IGNOU-M.Ed

SECOND YEAR

STUDY MATERIALS

MESE-066 :

INFORMATION TECHNOLOGY AND EDUCATION

PREPARED BY
K.K.DEVADOSS

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Basic units in a computer system

♣ Now let's understand how a computer operates. As you may have seen, computers are used in all walks of life. Have you ever wondered that how the computer can perform all kinds of functions? Well, this is possible due to programming. A computer accomplishes a task as the program tells it to do.

What is a program :

♣ A program is a set of instructions informing the computer what to do.The software part sends such instructions that the hardware part of the computer performs those functions; it is designed to act upon.

There are four basic units in a computer system:

♣ **Input:** These are those devices or processes with the help of which the data is inserted or fed into the computer, like through Keyboard.

♣ **Processing:** Through processing, the computer acts on the input data.

♣ **Output:** After acting on a given set of data, the computer produces output either on the monitor for us to see or 01) a paper printed through a printer.

♣ **Storage:** The data and the information are stored on a storage device for future use like on the hard disk, USB, CD/ DVD or floppy disk.

Input Devices:

• Keyboard• Mouse• MICR• Voice Recognition• Joystick• Microphone• Scanner• Digital Camera
• Bar Code Reader• Light Pen• Touch Screen• Graphic Tablet• OCR• OMR• Plotter Processor
• CPU Chipset - CU, ALU, MU

Output Devices:

• Monitor• Headphone• Speakers• Printers.Storage Devices• Hard Disk• Floppy Disk
• Compact Disc (CD / DVD / VCD)• Magnetic Tape• Pen Drive

Computers: Based on size

By so far you must have noticed the presence of certain kind of computerization in the machines around you, like in your car, washing machine, refrigerator, television, microwave etc. Initially the computers were classified on the basis of size although nowadays many other attributes are also considered while classifying the computers.

Any kind of computer can be fit into any of the following four categories.

Super-computer

These are very large, cluster of computers to perform complex, scientific calculations.

Mainframe-computer

Mainframe computers are also very big and expensive and are used in offices to store large amount of data and to do complex processing.

Mini-computer

Mostly used as a server in a Network, these were developed to reduce the cost and size.

Micro-computer

These are computers we normally use in our daily life like small pes, laptops, and palmtops.

Computer software

The computer software may be classified into three types.

(a) System software

♣ System software are those programs which control the processes and output etc. They tell the computer how to behave. Examples of system software are Microsoft Windows operating system and UNIX operating system.

(b) Application software

♣ Application software allow us to undertake certain activity like with the help of MS-Office which includes among others word processor, spreadsheet, presentation software, and Outlook etc. Therefore these enable us to create documents, presentations, email etc. Through Flash software we can create animation. PageMaker enables to do DTP (desktop publishing) work. Oracle software enables us to create and maintain databases.

(c) Developments software

♣ The development software are needed to create software like system or application software,

These are of two types:
• Low level
• Highlevel

The low level software are of two types:

♣ Machine Language: A set of instructions written to communicate with the computer to do the needed work.
♣ Assembly Language: A set of instructions (symbols: called Mnemonics) written to communicate with the computer to do the needed work.

High level (languages):

LOGO, BASIC, C++, JAVA, .NET

Translating programs

♣ Assembler: An assembler helps to translate assembly language into machine language.
♣ Interpreter: An interpreter helps to translate high level language into machine language,
one line code at a time.
♣ Compiler: A compiler helps to translate high level language into machine language, displays all the errors at one time.

Computer virus

♣ Did you ever face problem while using your computer like the files gone missing, file sizes becoming too large, irrelevant messages garbling up on the monitor etc.?This can be due to virus.

♣ Virus can affect the computer system like the flu affects our human body. When we are affected by a flu or virus, we feel unhealthy. Similarly, the computer system does not work in normal way if it gets affected by a virus.

♣ A virus is a piece of programming code, usually camouflaged as an innocent document, which can do damage to your computer.

♣ To cause maximum damage, the viruses are written in such a manner that they propagate. from one system to another.

♣ This can be either through some medium like using virus infested diskette / CD / USB, or downloading documents from Internet whose source may not be reliable.

♣ The viruses which spread through emails, attack the address book from where it reads all the email ids stored therein and then sends itself to all those and a chain reaction starts.

♣ This may result in bombarding of emails on the server and servers may crash due to excessive traffic.

Given below are some basic steps you can take to avoid computer viruses.

Never open an email attachment unless you know the source and if it is authentic and you are aware that what the attachment contains.

♣ Always avoid using diskettes / CDs / USBs from unknown persons or sources, may be they are already infected and can cause damage to your own system too.

♣ Installing Anti-virus software (such as Norton and McAfee) is best option to fight against viruses.

♣ Keep your anti-virus updated. Most of the legally purchased anti-virus softwares enable you to update it automatically from their website.

Maintenance of computer

♣ Regular maintenance of computer is very essential.

♣ It has to be saved from dust and moisture.

♣ The computer should be placed at such a place where adequate air circulation is there, so that it does not get overheated.

♣ We must regularly clean the computer to prevent overheating.

♣ The dust can cause shorting out electronics.

♣ The dust can also act as an insulating blanket and prevent heat sinks and other· components from cooling off.

♣ Best way is to use antistatic covers to coverthe machine when not in use.

Application areas of computer

Health care

The Health care industry seems to be very much benefited by the computer technology. It Assists doctors to diagnose and treat patients. These are used in performing surgeries. simple machines which are used to check various body functions like blood pressure or heart beat or pulse rate etc are done with the help of some kind of computerised equipment.

Banking

Computers and Internet has changed the way we do the banking. With some of the clicks of mouse, nowadays, you can transfer money to different account, check your account balance pay your electricity or telephone bills online. Remember how easy the life is now to withdraw money. Just go to any ATM, insert your card and withdraw money

Business

No business house is without computers. From being used as word processors, to making presentations to making spreadsheets to controlling security cameras, computers are an integral part of any business life. Accounting departments use computers to make budgetary analysis, computerised accounts keeping (like through Telly Software).

Transport

The computerisation of railways has made our life easy. You check the availability of tickets online and then make a purchase there and then itself.

Communication

Remember old days when we used to book our long distance call and the wait for the operator to call us that our line is through. The call charges used to be high. And if due to some reason the telephone cable is got cut, and then wait endlessly for the telephone lineman to come and repair. Mobile telephony changed the world the way we used to speak. This has become possible due to computer networks connecting all exchanges. Now we talk more, pay less, thanks to computers and technology.

Entertainment Industry

See all those computer animation movies where the persons fly in the space or do all kinds of things we cannot do in real life. Computer technology brought the dinosaurs alive! Not only in cinema, even the theatres are benefited. Computers have become a inseparable companion of musicians. They compose their tunes on computers and synthesisers and pay them to note the effect. If not happy they make changes immediately. Sound effects are created through computers. The electronic notes are created through MIDI (Musical Instrumental Digital Interface).

Defence forces

Like health industry, the defence forces too are great users of computers. In fact the defence can become weak if they are not properly equipped with latest computer technology products and techniques.

Government departments

You must have heard of e-governance. Nowadays the Central and State governments have put in place adequate technologies where computers are used for keeping records of birth, death, land records, income taxes, passport services, population data, conduct of elections etc.

Law enforcement

In this age of cyber crimes on the increase, the police department is also heavily using computers. In fact at many places there are special cells to deal with cyber crimes.

Computers in education

Computer applications for education fall into various categories, like:

♣ Instruction
♣ Communication
♣ Multimedia
♣ Assessment

Computer-Assisted Instruction (CAI)

The Encyclopeedia Britannica defines computer-assisted instruction as a program of Instructional material presented by means of a computer or computer systems.The Wriddle Wreference defines CAI (computer-assisted instruction) is the use of a computer as a medium of instruction for tutorial, drill and practice, simulation, or games. CAI is used for both initial and remedial training, and typically does not require that a computer be connected to a network or provide links to learning resources outside of the course.

Computer Mediated Communication

Computers playa great role in communications as well as has been explained above in this unit. Through Computer-Mediated Communication (CMC) the information is created, and exchanged with the help of networked telecommunications systems (or non-networked computers) that facilitate encoding, transmitting, and decoding messages

Different mode of CMC can be:

(a) Synchronous: This mode enables us to communicate in real time mode. In addition to chat, we can see video as well. Eg: Skype, Google talk, MSN, Yahoo Messenger etc
(b) Asynchronous: This mode is not in real time and we receive and reply back at different point of times. For example, email, Blogs, wikis, newsgroups, etc

Computer Based Multimedia

Computers are heavily used for multimedia applications in education. It has been found to be more effective and interesting than dealing with text only. Multimedia in simple terms can be considered as the data that include images, audio, video, or software.

Assessment

1. Computer-Assisted Assessment or Computer-Aided Assessment (CAA)
2. Computer-Mediated Assessment (CMA)
3. Computer-Based Assessment (CBA)
4. Online assessment or E-Assessment

Advantages of computer assisted assessment

♣ Animation or presentations can be included in assessment
♣ These can be implemented on a large scale and geographical area.
♣ Feedback can be generated instantly.
♣ Less paper work is involved.
♣ Saves money on postage and other administrative arrangements .

Advantages and limitations of computers

As you have understood the necessity and significance of computers in our daily life, let's have a look at the advantages and limitations of computers:

Advantage of computers

• These can facilitate self-paced learning.These can be used as a multimedia tool. Computers can be used as an interactive communication tool. As the computer technology is fast advancing, it affects the quality and costs too, for example, see how the telephones used to work just a decade ago and the prices were too high, nowadays everyone has mobiles and the call charges are down.
• Computers enables access to vast resources through Internet and World Wide Web.

Limitations of computers

• As the computer technology is changing quickly, it becomes difficult for institutions to switch over to new technology, new hardware and software immediately due to either cost factors or non-availability of skilled personnel. Putting in place the computer networks involves high investment.
• Replacing old machines with new machines adds to junk and leads to environmental pollution as old machines are dumped in a place. Still some people hesitate to use computers; such people suffer from computer phobia, although computers are easy to learn. There are places where computers are not available, which leads to computer illiteracy.

ICT and Components

ICT in simple terms can be understood as the use of electronic devices (like communication devices or computer or software applications) with the help of which the information can be created, precessed. stored., distributed, advanced and retrieved when needed.

♣ Information   ♣ Communication   ♣ Technology

Information

Information is a sort of knowledge we gather through various means,like research, observing, seeing, reading etc. Information provides us a base to take suitable decisions on the basis of gathered data. We obtain information through newspapers, radio, television, internet, magazines and periodicals etc. For example, if you have the information that due to heavy floods the road has been blocked on a particular route, you are able to take another route.

Communication

Communication is a sort of transmitting information from one source to another. There is a source of generator and receiver. The information exchange can be accomplished either verbally or non-verbally. With the advent of technology, the communication has become faster and nowadays, any information about any thing speards all over the globe immediately with the help of Internet or email or twitter etc.

Technology

Technology has been described as a product and a process. As a product it may be in the form of a tool, like radio or television, which are a great medium of transmitting information. As a process, it can be application software like email or spreadsheet or presentation software which performs specialised functions.

Tools for communication

1.(a) **Synchronous** = Skype, Google talk, MSN, Yahoo Messenger, video messaging
   (b) **Asynchronous** = Email, Blogs, Wikis, Newsgroups, Podcasts, YouTube,
2. **Computing** = Word processors, Spreadsheets, presentation software, database
3. **Course Management** = LMS, CMS ..Blackboard (WebCT)
4. **Course Evaluation and Assessment** =e-portfolio
5. **Knowledge base** = Online Encyclopedia, Online libraries, journals, magazines
6. **Social networking** = Facebook, Orkut, Twitter,
7. **file-to-file' conversion** = Flip4Mac and word-to-pdf
8. **Compress files** = winzip, rar, truckit, zipit, stuffit
9. **Technology** = Bluetooth, iPod, portable video player, USB, WebCarn,

Tools for technology

The tools pertaining to telecommunications equipment and services
• Wired • Wireless

Computer generations

The computers have evolved over time. There are certain factors in computer field where we have seen something going down and something going up. Like the size of the computer' machines.

These are getting smaller and smaller. Where as the 'Pemory and storage have been on the upward direction. Our need for these is always on the increasing therefore the memory and the disk capacities have increased tremendously over the decades.

Nowadays we do not use bulky CRT (Cathode Ray Tube) monitors. They consumed lot of electricity and space. These have been replaced with trendy LCD (Liquid Crystal Display) and TFT monitors.

First generation

The first generation computers used vacuum tubes, were large in size, slow in functioning and produced a lot of heat. These machines needed used machine key and punched cards for storage. Examples of this generation are ENIAC and UNIVAC.

Second generation

The second generation computers were built of transistors. These were smaller, faster and produced less heat. They used high level language like FORTRAN and needed magnetic tapes for storage. Examples of second generation computers are IBM-140 1, IBM-1620, BURROUGHS B-200 SERIES, HONEY-WELL H-400, UNIVAC-l 004 etc.

Third generation

The integrated circuits brought a revolution in the field of computers. The first Integrated Circuit (IC) was invented by Jack St Clair Kelby and Robert Noyce in 1958. The computer became smaller, more reliable, faster and cheaper; used high level languages like BASIC. During this generation the Operating System was introduced. IBM (International Business Machines) and DEC (Digital Equipment Coroporation) started manufacturing computers based on IC.

Fourth generation

These are the computers of today. They use large scale integration circuits. GUI (Graphical User Interface) was started to be used. Memory of the computer was large. Example? of fourth generation computers are DEC-I 0, STAR-J 000, POP-II and APPLE series personal computers.

Fifth generation

These are highly advanced computer systems which use Artificial Intelligence. Such system accepts instructions or commands through voice and interprets the signal.

The different generations of langauges

Since the programmers began working with computer machines to get the desired task accomplished or manipulate a data, the computer languages have evolved 'over decades. Thus with each advanced modification, new generation of languages evolved and each time the syntax of the language became more understandable and nearing human speaking language. Let's understand what various generations of languages are. Based upon the developments, we can categorise the computer languages into five generations:

First generation languages (lGL) [Machine Language]

First generation languages are the early, primitive computer languages when the humans started programming for the computers. They used Binary Language to interact with computers. Binary language consisted entirely of 1's and O's - the actual language that the computer understands (machine language). Here 1 denotes the presence of electrical pulse and 0 denote the absence of electrical pulse. Thus a specific combination of I and 0 (for example 111001001) would mean some special instruction to the computer.

Second generation languages (2GL) [Assembly Language]

Since Machine language was difficult, programmers continued with their efforts and thus language similar to English was developed in 1950 called as Assembly Language. This is also known as Symbolic Programming language. These Second generation languages were a step up from the first generation languages that consisted entirely of 1's and O's. Here in Second generation languages programmers used symbols and words instead of just numbers.

Third generation languages (3GL) [High Level Languages]

In third generation of computer programming, the syntax was much easier to understand as programmers could use words and commands instead of just symbols and numbers. Examples of Third generation languages also called as "high level languages" are LOGO, COBOL, FORTRAN, BASIC, PASCAL, C, C++, Java, and JavaScript etc.

Fourth generation languages (4GL)

Growing databases among organisations led to the development of Fourth Generation Languages. Since managing databases required more inputs from programmers, therefore these were designed to be very close to human language, closer to human language than any language of the previous generations. Examples of 4GL areSQL (Structured Query Language) and ColdFusion.

Fifth generation languages (5GL)

Fifth generation languages are the most advanced one and used for artificial intelligence and neural networks. A neural network can be explained as an imitation of how the human mind works. SGLs find their applications in the areas of Robotics, Surgery, air control systems, traffic signals etc where the machines simulate human intelligence.

Common terms used in programming languages

Source code

Computer can understand only machine language. So we write down code (known as program) in human understandable language, which can be translated in machine language so that computer can understand. The code we write in human understandable language is known as source code.

Compiler

The computer program which translates source code into machine language is known as compiler.

Data type

Names which are used, in computer language describe what type of data it is e.g. Integer, String, Boolean etc. These different words which describe which type of data we are trying to assign is , known as data type.

Variable

Names which are used in computer language describe what type of data . These different words which describe which type of data we are trying to assign is known as data type. If that data can change though out course of this program execution, it is known as variable.

Constant

Names which are used in computer language describe what type of data it is (e.g. Integer, String, Boolean etc). If that data can not change though out course of this program execution, it is known as constant.

Array

Ifwe can assign a name to group of variables, then it will be easier to refer these elements by referring first item of group, second item of group etc. This group is called an array of elements.

Conditional

When we want to say, if this is true do this, if not do this. This means on test if we are putting condition and action is needed according to conditional operations.

Loop

If we want to execute same set of instructions more than one time depending on condition, then that set of instructions is known as loop.

Function

Function is a method which is used to describe set of instructions and can be used repetitively.

Application in education

• **Flexibility of content:**

The reusability of the content material increases when it is designed to be applied in multiple contexts. It also avoids the problem to rewrite it each time for new context.

• **Increased value of content:**

The more the content is re-used, the more the value of content increases. This saves the costs (in designing new content and development & delivery time).

• **Ease of updates, searches, and content management:**

Updating, searching, and management of content are speeded up with the help of Metadata tags.

• **Interoperability:**

The specifications related to design, development and presentation of
learning objects can be maintained easily with object-oriented approach without altering its interoperability with other learning systems and contexts.

• **Facilitation of competency-based learning:**

The competency gaps of individuals can be filled up by tagging of granular learning objects, focusing especially on the knowledge, skills and attitude with in broad dimensions of competency development rather than course model.

• **Representative of general:**

As the objects are self-contained and responsible for their own behaviour,

• **Contributes to continuous evaluation:**

Learning objects may also contribute to 'continuous evaluation' as with each use and reuse, it gets more effective to those involved in online learning (Singh, 200 l).

• **Easy Exchange of relevant information:**

Cooperation among different objects to achieve the system operation/target is done through exchange of massages.

• **Flexibility in operation:**

Dynamic binding increases flexibility in operation by permitting the addition of new classes of objects.

• **Reuse of information:**

inheritance. coupled with dynamic binding permits the information to be REUSED,

• **Tailored to the needs:**

There can also be a substantial improvement in the quality of Self-Instructional Material.

• **Staff development:**

Staff development strategies can be properly applied to new situations. Various training programmes may follow hierarchical order according to their purpose.

• **Curriculum revision:**

As the objects are active, they may be involved in curriculum framing and reframing, so that the learning system may be geared up around the actual needs of the learners.

• **Effective communication:**

The interaction between objects is through sending messages,therefore there is a strong need for effective communication between student-student,student-teacher.

Learning objects

The origin of learning objects has been traced in object-oriented programming . The emergence of the concept of learning objects owes to the attempts undertaken in overcoming the problems while developing instructional content thorough traditional means that may lead to production of large and colossal courses. Such courses become instructor centered in terms of course design, development and delivery; information is presented in a linear fashion; and to change the content or to adapt to a new content becomes difficult.

Characteristics of learning objects

♣ The learning objects interact with each other by sending MESSAGES.

♣ In Object Oriented Approach, we identify an object to do a particular task and then pass a message to other object. A message is nothing but a request for another object to carry out one of its own methods. It specifies:

♣ The name of the required operation

♣ Name of the receiver object

♣ Some pre-defined communication protocol,

♣ Environment

For example, the course writer object may be requested (means giving message) to include suitable illustrations, concrete examples and diagrams in his article by the course editor. Another characteristics of objects is to exhibit POLYMORPHISM - where same object reacts differently to the same message, e.g., a tutor/counsellor treats the students (through same message) differently based on their individual capabilities, i.e. if the tutor/counsellor finds that the learner is backward in studies, he guides/counsels him in a different manner, as ifhe would have guided or provided counselling to an intelligent student. Thus we can say that the counsellor object can perform different activities, however message remaining same, depending on the context/need of the open learner.

This difference in the performance of objects may be due to **'Inheritance'** which may be considered to be powerful feature of OOA. Inheritance allows objects to acquire the attributes and behaviour of others objects. We can explain the concept of inheritance through the concept of systematic (the arrangement of all the diverse creatures of the world into an appropriate system of classification) which includes naming of organisms or compounds (nomenclature like I.U.P.A.C system in Chemistry); arrangement of organisms into groups (classification); and rules of classification (taxonomy) All plants and animals can be grouped in two major **kingdoms,** i.e., Plant and Animalkingdom- which can further be arranged in a hierarchy, that indicates the various levels of kinship, e.g.,

Kingdom
  Phylum (plural, phyla)
    Class
      Order
        Family
          Genus (Plural, Genera)
            Species

Ability of computers to adopt teaching

The computer technology has a significant impact on education. These have become a great source of assistance to the teachers in the classroom and outside the classroom. The computers have changed the way the students learn and the process of learning has gone beyond mere learning from the course textbooks. Like the human teachers the computers have adopted the ability of teaching in the form of information exchange and retrieval system.

Due to their high storage capacity, reliability, fast computational powers, networking capabilities, they are rapidly becoming indispensable tools in the teaching/learning process.Educational software have been developed whereby through the computer video games, certain content is taught to the students by letting them play and assuming the role of main character.There are strategic games which have been found to increase the mental decision making processes among the students.

Lets have a look in what various forms the computers have been used in education:
• Computer Assisted Instruction (CAI)• Computer Managed Learning (CML)
• Computer Based Education (CBE)• Computer Assisted Training (CAT)
• Computer Based Testing (CBT)• Computer Based Training (CBT)
• Computer Managed Instruction (CMI)• Computer Managed Training (CMT)
• Computer Assisted Learning (CAL)• Intelligent Tutoring System (ITS)
• Intelligent Computer Assisted Instruction (ICAI)

Computers for drill and practice

You must be aware of the value of drill and practice in education particularly in thos.e subjects or areas where repetition is there. Can you identify some areas where repetitive things are done and learning is associated. These are:
• Mathematics• Language Learning • Manual skills like keyboard learning, driving etc

Computers as simulator

This can be defined as mimicking or modelling certain actions, procedures or phenomena using computers. You must be watching weather on the television. For predicting future weather or forecasting the weather, the pattern is analysed through simulations. Similarly before actually performing hazardous chemical reactions, these are performed through simulation to see their effect and assuring all safety precautions. Computer have not only developed the ability for drill and practice, but they can perform simulations too Similary, in case of biology classes, there are simulator programs which help the student to understand the anatomy of the animals without actually them doing the dissection of an animal.

Computers as virtual world (VW)

Second life (SL) is one of the most widely used 3D virtual world used by educational and academic community. The beginning of virtual worlds was through Multi-User Dungeon (MUD) - a text based virtual world (constructed by Roy Trubshaw) in 1979. The Bulletin Boards (BBSs) gave a new dimension to the way the people used to connect and share softwareand messages.

computers in assessment

- ♣ **Criterion referenced** (based on some criteria)
- ♣ **Norm referenced** (based on an order of achievements within a group,).

The assessment in education is used for these purposes

- ♣ **Diagnostic** (to identify strengths and weaknesses).
- ♣ **Formative** (to provide feedback to students).
- ♣ **Summative** (to assess performance at the end of a course or unit of study).

Computers are being used to maximum extent in assessment in education. These are employed for different purposes and at different levels. Computers can be used for simple form of diganostic tools or in the form of completely automated assessment systems. The use of computers in assessment varies depending upon the target group (be it student, teacher, course coordinator. institutional or external evaluator).

The advantages of computers in assessment are:

• faster feedback timely declaration of results

• more suitable for formative and summative assessment students can have self assessment as per their requirements or abilities

Lets have a look at some of the cases where the computer's abilities are utilised in assessment.

A) MoodIe:

Moodie is an Open Source Course Management System (CMS), also known as a Learning Management System (LMS) or a Virtual Learning Environment (VLE). It has become very popular among educators around the world as a tool for creating online dynamic web sites for their students. Moodie is being used in the form of activity modules (such as Forums, Wikis, Databases etc) to build richly collaborative communities of learning around their subject matter. It is also used to assess learning using assignments or quizzes.

B) The Questionmark Perception assessment Management System:

The Questionrnark Perception assessment management system enables educators and trainers to author, schedule, deliver, and report on surveys, quizzes, tests and exams. The other features of this system are:

• It can create questions and organize them into exams, quizzes, tests or surveys.

• You can schedule assessments for participants and groups.

• It can deliver via standard web browser, secure browser, PDA, CD or paper.

• You may have the report on and analyze results using 12 standard reports.

C) Question Tools :

Question Tools is an integrated suite of products that allows anyone to create online lessons, exercises, surveys, tests & exams, and automatically collect & analyse results.

E-Portfolios

What is an ePortfolio ?

A portfolio is a collection ofworkJoutput created across diverse contexts over time. The portfolios are beneficial to the students and teachers as these help them in organizing, archiving and displaying their work. Nowadays electronic portfolios are gaining popularity as the faculty can make an assessment of the student portfolios using technology, like the Internet, CD-ROM, video, animation or audio. The electronic portfolios can be developed with the help of an electronic portfolio application.

ePortfolio

"In general, an ePortfolio is a purposeful collection of information and digital artifacts that demonstrates development or evidences learning outcomes, skills or competencies. The processof producing an ePortfolio (writing, typing, recording etc.) usually requires the synthesis of ideas, reflection on achievements, self-awareness and forward planning; with'the potential for educational, developmental or other benefits. Specific types ofePortfolios can be defined in part by their purpose (such as presentation, application, reflection, assessment and personal development planning), pedagogic design, level of structure (intrinsic or extrinsic), duration

The ePortfolio application

"e Portfolios can be produced using simple tools (such as presentation software or blogs) but more typically using specialist ePortfolio applications that contain a level of structure (pedagogy and learning outcomes/skills) with a high level of customisation for specific contexts and support for multiple purposes. ePortfolio applications allow the owner to share specific parts or views oftheir portfolio online and support feedback and dialogue. Ideally ePortfolios are interoperable (for example with learning environments, recruitment services or for the migration of portfolio data to support continuity in life-long learning)"

Elements of an e-Portfolio

• Student Information Table of Contents
• Learner Goals
• Curricular standards and/or criteria
• Rubrics
• Guidelines
• Artifacts
• Instructor feedback
• Self-reflection pieces:

Assessment through an e-portfolio

Electronic portfolios reflect the student output and can be assessed as per pre-defined standards or criteria. Electronic Portfolios deal with multi dimensions of learning, like student competence and skill for well-defined areas. These may be end-of-course or program assessments primarily for evaluating student performance.

Intelligent Tutoring System (ITS)

An Intelligent Tutoring System (ITS) is a computer based learning system that takes into account the individual learner's strengths and weaknesses, and that modifies its presentations accordingly,

Rane (2005) defined "Intelligent Tutoring Systems" (ITS) attempt to simulate such a "teacher", who guides the student's lesson flow. uses pedagogical methods suitable to a student and monitors progress on an individual basis, in an online setup based on his or her level of understanding in the subject. Basically approach is to record the "expertise" of a teacher in the subject and the "understanding" of the student in the subject, so as to del iver an effective personalized "instruction", in an online environment.

Examples of ITS

Acharya
ACHARYA (Latesh Bhaghat, et.al, 2002) is an ITS targeted at teaching SQL.

Adis
The Animated Data Structure Intelligent Tutoring System (Warendorf, 1997) is used as a teaching data structures like lists, stacks, queues, trees and graphs. Ohlsson (1992) developed the 'Instruction Model' using constraint based tutoring module.

SQL Tutor
SQL-Tutor is an intelligent teaching system for SQL, based on learning-by-doing. The student can learn about concepts and elements of SQL.

Cognitive Tutors
Carnegie Learning developed a suite ofITS based "cognitive tutors" in secondary-level math subjects.

Simulated Scenarios and Automated Evaluation
Stottler Henke Associates developed an ITS for the U.S. Navy to teach Tactical Action Officers using simulated scenarios and automated evaluation of the student's actions. This ITS is used as part of classroom instruction and as a stand-alone system aboard Navy ships, where learners use it for self-study.

Computers for virtual reality simulations

♣ At the outset let's see what virtual reality is? As you studied in the above sections, virtual reality is created through computer simulation which is so realistic, it appears almost real.

♣ Virtual reality simulations normally involve more than one of the senses and are often designed in such a fashion that the participant's movements are reflected in realistic changes in visual, auditory, or kinaesthetic stimulation (Franch i, 1994).

♣ Here virtual reality becomes a certain kind of computer-learner interface wherein the student experiences dimensions of an environment and takes a decision and then moves within that environment in such a manner that the experience seems virtually real.

♣ Ferrington and Loge (1992) explained a virtual reality system where the students wear the computer's display systems on their heads which looked like helmet and goggles.

♣ This system created a three dimensional visual and corresponding auditory displays. This also had some sensors which respond to user's movements.

♣ If the user looks towards right side, they may see a landscape, if they look up, they may see sky and likewise.

♣ This program is used to study the ancient Mayan civilizations. In this program the student feels that he is climbing the precipitous 'Slope of the main pyramid's north face, looking in various directions, goes into museum mode or database mode to have a look at different photographs etc.

♣ Auld & Pantelidis (1994) and Lewis (1994) noted that through kinaesthetic and visual feedback, we can manipulate the visual images and auditory stimulation which has great possibilities in the development of highly realistic game simulations, military training simulations, and other educational and entertainment products.

Computers as virtual world (VW)

Second life (SL) is one of the most widely used 3D virtual world used by educational and academic community. The beginning of virtual worlds was through Multi-User Dungeon (MUD) - a text based virtual world (constructed by Roy Trubshaw) in 1979. The Bulletin Boards (BBSs) gave a new dimension to the way the people used to connect and share software and messages.

In the 'Second life' you can share your experiences, have a feeling of your presence, get engaged, have real time collaboration, engage in face-to-face conversation and observe social cues. Entering this virtual world (VW) is quite easy: you need to register at the site www.secondlife.corn (free for a basic account) and install a client software onto your machine. Note that Second Life is a bifurcated world, with a Teen Grid (for users ages 1'3to 18) and an adults-only Main Grid (for users age 18+):

The registration is completed by selecting an avatar and you have to select a name (alter ego) where the choice is for first name only. For your virtual surname, you need to select from those offered. Next comes to dress up. Experiment with your appearance, of course can be changed any moment you need to Ever since its launch in 2003 with just 500 residents by Linden Lab, Second Life (SL, www.secondlife.com) is now populated by nearly 7 million avatars or residents (registered users). It all started on the hard disk drives of Debian Linux serer in a San Francisco data warehouse with one square kilometer of virtual real estate to now over 600-square-kilometer of virtual space where you can engage yourself in all sorts of activities like business, sports, entertainment and not to forget education.

You can sell and buy all kinds of merchandise, learn a skill, collaborate on some project,' there are all kinds of endeavours you do in your real life. When the students are taken to the Islands in Second Life, they would feel absorbed by the ambience and the dynamism of the medium. To some it would give a feel of online gaming. YOU can create all kinds of havoc without getting hurt (of course physically) yourself. The games transport LlSto another world. From the simple stand alone computer games to multiuser online games, SL like VWs take us to the next level of virtual realism. Like in real world we have our postal address, in web we have URLs, here in SL, we are located at SLURLs. you can buy or rent a property.

The objects can move, interact. The avatar created at the time of registration can be altered. There is some free stuff which you use for basic appearance, there are things to buy for those who want some special appearance. The avatar can walk, fly, teleport, and chat with others. As soon as you create your avatar, you are taken to an Orientation Island. This is the place to learn SL. SL has become such a big commercial space that big brands can also be found there. BBC, IBM, Disney, MTV, Coca-Cola, Intel, Sun Microsystems, and Warner Brothers etc have their presence in SL.
The impact of SL is so powerful that persons associated with painting, dance, literature, health sciences and cinema are using this medium to express their creativeness. Machinima is another application ofSL where SL is used to create movies with the help of built-in recording features or third party software. "Machinima is filmmaking within a real-time, 3D virtual environment, often using 3D video-game technologies."

Computers as simulator

Let's first understand what a simulation is? Can you explain it? This can be defined as mimicking or modeling certain actions, procedures or phenomena using computers. You must be watching weather on the television. For predicting future weather or forecasting the weather, the pattern is analysed through simulations.

Similarly before actually performing hazardous chemical reactions, these are performed through simulation to see their effect and assuring all safety precautions.

Computer have not only developed the ability for drill and practice, but they can perform simulations too. There are computer programs which can mimic circulatory system or the taking off of a space shuttle, or after effects of a nuclear reaction etc.

What are the advantages of these simulations? These allow the students to find the answer to certain questions where greater risk is involved and without actually performing it. For example, there are flight simulators to enable pilots to learn how to fly the plane.

Since the pilots are not flying the actual plane therefore during learning if some skill is not properly demonstrated (for example in case of crash) the simulator will immediately send a warning signal, but since it is in controlled conditions without incurring the loss of multimillion rupees worth of airplane or loss of human life.

Similarly, in case of biology classes, there are simulator programs which help the student to understand the anatomy of the animals without actually them doing the dissection of an animal.

There are chemical reaction simulators which perform complex and dangerous chemical reactions where the students learn the effects of chemical reactions through combustion, heating, cooling or pressurising etc.

Computers have developed the ability to teach perceptual and cognitive skills involved in sports (Starkes & Lindley, 1994).

They demonstrated it by developing a video and slide simulation of basketball game. Woodward, Carnine & Gersten (1988) with the help of their health and lifestyles program (called Health Ways) revealed that computers can teach problem solving skills which make students understand the factors related to longevity.

Delivery models

The web-based media is mainly used to deliver learning resources and provide communication facilities. Various models are derived on the basis of approaches used to utilize features of the web in delivering educational materials.

Library model

Here Web is mainly used as library. Learners are provided direct access to the instructional materials and other educational resources through web. Even links are provided ta outside resources keeping in mind that outside resources are reliable and there is no infringement of copy rights rules. Sometimes a brief review on the quality of external contents is also provided to learners so that they can judge whether information connected from the web is reliable. This type of model is good when learners are mature and have good knowledge about the subject so that they can judge the quality of the material. The library model is effective where peer group activities are not significant.

Interactive instructional model

This model provides interactive multimedia based instructional resources to learners via the Web. Under this model software can customize learning events on the basis of responses from the learners. This model is more effective than library model as it allows customization of learning events according to the convenience and preferences of learners. Teachers can- provide simulations or interactive games to improve motor skills of learners.

Computer mediated communication model

Under this model, the Web is mainly used to provide communication facilities. As discussed earlier, the computer is equally effective in providing synchronous and asynchronous communications. If the bandwidth of communication channel is low, then we can use more of. text based communication. Audio and video conferencing can- be used if we have broader bandwidth communication channel.

Hybrid model

The hybrid model combines the facilities of library, interactive instructional materials and computer mediated communication models. It provides educational resources, interactive multimedia along with communication facilities. The hybrid model uses the most effective component of each model.

Virtual classroom model

In most of the models mentioned above, computers are used supplementary technology. A number of services are still provided through traditional methods. But in the virtual class room environment all the services are provided through Internet. This model is used to create virtual classroom. The functions and activities of a virtual classroom are very close to those of an actual classroom. A learner can perform all activities needed in traditional system under virtual classroom model over the Internet.

Strategies to overcome the barriers

Technophobia

The general experience of the teachers and learners with other educational technologies is not ·encouraging. Educational technology is usually introduced when teachers and learners are not well prepared to accept the new technologies. Most of these equipment are underused. The administrator should understand the needs of new educational environment. Training programmes and workshops should be arranged for teachers and learners to make them aware of new technologies. The use of technology can be learned only by practical activities with the technology. Teachers and learners should be motivated to use the Internet in day-to-day activities. The teachers should be involved in the development of Web-based programmes.

Understanding the capabilities of the Internet

Teachers sometimes feel that the Internet based education is dull and they miss the eye contact with their students. Teachers also feel that they can only place their lectures and notes on the website without any pedagogical value. Thus their lectures will be no different from the cheap guidebooks available in the market. In the same way, computer-based assessment' techniques have limited capabilities. It can be used only to measure simple learning skills such as recalling facts through multiple choice questions or drill and practice kind of exercises, etc

Insufficient assistance to implement Web based programmes

Teachers feel that the financial input and the manpower support provided by institutions for developing and running an Internet based programme are not sufficient to maintain the quality of the programme. The procedures for the approval of grants are very complex and lengthy. Grants are usually not released timely. The educational institutions should expedite the grant approval procedures and should have a liberal attitude towards Web based programmes. The educational institutes should collaborate with private organizations for getting grants and manpower for developing Internet-based programmes.

Inadequate access to technology

in India millions of people still do not have access to adequate technology or any technology at all. The infrastructure needed to access the Internet is available in major towns and cities. Even there, it is accessible to all. The large section of the society cannot bear the recurring expenditure incurred in accessing Internet.

Language barrier

English is the most widely used language over the Internet. Most of the resources over the Web are written in English language. India is a multi-linguistic country, having l 18 officially recognized languages. English language is not so popular, particularly among the citizens living in the rural and remote areas of the 'Country.

Copyrights violation

Since it is rather easy to access materials on the Internet, there is a growing tendency to use such materials without acknowledgement. This is outright wrong and violation of intellectual property right and the copyright law.

Scarcity of skilled manpower

As discussed earlier in this unit, most of the jobs in the post industrial environment can be handled by semi professionals. We do not require heavily skilled manpower.

Closed circuit television(CCTV)

The Closed Circuit Television (CCTV) system is a kind of television transmission system in which signals are sent over a closed loop to a predetermined group. The signals may be sent to the members through cable or microwave link. The CCTV transmitted through coaxial cable is popular in India. The CCTV can be used to provide audio, visual and text supports for students. Teachers can use the CCTV to make their presentations more attractive and effective as it has capability to include audio and video in a lesson. The CCTV will cater to the needs of students who do not have good reading skills. The CCTV provides facility to re-play a particular part of a lecture on demands of learners. Sometimes institutions transmit a lesson in more than one format, translated into regional languages. Students can select a format and the language of transmission. These features will be helpful for heterogeneous populations of learners. Teachers can address more than one class simultaneously through the CCTV system. The CCTV system also connects the main campus with homes of individual students, so that students who fail to attend the class may avail of the lectures from their homes. They can see programmes even after school hours over the CCTV system.

The educational CCTV system has the following advantages:

♣ The CCTV system caters to the specific needs of a closed group or area. Thus students have a sense of belonging within the group.

♣ It caters to the needs of learners who have been living near the institution but could not battend the campus

♣ Some times it is difficult to assemble all students in a single classroom due to sitting capacity of the classroom. The CCTV system is very helpful in such situation. Students sitting in different classrooms can be addressed simultaneously over the CCTV system.

♣ Administrative staff can use the CCTV system to see the effectiveness of the teaching learning process without going to the classroom.

♣ The CCTV system enhances the independence of learners by providing accessibility to the institution from homes of learners.

♣ The CCTV system can be used to improve presentations. For example microscopic slides in biology and three dimensional images in geometry can be effectively demonstrated over the CCTV system.

The educational CCTV system has following limitations:

♣ 'Students can watch only what is recorded by cameras. Directions of cameras have an impact on the vision and interpretation.

♣ Some subjects cannot be taught through the CCTV system as they need direct supervision of teachers for effective learning.

♣ Reading text over the screen of the CCTV system put lot of strain on eyes. The reading speed is slow and inefficient over the CCTV system.

♣ Where there is a lack of academic environment at home, students feel lonely and inconvenient in accessing lessons.

♣ There is a lack of interactivity in CCTV programmes.

Assistive technology

♣ People with disabilities or/and special needs according to their own requirements need some structural changes or some extra tools to be added in the conventional or traditional technological tools with the main devices for better accessibility.

♣ This kind of technology assists such people to get their work done. Any device that is used to enhance a person's working ability is called as special device or assistive technology.

♣ In other words, assistive technology means alternative or adaptive specialized hardware and software, including input and output devices designed for users with various disabilities.

♣ This technology helps the students with learning and physical disabilities to actively participate in inclusive classroom tasks such as writing, reading and for doing mathematics.

♣ To a large extent, assistive technology is found useful in creating new abilities for. children and adults with disabilities including sensory, cognitive, learning and physical disabilities.

♣ This allows these students to independently complete their assignments, examinations and other class room activities.

♣ Some examples of assistive technology are: touch control devices, alternative keyboards and mice, speech-to-text word recognition tools, word prediction programs, word processors, grammar checkers, scanners, compact disc recording drives and spell checkers.

Universal design

Universal design is "the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design" Designing any product or technology involves the consideration of many factors like aesthetics, engineering, environmental issues, industry standards, safety concerns and cost. In general, products and technologies are designed for the average user. For example, a staircase to enter into a building is not accessible to everyone. If a ramp is constructed, the building becomes accessible to more people, including some wheelchair users. By applying universal design principles the above mentioned facility is designed that benefits everyone including a small child, a man carrying luggage and to a person using a walker or wheel chair. Universal design is further defined by the Center for Universal Design at North Carolina State University as the design of products and environments which can be used by all people, to the greatest extent possible. There is no need for adaptation or specialized design. The Center established a set of principles that provide guidance for the designing of products and environments.

The principles are:
•. Equitable use:

The design should be useful and marketable to people with diverse abilities.
• Flexibility in use:

The design should accommodate a wide range of individual needs and abilities.
• Simple and intuitive:

Use of the design should be easy to understand for all the users with different experience, knowledge and language skills.
• Perceptible information:

The design should communicate necessary information effectively to all the users, according to their needs and abilities.
• Tolerance for error:

The design should minimize the danger of accidental or unintended actions.
• Low physical effort:

The design should be such that it can be used efficiently and comfortably with the minimum difficulty.
• Size and space for approach and use:

Appropriate size and space should be provided for approach, reach and use to all users depending on their body size, posture or mobility requirements.

Universal accessibility

♣ Accessibility means making a device, product, a website or a building usable by the greatest number of people irrespective of their language, gender, height or abilities (disabled), bringing the concerned subjects within the reach of the maximum number of people.

♣ In the educational institutions. by applying universal design principles accessibility to all including the people with special needs can be ensured.

♣ When we design a website or a course, we should ensure that they are accessible by all including persons with disabilities.

♣ By making some necessary changes we can make the products and environments accessible according to the needs of the people.

♣ As we discussed above, by applying the universal design principles we can make the courses, lectures, discussions, visual aids, videotapes, printed materials, labs and fieldwork accessible to all students.

♣ Distance-learning courses that incorporate universal design features can he accessed by students with diverse characteristics, including those defined by age, race, Ethnicity gender, native language, and levels of ability to hear, see, move and speak.

Special technologies for the people with various disabilities

Technologies for students with hearing impairments

Captioning

Captioning refers to the addition of text to a visual display. With the help of this technology the words that are spoken can be seen as text. You must have seen some written text at the bottom of your television sets while watching some programmes in foreign languages.

Live speech captioning

Live speech captioning is another type of captioning which provides accessibility of live programmes and speech to the hearing impaired people. It is just a variation of this technology which we have already discussed. This allows them to access the words as they are being spoken. Live speech captioning works like the steno keyboards.

Technologies for students with visual impairments

Computer screen magnification

In most of the computers available today, magnification of the screens is possible by the use of special software. " This technology helps the low vision students to use the screen easily with the magnification.

Descriptive video services

As we have already discussed that this technology gives a narrative verbal description of the visual elements displayed on the screen. These may be background, costumes, physical descriptions of the characters and facial expressions.

Screen readers

Screen readers are generally a type of software. These are also known as text-to-speech applications. A screen reading software analyzes the characters, words and sentences and converts them into synthetic or digital speech.

Optical character recognition

This technology helps blind students scan the books or other print materials and read them by using synthetic or digital speech.

Technologies for students with severe physical disabilities

Switches

Generally, switches control the flow of electrical power to the devices that the user wants to turn on or off. With a little effort, we can add some extra switches to the devices for the better use of students with physical disabilities.

Infrared sensors with pneumatic switches

This infrared technology is one of the latest innovations for assisting the people with physical disabilities. This helps physically disabled students to use the computer easily and independently.

Voice recognition

The use of voice recognition software makes the computer operation easier. It is used as an alternative to the keyboard, especially for typing, where the users just have-!) speak to the computer.

Generations of IT for organizational management

First generation - inventory control

Most of the systems software was designed to handle inventory based in traditional inventory concepts. In the inventory control system helps an organisation to monitor its operations. It also helps the organisation to locate and identify the status of its various operations related to shipping, receiving, picking and put away processes. In an educational organization an inventory control system can manage classes, subjects according to requirements, can generate automated time table with a number of options, transport maintenance management, library management etc.

Second generation - material requirement planning

This system helped in translating the master production schedule into requirements for individual units like sub assemblies, components and other raw material planning and "procurement. This system was involved mainly in planning the raw material requirements. Most manufacturing problems would be a lot easier to solve if you could only balance future supply and demand. The primary control focus of an MRP system is Order Entry. Once an order is entered (and it may be an internal order to build for stock), all the manufacturing functions are put into motion. These include Cost estimates - a function of order entry. Cost builds can be ordered from information in the other modules.

Third generation

Manufacturing Resource Planning-II: This involved optimizing the entire plant production process. Though MRP-II, in the beginning was an extension ofMRP to include shop floor and distribution management activities, during later years, MRP-JI was further extended to include areas like Finance, Human Resource, Engineering, Project Management etc.