative price list of computer system available with them.
2. LAN is necessary if you want to use more than one computers in your institution for potential benefits. English the requirements and draw a rough institution for potential benefits. Enlist the requirements and draw a rough sketch for LAN for professional who is just coming to your institution for installation of computers.
3. Take a sample of twenty teachers. Develop a questionnaire to assess their attitudes towards the use of compute in the education.
4. Visit computer colleges of our area Regional Office of Allama Iqbal Open University to find out the courses they offer. Also indicate which may be helpful for teachers for professional development.
5. Have a meeting with the representative of the company from which you have purchased a computer, develop a evaluation criteria for the working of computer and carry out this criteria and make a report of this for workshop being held at the end of the semester.

9.12 Exercise

- Q.1 For choosing appropriate computer model, Hussain and Hussain (1989) has enlisted a number of factors. Discuss these factors.
- Q.2 Discuss ingredients approach or resource approach to cost estimation.
- Q.3 Describe store network topology, discuss its advantages and disadvantages.
- Q.4 Enlist and discuss characteristics of an effective software.
- Q.5 What is computer phobia? What may be its foundations? How it can be overcome?
- Q.6 Describe the importance of machine code.
- Q.7 Enlist measures for the maintenance of hard disk.
- Q.8 What measures you would like to adopt for the safety and maintenance of diskettes?
- Q.9 Sketch a program of professional development of teachers who are using computer.
- Q.10 How a computer education program can be evaluated?

9.13 Bibliography

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