

# NEHRU COLLEGE OF EDUCATION

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## B.Ed. DEGREE SECOND YEAR



Course - 18(xi) - Pedagogy of Computer Science – Part 2

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## Pedagogy of computer science – part 2

### Unit – I (Information communication technology)

Educational technology is a systematic and organized process of applying modern technology to improve the quality of education (efficiency, optimal, true, etc.).

It is a systematic way of conceptualizing the execution and evaluation of the educational process, i. e. learning and teaching and help with the application of modern educational teaching techniques.

#### Technology in Education:-

**Educational technology** is "the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources"

Educational technology is an inclusive term for both the material tools *and* the theoretical foundations for supporting learning and teaching.

Educational technology is not restricted to high technology. Education technology is anything that enhances classroom learning in the utilization of blended or online learning

#### **Educational technology has three domains of use:**

- Technology as a tutor (computer gives instructions and guides the user),
- Technology as a teaching tool and
- Technology as a learning tool.

A number of authors (Clements and Sarama, 2003; Glaubke 2007; Dynarski et al. 2007) suggest that we should focus on the areas of software programs that have the potential to strongly influence children's learning experience:

1. The educational value of the program,
2. Its ability to engage children in learning,
3. Ease of use,
4. Interactivity between the child and programs,
5. The possibility that a software program monitors the progress of the child.

#### Concept of information Technology:-

Information is a resource which has no value until it is extracted, processed and utilized. Information technology deals with information system, data storage, access, retrieval, analysis and intelligent decision making. Information technology refers to the creation, gathering, processing, storage, presentation and dissemination of information and also the processes and devices that enable all this to be done.

Information technology is affecting us as individual and as a society. Information technology stands firmly on hardware and software of a computer and tele-communication infrastructure.

#### Communication technology:-

**Information and communication technology (ICT)** is an extended term for information technology (IT) which stresses the role of unified communications and the integration of telecommunications (telephone lines and wireless signals), computers as well as necessary enterprise software, middleware, storage, and audio-visual systems, which enable users to access, store, transmit, and manipulate information

#### **What is Instructional Technology?**

According to the Association of Educational Communications and Technology, "Instructional Technology is the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning (Seels & Richey, 1994).

" The term **Instructional Technology and Educational Technology** are generally considered synonymous. "Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technology processes and resources (Januszewski & Molenda, 2008)."

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### **Need and Significance of Educational Technology:-**

#### **Need**

- Education is a lifelong process therefore anytime anywhere access to it is the need
- Information explosion is an ever increasing phenomena therefore there is need to get access to this information
- Education should meet the needs of variety of learners and therefore IT is important in meeting this need
- It is a requirement of the society that the individuals should posses technological literacy
- We need to increase access and bring down the cost of education to meet the challenges of illiteracy and poverty-IT is the answer

#### **Importance**

- access to variety of learning resources
- immediacy to information
- anytime learning
- anywhere learning
- collaborative learning
- multimedia approach to education
- authentic and up to date information
- access to online libraries
- teaching of different subjects made interesting
- educational data storage
- distance education
- access to the source of information
- multiple communication channels-e-mail,chat,forum,blogs,etc.
- access to open courseware
- better accesses to children with disabilities
- reduces time on many routine tasks

## Emerging Trends in Educational Technology:-

As innovators in the eLearning space, we keep an eye on emerging trends, terms, and technology in the industry. Here are some of the top education technology trends that have been on our radar recently!

### 1. Virtual Reality

While basic forms of virtual realities have been around since the early 90's, a more sophisticated model is expected to formulate and take off in the next year or so. Students can “visit” places virtually that they do not have physical access to — historical times, monuments, under the sea, other countries, and even outer space. Virtual realities can take history and science lessons to the next level!

### 2. Holographic Technology

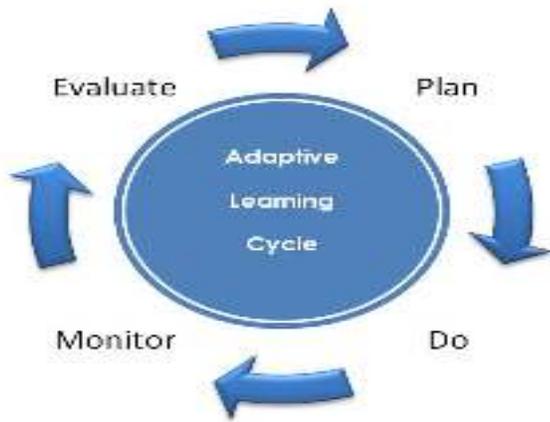
Created through light beams, holograms are lifelike and **three-dimensional** reflections of an image, person, place, etc. Holographic technology has the potential to create an engaging learning experience for learners, and provide them with the visuals they need to absorb material. It can be used for **videoconferencing, gamification, and simulating assignments and projects**. Major tech companies have been quick to jump on holography — Microsoft picked up on this trend last year, with the release of Windows Holographic.



### 3. Adaptive Learning

Adaptive learning is a computer/technology based method of learning, that uses learning technologies that modify the presentation of learning materials to adapt to individual learner needs, often influenced by the learning data gathered from **learning analytics**. Think of adaptive learning as an **artificially-intelligent tutor**. Modern teaching tools can now essentially learn the way people learn, and adapt learning material to each learner. As you go through a course, the learning technologies in place track which elements of the course you work well with, and which ones are more challenging, so that it can adjust the course path and course materials based on your performance.

For example, if you've performed well from watching a learning video, the course will incorporate more video's into your specific learning path to increase your overall performance.



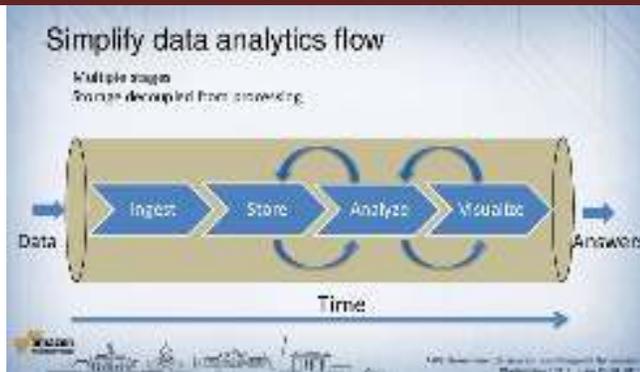
#### 4. Makerspaces

A Makerspace is simply a **peer-based collaborative space** where learners can come together to work, innovate, learn, and educate — a “space” for people to create, or “make.” Incorporating makerspaces into a learning environment means that multimedia and technology such as video, 3D printing, photography, and art pieces are more accessible, and less regulated. Makerspaces spark innovation, creativity, and engagement.



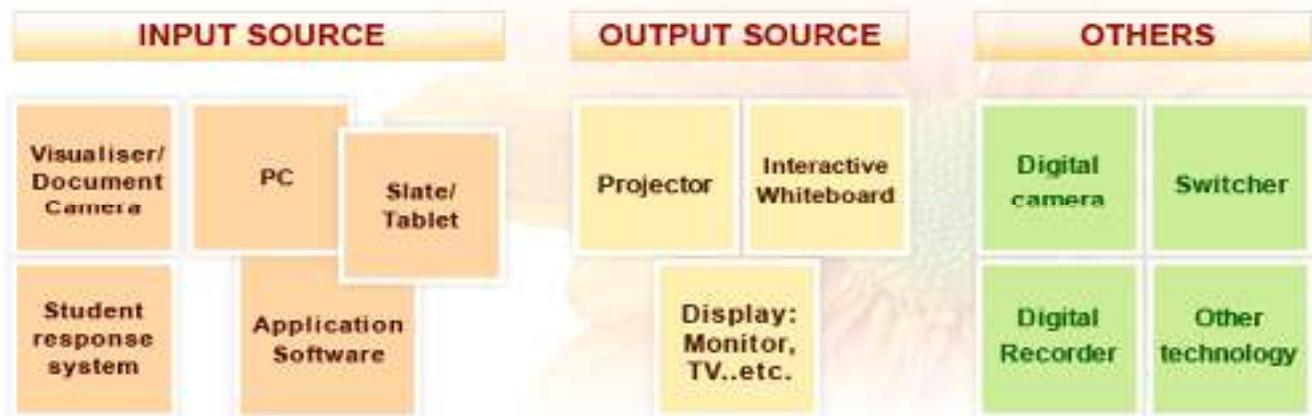
#### 5. Data & Analytics

While it may not be flashy or 3-D, learning analytics is possibly the most transformative trend in the education world. Learning analytics is data pulled from reports and dashboards (through a reporting and analytics tool), that helps develop learner profiling. Learning analytics first emerged with a focus in hindsight, preoccupied with describing results and providing a diagnosis. Over the years it has transformed to its current state, which is predicting what will happen in the future. This is evident through the current state of the market, where learning analytic tools help identify which students are struggling, and the specific areas they are struggling in. Analytic data empowers educators with information that allows them to shape better learning pedagogies, empower active learning, identify the factors that affect student success, and build courses that meet students individual needs.



1.Cloud Computing, 2.Mobile Learning, 3.Tablet Computing, 4.MOOCs, 5.Open Content, 6.Learning Analytics, 7.Games and Gamification, 8.3D Printing, 9.Virtual and Remote Laboratories, 10.Wearable Technology

**ICT in Education**



Worldwide research has shown that ICT can lead to improved student learning and better teaching methods. A report made by the National Institute of Multimedia Education in Japan, proved that an increase in student exposure to educational ICT through curriculum integration has a significant and positive impact on student achievement, especially in terms of "**Knowledge • Comprehension**" · "**Practical skill**" and "**Presentation skill**" in subject areas such as mathematics, science, and social study.

**MAIN ADVANTAGES OF ICT TOOLS FOR EDUCATION**

1. Through ICT, images can easily be used in teaching and improving the retentive memory of students.
2. Through ICT, teachers can easily explain complex instructions and ensure students' comprehension.
3. Through ICT, teachers are able to create interactive classes and make the lessons more enjoyable, which could improve student attendance and concentration.

Information and Communication Technologies (ICTs) play an increasingly important role in the way we communicate, learn and live.

The challenge is to effectively harness these technologies in a way that serves the interests of learners and the larger teaching/learning community.

UNESCO considers that ICTs can contribute to universal access to education, equity in education, the delivery of quality learning and teaching, teachers' professional development as well as improve education management, governance and administration provided the right mix of policies, technologies and capacities are in place.

UNESCO takes a comprehensive approach to ICTs in education. It is through the Organization's Intersectoral Platform that it focuses on the joint work of the Communication and Information, Education and Science Sectors where the issues of access, inclusion, equity and quality in education can be addressed.

### **ICT importance in education:-**

**First**, the ICT has been developing very rapidly nowadays. Therefore, in order to balance it, the whole educational system should be reformed and ICT should be integrated into educational activities.

**Second**, the influence of ICT, especially internet (open source tool) cannot be ignored in our student's lives. So, the learning activities should be reoriented and reformulated, from the manual source centered to the open source ones. In this case the widely use of internet access has been an unavoidable policy that should be anticipated by schools authorities.

**Third**, the presence of multimedia games and online games by internet has been another serious problem that should be wisely handled by the educational institutions. The students cannot be exterminated from this case. They can have and do with it wherever and whenever they want. Schools, as a matter of fact, do not have enough power and time to prevent or stop it after school times. Meanwhile, most parents do not have enough times to accompany and control their children. So, the students have large opportunities to do with multimedia games or online games or browsing the negative sites. Having been addicted, the students will have too little time to study, and even do not want to attend classes. In such situation, education institutions play an important role to eradicate these problems. One of which is by facilitating the students to do edutainment or educational games. Schools can let their students be familiar with educational games adjusted by their teachers. Besides, they can also support and facilitate their students to have their own blogs in the internet. A lot of Weblog providers are free to the users, such as WordPress. In their blogs, the students can create and write something, like an article, poem, news, short stories, features, or they can also express their opinion by an online forum provided in the internet. They are able to share experiences throughout their blogs to others from all over the world. I think it will be an interesting activity for them, and it will lessen their time to visit the negative sites existed. By doing so, I think our young generation will get more and more information and knowledge by browsing in the internet. They can also create innovation in web design that it may be out of the formal curriculum content, but it will be useful for their future.

**Fourth**, the implementation of ICT in education has not been a priority trend of educational reform and the state paid little attention to it. Therefore, there should be an active participation, initiative and good will of the schools and the government institutions to enhance ICT implementation at school.

**Fifth**, the teachers should be the main motivator and initiator of the ICT implementation at schools. The teachers should be aware of the social change in their teaching activities. They should be the agent of change from the classical method into the modern one. They must also be the part of the global change in learning and teaching modification.

The followings are the aim and objectives of ICT implementation in education:

- 1) To implement the principle of life-long learning / education.
- 2) To increase a variety of educational services and medium / method.

- 3) To promote equal opportunities to obtain education and information.
- 4) To develop a system of collecting and disseminating educational information.

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- 5) To promote technology literacy of all citizens, especially for students.
- 6) To develop distance education with national contents.
- 7) To promote the culture of learning at school (development of learning skills, expansion of optional education, open source of education, etc.)
- 8) To promote the culture of learning at school (development of learning skills, expansion of optional education, open source of education, etc.)

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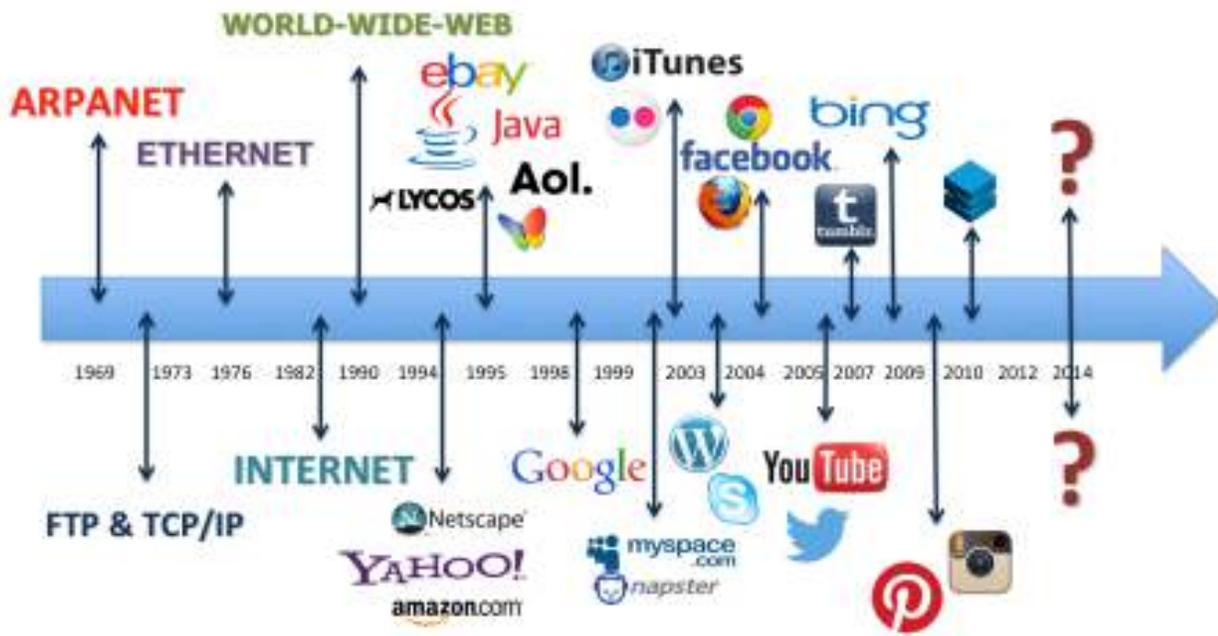
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**UNIT – II (INTERNET AND ITS APPLICATIONS)**

**HISTORY OF THE INTERNET:-**



The **Internet** is the global system of interconnected computer networks that use the Internet protocol suite (TCP/IP) to link devices worldwide.

It is a *network of networks* that consists of private, public, academic, business, and government networks of local to global scope, linked by a broad array of electronic, wireless, and optical networking technologies.

The Internet carries an extensive range of information resources and services, such as the inter-linked hypertext documents and applications of the World Wide Web (WWW), electronic mail, telephony, and file sharing.

- 1987 - The new network CREN forms.
- 1987- The number of hosts breaks 10,000
- 1988 - Traffic rises and plans are to find a new replacement for the T1 lines.
- 1989- The Number of hosts breaks 100 000
- 1989- Arpanet ceases to exist
- 1990 - Advanced Network & Services (ANS) forms to research new ways to make internet speeds even faster. The group develops the T3 line and installs in on a number of networks.
- 1990 - A hypertext system is created and implemented by Tim Berners-Lee while working for CERN.
- 1990- The first search engine is created by McGill University, called the Archie Search Engine
- 1991- U.S green-light for commercial enterprise to take place on the Internet

- 1991 - The National Science Foundation (NSF) creates the National Research and Education Network (NREN).
- 1991 - CERN releases the World Wide Web publicly on August 6th, 1991
- 1992 – The Internet Society (ISOC) is chartered
- 1992- Number of hosts breaks 1,000,000
- 1993 - InterNIC released to provide general services, a database and internet directory.
- 1993- The first web browser, Mosaic (created by NCSA), is released. Mosaic later becomes the Netscape browser which was the most popular browser in the mid 1990's.
- 1994 - New networks added frequently.
- 1994 - First internet ordering system created by Pizza Hut.
- 1994 - First internet bank opened: First Virtual.
- 1995 - NSF contracts out their access to four internet providers.
- 1995 - NSF sells domains for a \$50 annual fee.
- 1995 – Netscape goes public with 3rd largest ever NASDAQ IPO share value
- 1995- Registration of domains is no longer free.
- 1996- The WWW browser wars are waged mainly between Microsoft and Netscape. New versions are released quarterly with the aid of internet users eager to test new (beta) versions.
- 1996 – Internet2 project is initiated by 34 universities
- 1996 - Internet Service Providers begin appearing such as Sprint and MCI.
- 1996 - Nokia releases first cell phone with internet access.
- 1997- (Arin) is established to handle administration and registration of IP numbers, now handled by Network Solutions (InterNic)
- 1998- Netscape releases source code for Navigator.
- 1998-Internet Corporation for Assigned Names and Numbers (ICANN) created to be able to oversee a number of Internet-related tasks
- 1999 - A wireless technology called 802.11b, more commonly referred to as Wi-Fi, is standardized.
- 2000- The dot com bubble bursts, numerically, on March 10, 2000, when the technology heavy NASDAQ composite index peaked at 5,048.62
- 2001 - Blackberry releases first internet cell phone in the United States.
- 2001 – The spread of P2P file sharing across the Internet
- 2002 -Internet2 now has 200 university, 60 corporate and 40 affiliate members
- 2003- The French Ministry of Culture bans the use of the word "e-mail" by government ministries, and adopts the use of the more French sounding "courriel"
- 2004 – The Term Web 2.0 rises in popularity when O'Reilly and MediaLive host the first Web 2.0 conference.
- 2004- Mydoom, the fastest ever spreading email computer worm is released. Estimated 1 in 12 emails are infected.
- 2005- Estonia offers Internet Voting nationally for local elections
- 2005-Youtube launches
- 2006- There are an estimated 92 million websites online

2006 – Zimbabwe's internet access is almost completely cut off after international satellite communications provider Intelsat cuts service for non-payment

2006- Internet2 announced a partnership with Level 3 Communications to launch a brand new nationwide network, boosting its capacity from 10Gbps to 100Gbps

2007- Internet2 officially retires Abilene and now refers to its new, higher capacity network as the Internet2 Network

2008- Google index reaches 1 Trillion URLs

2008 – NASA successfully tests the first deep space communications network modeled on the Internet. Using software called Disruption-Tolerant Networking, or DTN, dozens of space images are transmitted to and from a NASA science spacecraft located about more than 32 million kilometers from Earth

2009 – ICANN gains autonomy from the U.S government

2010- Facebook announces in February that it has 400 million active users.

2010 – The U.S House of Representatives passes the Cybersecurity Enhancement Act (H.R. 4061)

2012 - A major online protest shook up U.S. Congressional support for two anti-Web piracy bills - the Stop Online Piracy Act in the House and the Protect IP Act in the Senate. Many in the tech industry are concerned that the bills will give media companies too much power to shut down websites.

**2014-**A coding error discovered in April in OpenSSL, encryption software that makes transactions between a computer and a remote secure, makes users vulnerable to having their usernames, passwords, and personal information stolen. Millions of banks, Internet commerce companies, email services, government sites, and social media sites rely on OpenSSL to conduct secure transactions. The coding error was made in 2012. Computer security experts encourage computer users to change their passwords.

**2015-**On September 26, Mark Zuckerberg (Facebook) spoke during the 70th annual U.N. General Assembly session, to increase awareness and garner support for the initiative, ONE--an organization "taking action to end extreme poverty and preventable disease." Zuckerberg's goal is to bring the Internet to the masses; universal Internet access, he claims, is a basic human right and is an essential tool in the fight to achieve global justice.

### **THE INFLUENCE AND IMPACT OF THE INTERNET**

The influence of the Internet on society is almost impossible to summarize properly because it is so all-encompassing. Though much of the world, unfortunately, still does not have Internet access, the influence that it has had on the lives of people living in developed countries with readily available Internet access is great and affects just about every aspect of life.

To look at it in the most general of terms, the Internet has definitely made many aspects of modern life much more convenient. From paying bills and buying clothes to researching and learning new things, from keeping in contact with people to meeting new people, all of these things have become much more convenient thanks to the Internet.

Things that seemed like science fiction only a couple of decades ago such as paying your bills from your mobile phone or accessing your music library anywhere are commonplace today thanks to the Internet. The concept of cloud computing and having all of your files with you at all times, even when you are miles

away from your computer, is another aspect of the Internet that gives people great convenience and mobility that were unimaginable before it. For example, opening up and working on a Microsoft Word file located on your home computer can be done from anywhere, as long as you have Internet access, thanks to programs like Dropbox and Google Drive or a remote desktop access program or application.

Communication has also been made easier with the Internet opening up easier ways to not only keep in touch with the people you know, but to meet new people and network as well. The Internet and programs like Skype have made the international phone industry almost obsolete by providing everyone with Internet access the ability to talk to people all around the world for free instead of paying to talk via landlines. Social networking sites such as Facebook, Twitter, YouTube and LinkedIn have also contributed to a social revolution that allows people to share their lives and everyday actions and thoughts with millions.

The Internet has also turned into big business and has created a completely new marketplace that did not exist before it. There are many people today that make a living off the Internet, and some of the biggest corporations in the world like Google, Yahoo and EBay have the Internet to thank for their success. Business practices have also changed drastically thanks to the Internet. Off-shoring and outsourcing have become industry standards thanks to the Internet allowing people to work together from different parts of the world remotely without having to be in the same office or even city to cooperate effectively.

All this only scratches the surface when talking about the Internet's impact on the world today, and to say that it has greatly influenced changes in modern society would still be an understatement.

### **THE FUTURE: INTERNET2 AND NEXT GENERATION NETWORKS**

The public Internet was not initially designed to handle massive quantities of data flowing through millions of networks. In response to this problem, experimental national research networks (NRN's), such as Internet2 and NGI (Next Generation Internet), are developing high speed, next generation networks.

In the United States, Internet2 is the foremost non for profit advanced networking consortium led by over 200 universities in cooperation with 70 leading corporations, 50 international partners and 45 non profit and government agencies. The Internet2 community is actively engaged in developing and testing new network technologies that are critical to the future progress of the Internet.

Internet2 operates the Internet2 Network, a next-generation hybrid optical and packet network that furnishes a 100Gbps network backbone, providing the U.S research and education community with a nationwide dynamic, robust and cost effective network that satisfies their bandwidth intensive requirements. Although this private network does not replace the Internet, it does provide an environment in which cutting edge technologies can be developed that may eventually migrate to the public Internet.

Internet2 research groups are developing and implementing new technologies such as Ipv6, multicasting and quality of service (QoS) that will enable revolutionary Internet applications.

New quality of service (QoS) technologies, for instance, would allow the Internet to provide different levels of service, depending on the type of data being transmitted. Different types of data packets could receive different levels of priority as they travel over a network. For example, packets for an application such as videoconferencing, which require simultaneous delivery, would be assigned higher priority than e-mail messages. However, advocates of net neutrality argue that data discrimination could lead to a tiered service model being imposed on the Internet by telecom companies that would undermine Internet freedoms.

More than just a faster web, these new technologies will enable completely new advanced applications for distributed computation, digital libraries, virtual laboratories, distance learning and tele-immersion.

As next generation Internet development continues to push the boundaries of what's possible, the existing Internet is also being enhanced to provide higher transmission speeds, increased security and different levels of service.

### **Application of Network:-**

Applications of **Computer Networks**. A network is a collection or set of computing devices connected to one another to establish communication and also share available resources. A network will comprise of software and hardware devices. You can have a network even if you are not connected to the **internet**.

### **Network applications**

Sample applications

- E-mail • Web • Instant messaging • Remote login • P2P file sharing • Multi-user network games • Streaming stored video clips • Internet telephone • Real-time video conference • Massive parallel computing • ...

Typical architectures Typical architectures

- Client-server • Peer-to-peer (P2P) peer (P2P) • Hybrid of client Hybrid of client-server and P2P

### **The Advantages (Benefits) of Networking**

You have undoubtedly heard the “the whole is greater than the sum of its parts”. This phrase describes networking very well, and explains why it has become so popular. A network isn't just a bunch of computers with wires running between them. Properly implemented, a network is a system that provides its users with unique capabilities, above and beyond what the individual machines and their software applications can provide.

Most of the benefits of networking can be divided into two generic categories: *connectivity* and *sharing*. Networks allow computers, and hence their users, to be connected together. They also allow for the easy sharing of information and resources, and cooperation between the

devices in other ways. Since modern business depends so much on the intelligent flow and management of information, this tells you a lot about why networking is so valuable.

Here, in no particular order, are some of the specific advantages generally associated with networking:

- **Connectivity and Communication:** Networks connect computers and the users of those computers. Individuals within a building or work group can be connected into *local area networks (LANs)*; LANs in distant locations can be interconnected into larger *wide area networks (WANs)*. Once connected, it is possible for network users to communicate with each other using technologies such as electronic mail. This makes the transmission of business (or non-business) information easier, more efficient and less expensive than it would be without the network.
- **Data Sharing:** One of the most important uses of networking is to allow the sharing of data. Before networking was common, an accounting employee who wanted to prepare a report for her manager would have to produce it on his PC, put it on a floppy disk, and then walk it over to the manager, who would transfer the data to her PC's hard disk. (This sort of “shoe-based network” was sometimes sarcastically called a “sneakernet”.)

True networking allows thousands of employees to share data much more easily and quickly than this. More so, it makes possible applications that rely on the ability of many people to access and share the same data, such as databases, group software development, and much more. Intranets and extranets can be used to distribute corporate information between sites and to business partners.

- **Hardware Sharing:** Networks facilitate the sharing of hardware devices. For example, instead of giving each of 10 employees in a department an expensive color printer (or resorting to the “sneakernet” again), one printer can be placed on the network for everyone to share.
- **Internet Access:** The Internet is itself an enormous network, so whenever you access the Internet, you are using a network. The significance of the Internet on modern society is hard to exaggerate, especially for those of us in technical fields.
- **Internet Access Sharing:** Small computer networks allow multiple users to share a single Internet connection. Special hardware devices allow the bandwidth of the connection to be easily allocated to various individuals as they need it, and permit an organization to purchase one high-speed connection instead of many slower ones.
- **Data Security and Management:** In a business environment, a network allows the administrators to much better manage the company's critical data. Instead of having this data spread over dozens or even hundreds of small computers in a haphazard fashion as their users create it, data can be centralized on shared servers. This makes it easy for everyone to find the data, makes it possible for the administrators to ensure that the data is regularly backed up, and also allows for the

implementation of security measures to control who can read or change various pieces of critical information.

- **Performance Enhancement and Balancing:** Under some circumstances, a network can be used to enhance the overall performance of some applications by distributing the computation tasks to various computers on the network.
- **Entertainment:** Networks facilitate many types of games and entertainment. The Internet itself offers many sources of entertainment, of course. In addition, many multi-player games exist that operate over a local area network. Many home networks are set up for this reason, and gaming across wide area networks (including the Internet) has also become quite popular. Of course, if you are running a business and have easily-amused employees, you might insist that this is really a *disadvantage* of networking and not an advantage!



**Key Concept:** At a high level, networks are advantageous because they allow computers and people to be connected together, so they can share resources. Some of the specific benefits of networking include communication, data sharing, Internet access, data security and management, application performance enhancement, and entertainment.

There are so many different types of computer networks in existence, it can be hard to understand the differences between them, particularly the ones with very similar-sounding names. This lesson explains the structures and functions of some of the most popular computer networks.

### Types of Networks

There are several different types of computer networks. Computer networks can be characterized by their size as well as their purpose.

The size of a network can be expressed by the geographic area they occupy and the number of computers that are part of the network. Networks can cover anything from a handful of devices within a single room to millions of devices spread across the entire globe.

Some of the different networks based on size are:

- Personal area network, or PAN
- Local area network, or LAN
- Metropolitan area network, or MAN
- Wide area network, or WAN

In terms of purpose, many networks can be considered general purpose, which means they are used for everything from sending files to a printer to accessing the Internet. Some types of networks, however, serve a very particular purpose. Some of the different networks based on their main purpose are:

- Storage area network, or SAN
- Enterprise private network, or EPN
- Virtual private network, or VPN

Let's look at each of these in a bit more detail.

### **Personal Area Network**

A **personal area network**, or **PAN**, is a computer network organized around an individual person within a single building. This could be inside a small office or residence. A typical PAN would include one or more computers, telephones, peripheral devices, video game consoles and other personal entertainment devices.

If multiple individuals use the same network within a residence, the network is sometimes referred to as a home area network, or HAN. In a very typical setup, a residence will have a single wired Internet connection connected to a modem. This modem then provides both wired and wireless connections for multiple devices. The network is typically managed from a single computer but can be accessed from any device.

This type of network provides great flexibility. For example, it allows you to:

- Send a document to the printer in the office upstairs while you are sitting on the couch with your laptop.
- Upload a photo from your cell phone to your desktop computer.
- Watch movies from an online streaming service to your TV.

If this sounds familiar to you, you likely have a PAN in your house without having called it by its name.

### **Local Area Network**

A **local area network**, or **LAN**, consists of a computer network at a single site, typically an individual office building. A LAN is very useful for sharing resources, such as data storage and printers. LANs can be built with relatively inexpensive hardware, such as hubs, network adapters and Ethernet cables.

The smallest LAN may only use two computers, while larger LANs can accommodate thousands of computers. A LAN typically relies mostly on wired connections for increased speed and security, but wireless connections can also be part of a LAN. High speed and relatively low cost are the defining characteristics of LANs.

LANs are typically used for single sites where people need to share resources among themselves but not with the rest of the outside world. Think of an office building where everybody should be able to access files on a central server or be able to print a document to one or more central printers. Those tasks should be easy for everybody working in the same office, but you would not want somebody just walking outside to be able to send a document to the printer from their cell phone! If a local area network, or LAN, is entirely wireless, it is referred to as a wireless local area network, or WLAN.

### Metropolitan Area Network

A **metropolitan area network**, or **MAN**, consists of a computer network across an entire city, college campus or small region. A MAN is larger than a LAN, which is typically limited to a single building or site. Depending on the configuration, this type of network can cover an area from several miles to tens of miles. A MAN is often used to connect several LANs together to form a bigger network. When this type of network is specifically designed for a college campus, it is sometimes referred to as a campus area network, or CAN.

### Wide Area Network

A **wide area network**, or **WAN**, occupies a very large area, such as an entire country or the entire world. A WAN can contain multiple smaller networks, such as LANs or MANs. The Internet is the best-known example of a public WAN.

### Private Networks

One of the benefits of networks like PAN and LAN is that they can be kept entirely private by restricting some communications to the connections within the network. This means that those communications never go over the Internet.

For example, using a LAN, an employee is able to establish a fast and secure connection to a company database without encryption since none of the communications between the employee's computer and the database on the server leave the LAN. But, what happens if the same employee wants to use the database from a remote location? What you need is a private network.

One approach to a private network is to build an **enterprise private network**, or **EPN**. An EPN is a computer network that is entirely controlled by one organization, and it is used to connect multiple locations. Historically, telecommunications companies, like AT&T, operated their own network, separate from the public Internet. EPNs are still fairly common in certain sectors where security is of the highest concern. For example, a number of health facilities may establish their own network between multiple sites to have full control over the confidentiality of patient records

### Basic computer network components

Computer networks share common devices, functions, and features including servers, clients, transmission media, shared data, shared printers and other hardware and software resources, network interface card(NIC), local operating system(LOS), and the network operating system (NOS).

**Servers** - Servers are computers that hold shared files, programs, and the network operating system. Servers provide access to network resources to all the users of the network. There are many different kinds of servers, and one server can provide several functions. For example, there are file servers, print servers, mail servers, communication servers, database servers, fax servers and web servers, to name a few.

**Clients** - Clients are computers that access and use the network and shared network resources. Client computers are basically the customers(users) of the network, as they request and receive services from the servers.

**Transmission Media** - Transmission media are the facilities used to interconnect computers in a network, such as twisted-pair wire, coaxial cable, and optical fiber cable. Transmission media are sometimes called channels, links or lines.

**Shared data** - Shared data are data that file servers provide to clients such as data files, printer access programs and e-mail.

**Shared printers and other peripherals** - Shared printers and peripherals are hardware resources provided to the users of the network by servers. Resources provided include data files, printers, software, or any other items used by clients on the network.

**Network Interface Card** - Each computer in a network has a special expansion card called a network interface card (NIC). The NIC prepares(formats) and sends data, receives data, and controls data flow between the computer and the network. On the transmit side, the NIC passes frames of data on to the physical layer, which transmits the data to the physical link. On the receiver's side, the NIC processes bits received from the physical layer and processes the message based on its contents.

**Local Operating System** - A local operating system allows personal computers to access files, print to a local printer, and have and use one or more disk and CD drives that are located on the computer. Examples are MS-DOS, Unix, Linux, Windows 2000, Windows 98, Windows XP etc.

**Network Operating System** - The network operating system is a program that runs on computers and servers, and allows the computers to communicate over the network.

**Hub** - Hub is a device that splits a network connection into multiple computers. It is like a distribution center. When a computer requests information from a network or a specific computer, it sends the request to the hub through a cable. The hub will receive the request and transmit it to the entire network. Each computer in the network should then figure out whether the broadcast data is for them or not.

**Switch** - Switch is a telecommunication device grouped as one of computer network components. Switch is like a Hub but built in with advanced features. It uses physical device addresses in each incoming messages so that it can deliver the message to the right destination or port.

Like a hub, switch doesn't broadcast the received message to entire network, rather before sending it checks to which system or port should the message be sent. In other words, switch connects the source and destination directly which increases the speed of the network. Both switch and hub have common features: Multiple RJ-45 ports, power supply and connection lights.

**Router** - When we talk about computer network components, the other device that used to connect a LAN with an internet connection is called Router. When you have two distinct networks (LANs) or want to share a single internet connection to multiple computers, we use a Router. In most cases, recent routers also include a switch which in other words can be used as a switch. You don't need to buy both switch and router, particularly if you are installing small business and home networks. There are two types of Router: wired and wireless. The choice depends on your physical office/home setting, speed and cost.

## Types of Network Topology

Network Topology is the schematic description of a network arrangement, connecting various nodes(sender and receiver) through lines of connection.

### BUS Topology

Bus topology is a network type in which every computer and network device is connected to single cable. When it has exactly two endpoints, then it is called **Linear Bus topology**.



### Features of Bus Topology

1. It transmits data only in one direction.
2. Every device is connected to a single cable

### Advantages of Bus Topology

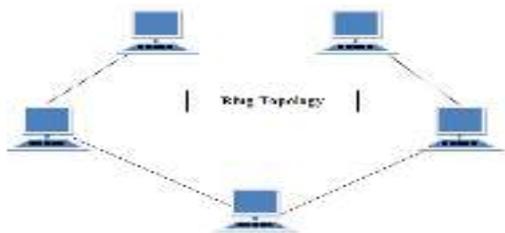
1. It is cost effective.
2. Cable required is least compared to other network topology.
3. Used in small networks.
4. It is easy to understand.
5. Easy to expand joining two cables together.

### Disadvantages of Bus Topology

1. Cables fails then whole network fails.
2. If network traffic is heavy or nodes are more the performance of the network decreases.
3. Cable has a limited length.
4. It is slower than the ring topology.

### RING Topology

It is called ring topology because it forms a ring as each computer is connected to another computer, with the last one connected to the first. Exactly two neighbours for each device.



### *Features of Ring Topology*

1. A number of repeaters are used for Ring topology with large number of nodes, because if someone wants to send some data to the last node in the ring topology with 100 nodes, then the data will have to pass through 99 nodes to reach the 100th node. Hence to prevent data loss repeaters are used in the network.
2. The transmission is unidirectional, but it can be made bidirectional by having 2 connections between each Network Node, it is called **Dual Ring Topology**.
3. In Dual Ring Topology, two ring networks are formed, and data flow is in opposite direction in them. Also, if one ring fails, the second ring can act as a backup, to keep the network up.
4. Data is transferred in a sequential manner that is bit by bit. Data transmitted, has to pass through each node of the network, till the destination node.

### *Advantages of Ring Topology*

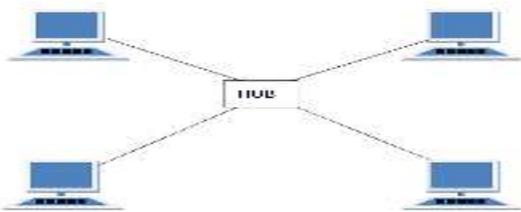
1. Transmitting network is not affected by high traffic or by adding more nodes, as only the nodes having tokens can transmit data.
2. Cheap to install and expand

### *Disadvantages of Ring Topology*

1. Troubleshooting is difficult in ring topology.
2. Adding or deleting the computers disturbs the network activity.
3. Failure of one computer disturbs the whole network.

### **STAR Topology**

In this type of topology all the computers are connected to a single hub through a cable. This hub is the central node and all others nodes are connected to the central node.



### *Features of Star Topology*

1. Every node has its own dedicated connection to the hub.
2. Hub acts as a repeater for data flow.
3. Can be used with twisted pair, Optical Fibre or coaxial cable.

### *Advantages of Star Topology*

1. Fast performance with few nodes and low network traffic.

2. Hub can be upgraded easily.
3. Easy to troubleshoot.
4. Easy to setup and modify.
5. Only that node is affected which has failed, rest of the nodes can work smoothly.

### ***Disadvantages of Star Topology***

1. Cost of installation is high.
2. Expensive to use.
3. If the hub fails then the whole network is stopped because all the nodes depend on the hub.
4. Performance is based on the hub that is it depends on its capacity

### **MESH Topology**

It is a point-to-point connection to other nodes or devices. All the network nodes are connected to each other. Mesh has  $\frac{n(n-1)}{2}$  physical channels to link  $n$  devices.

There are two techniques to transmit data over the Mesh topology, they are :

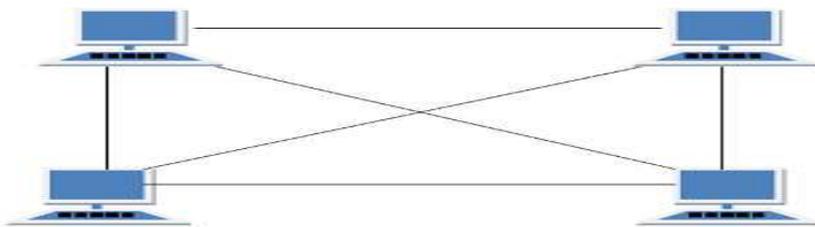
1. Routing
2. Flooding

### ***Routing***

In routing, the nodes have a routing logic, as per the network requirements. Like routing logic to direct the data to reach the destination using the shortest distance. Or, routing logic which has information about the broken links, and it avoids those node etc. We can even have routing logic, to re-configure the failed nodes.

### ***Flooding***

In flooding, the same data is transmitted to all the network nodes, hence no routing logic is required. The network is robust, and the its very unlikely to lose the data. But it leads to unwanted load over the network.



### ***Types of Mesh Topology***

1. **Partial Mesh Topology** : In this topology some of the systems are connected in the same fashion as mesh topology but some devices are only connected to two or three devices.
2. **Full Mesh Topology** : Each and every nodes or devices are connected to each other.

### *Features of Mesh Topology*

1. Fully connected.
2. Robust.
3. Not flexible.

### *Advantages of Mesh Topology*

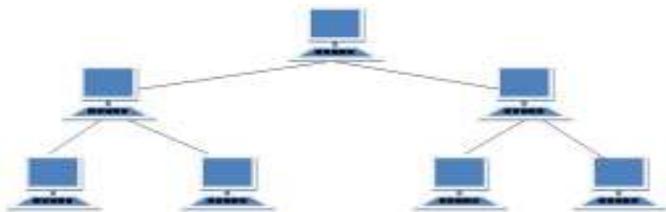
1. Each connection can carry its own data load.
2. It is robust.
3. Fault is diagnosed easily.
4. Provides security and privacy.

### *Disadvantages of Mesh Topology*

1. Installation and configuration is difficult.
2. Cabling cost is more.
3. Bulk wiring is required.

### **TREE Topology**

It has a root node and all other nodes are connected to it forming a hierarchy. It is also called hierarchical topology. It should at least have three levels to the hierarchy.



### *Features of Tree Topology*

1. Ideal if workstations are located in groups.
2. Used in Wide Area Network.

### *Advantages of Tree Topology*

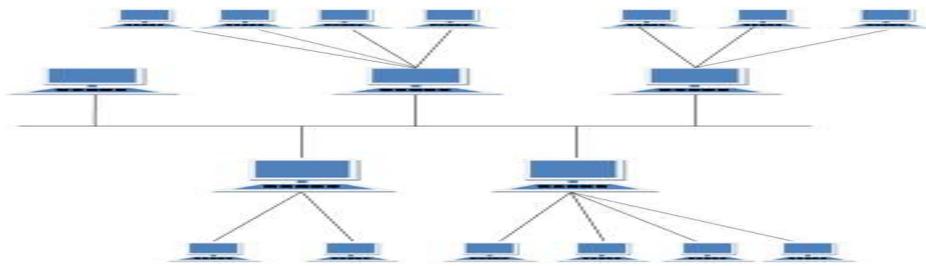
1. Extension of bus and star topologies.
2. Expansion of nodes is possible and easy.
3. Easily managed and maintained.
4. Error detection is easily done.

### *Disadvantages of Tree Topology*

1. Heavily cabled.
2. Costly.
3. If more nodes are added maintenance is difficult.
4. Central hub fails, network fails.

### **HYBRID Topology**

It is two different types of topologies which is a mixture of two or more topologies. For example if in an office in one department ring topology is used and in another star topology is used, connecting these topologies will result in Hybrid Topology (ring topology and star topology).



### *Features of Hybrid Topology*

1. It is a combination of two or topologies
2. Inherits the advantages and disadvantages of the topologies included

### *Advantages of Hybrid Topology*

1. Reliable as Error detecting and trouble shooting is easy.
2. Effective.
3. Scalable as size can be increased easily.
4. Flexible.

### *Disadvantages of Hybrid Topology*

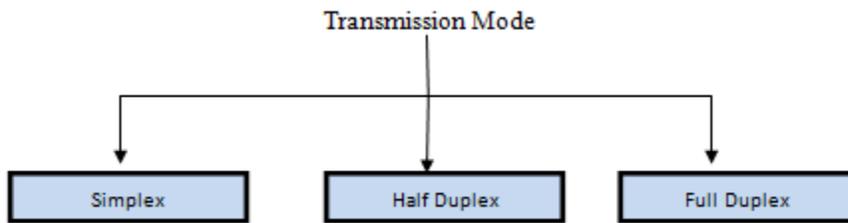
1. Complex in design.
2. Costly.

### **Transmission Modes in Computer Networks**

Transmission mode means transferring of data between two devices. It is also called communication mode. These modes direct the direction of flow of information. There are three types of transmission mode. They are :

- Simplex Mode

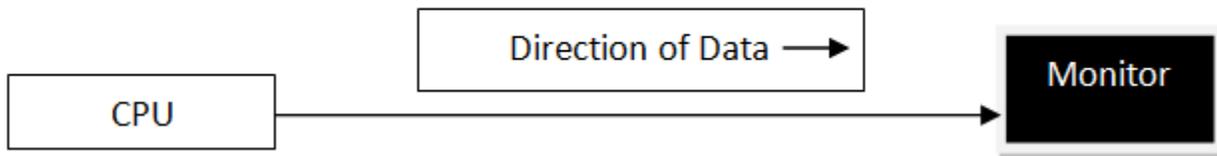
- Half duplex Mode
- Full duplex Mode



***SIMPLEX Mode***

In this type of transmission mode data can be sent only through one direction i.e. communication is unidirectional. We cannot send a message back to the sender. Unidirectional communication is done in Simplex Systems.

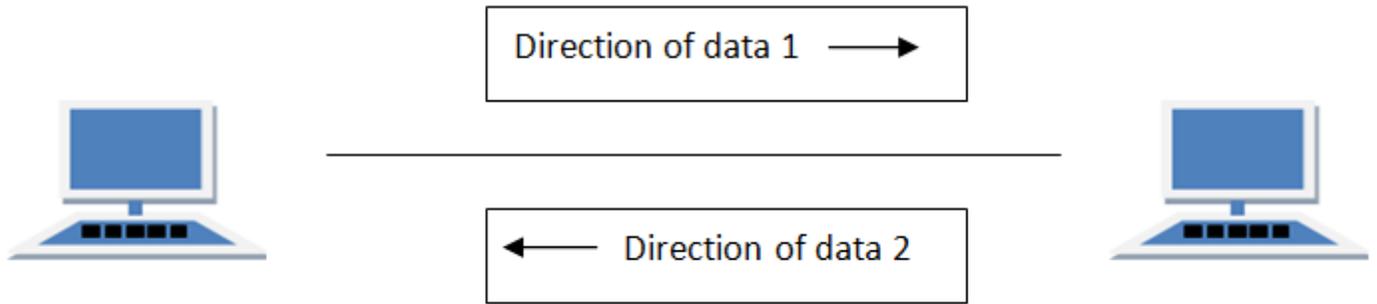
Examples of simplex Mode is loudspeaker, television broadcasting, television and remote, keyboard and monitor etc.



***HALF DUPLEX Mode***

In half duplex system we can send data in both directions but it is done one at a time that is when the sender is sending the data then at that time we can't send the sender our message. The data is sent in one direction.

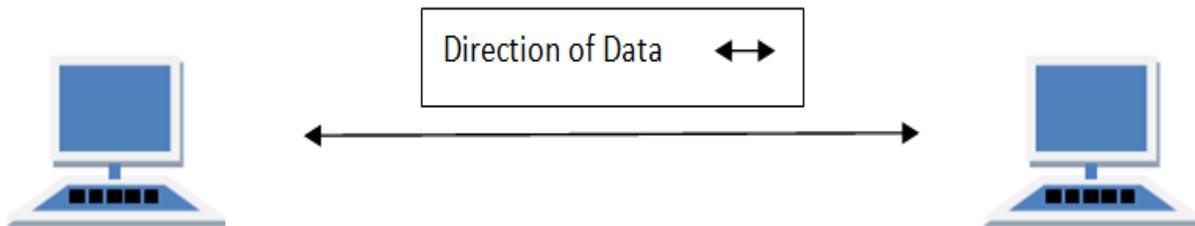
Example of half duplex is a walkie- talkie in which message is sent one at a time and messages are sent in both the directions.



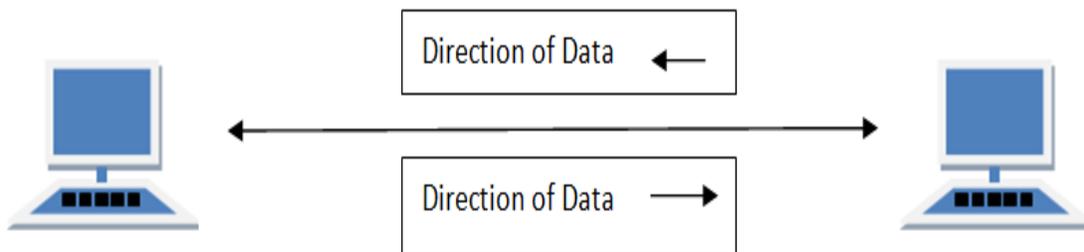
**FULL DUPLEX Mode**

In full duplex system we can send data in both directions as it is bidirectional. Data can be sent in both directions simultaneously. We can send as well as we receive the data.

Example of Full Duplex is a Telephone Network in which there is communication between two persons by a telephone line, through which both can talk and listen at the same time.



In full duplex system there can be two lines one for sending the data and the other for receiving data.



**INTRANET AND EXTRANET:-**

An **intranet** is a network where employees can create content, communicate, collaborate, get stuff done, and develop the company culture. An **extranet** is like an **intranet**, but also provides controlled access to authorized customers, vendors, partners, or others outside the company.

**INTRANET:-**

Intranet is an internal network. It is used by companies to connect their computers on a network. Webopedia defines intranet as “a network based on TCP/IP protocols (an internet) belonging to an organization, usually a corporation, accessible only by the organization's members, employees, or others with authorization. An intranet's Web sites look and act just like any other Web sites, but the firewall surrounding an intranet fends off unauthorized access.”

Intranets began to appear in a range of larger organizations from 1994.<sup>[1]</sup>

Usefulness of an intranet

### Usefulness of an intranet

- Access to information regarding the enterprise (bulletin board)
- Access to technical documents
- Search engine for documentations
- Exchange of data among coworkers
- Staff roster
- Project management, decision-making aid, agenda, computer-aided engineering
- Electronic messaging
- Discussion forum, distribution list, direct chat
- Videoconference
- Internet portal

### EXTRANET:-

Extranet, on the other hand, is an internal network that can be accessed externally. The extranet can be thought as an extension of the company's intranet. People from outside the company can have a limited access to the company's internal network for business or education related purposes. The access may be granted to the organization's partners, vendors, suppliers, current and potential customers, etc.

### UNDERSTANDING WWW:-

**World Wide Web (WWW)**, byname **The Web**, the leading information retrieval service of the Internet(the worldwide computer network). The Web gives users access to a vast array of documents that are connected to each other by means of hypertext or hypermedia links—*i.e.*, hyperlinks, electronic connections that link related pieces of information in order to allow a user easy access to them.

Hypertext allows the user to select a word from text and thereby access other documents that contain additional information pertaining to that word; hypermedia documents feature links to **images, sounds, animations, and movies**.

The Web operates within the Internet's basic client-server format; servers are computer programs that store and transmit documents to other computers on the network when asked to, while clients are programs that request documents from a server as the user asks for them. Browser software allows users to view the retrieved documents.

A hypertext document with its corresponding text and hyperlinks is written in HyperText Markup Language (HTML) and is assigned an online address called a Uniform Resource Locator (URL).

The development of the World Wide Web was begun in 1989 by Tim Berners-Lee and his colleagues at CERN, an international scientific organization based in Geneva, Switz. They created a protocol, HyperText Transfer Protocol (HTTP), which standardized communication between servers and clients. Their text-based Web browser was made available for general release in January 1992. The World Wide Web gained rapid acceptance with the creation of a Web browser called Mosaic, which was developed in the United States by Marc Andreessen and others at the National Center for Supercomputing Applications at the University of Illinois and was released in September 1993. Mosaic allowed people using the Web to use the same sort of “point-and-click” graphical manipulations that had been available in personal computers for some years. In April 1994 Andreessen cofounded Netscape Communications Corporation, whose Netscape Navigator became the dominant Web browser soon after its release in December 1994. By the mid-1990s the World Wide Web had millions of active users.

### **Web browser and its type:-**

**Browser**, software that allows a computer user to find and view information on the Internet. Web browsers interpret the HTML tags in downloaded documents and format the displayed data according to a set of standard style rules.

When British scientist Tim Berners-Lee invented the World Wide Web, he also created the first browser, WorldWideWeb, which became available in 1991 and could also be used to edit Web pages. Web use expanded rapidly after the release in 1993 of Mosaic, which used “point-and-click” graphical manipulations and was the first browser to display both text and images on a single page. The team behind Mosaic created Netscape Navigator, which was optimized for home users browsing at the slow speeds of dial-up modems. Netscape Navigator became the dominant Web browser soon after its release in 1994. BookLink Technologies's InternetWorks, the first browser with tabs, in which a user could visit another Web site without opening an entirely new window, debuted that same year. Microsoft released its browser Internet Explorer in 1995. Internet Explorer came bundled with the Microsoft Windows operating system and supplanted Netscape Navigator as the dominant browser by the late 1990s.

Apple's Safari was released in 2003 as the default browser on Macintosh personal computers and later on iPhones (2007) and iPads (2010). Safari 2.0 (2005) was the first browser with a privacy mode, Private Browsing, in which the application would not save Web sites in its history, downloaded files in its cache, or personal information entered on Web pages.

The first serious challenger to Internet Explorer's dominance was Mozilla's Firefox, released in 2004 and designed to address issues with speed and security that had plagued Internet Explorer. In 2008 Google launched Chrome, the first browser with isolated tabs, which meant that when one tab crashed, other tabs and the whole browser would still function. By 2013 Chrome had become the dominant browser,

surpassing Internet Explorer and Firefox in popularity. Microsoft discontinued Internet Explorer and replaced it with Edge in 2015.

### **Favorite and bookmark:**

In the context of the [World Wide Web](#), a **bookmark** is a [Uniform Resource Identifier](#) (URI) that is stored for later retrieval in any of various storage formats. All modern [web browsers](#) include bookmark features. Bookmarks are called **favorites** or **Internet shortcuts** in [Internet Explorer](#), and by virtue of that browser's large [market share](#), these terms have been synonymous with *bookmark* since the [first browser war](#). Bookmarks are normally accessed through a menu in the user's web browser, and [folders](#) are commonly used for organization. In addition to bookmarking methods within most browsers, many external applications offer bookmark management.

### **Web Referances:-**

- <https://en.wikipedia.org/wiki/Internet>
- <http://www.investintech.com/content/historyinternet/>
- [http://www.tcpipguide.com/free/t\\_TheAdvantagesBenefitsofNetworking.htm](http://www.tcpipguide.com/free/t_TheAdvantagesBenefitsofNetworking.htm)
- <http://study.com/academy/lesson/types-of-networks-lan-wan-wlan-man-san-pan-eqn-vpn.html>
- [https://en.wikiversity.org/wiki/Basic\\_computer\\_network\\_components](https://en.wikiversity.org/wiki/Basic_computer_network_components)
- [https://en.wikipedia.org/wiki/Network\\_topology](https://en.wikipedia.org/wiki/Network_topology)
- <http://www.differencebetween.info/difference-between-intranet-and-extranet>
- <https://www.britannica.com/topic/World-Wide-Web>

**UNIT – III (PLANNING AND MAINTENANCE OF A COMPUTER LABORATORY)****COMPUTER LABORATORY:-**

- A **computer lab** is a space which provides **computers** services to a defined community.
- **Computer labs** are typically provided by libraries to the public, by academic institutions to students who attend the institution, or by other institutions to the public or to people affiliated with that institution.

**NEED FOR PLANNING THE COMPUTER LABORATORY:-**

Laboratories are most essential and important in science education included Computer Sciences. Science can not be taught effectively without testing, experimentation and demonstration of the scientific facts and science laboratories are the ices and means with the help of which all these necessary activities can be performed smoothly and effectively. In general, the need and importance of the laboratory for teaching sciences may be justified on the following grounds;

**SPECIAL FEATURES OF COMPUTER LAB:-**

- In Laboratory required computer, instruments, materials other requirements may be kept safe, secure and ready for the use of observation and experimentation as and when required to do so.
- Here the different systems are properly arranged and properly locked in specific tables and places to save time and energy of the students and teachers.
- The arrangements, setting and environment of the laboratory encourage the students to perform their practicals carefully in a congenial environment.
- Laboratories are helpful in creating and promoting scientific attitude in the students.
- With the working in groups in the laboratory the students develop a sense of co-operation and spirit of healthy competition, the traits very essential for getting desired success in future life.

**Planning and Designing**

The importance and utility of laboratories in Computer- Sciences teaching can thus not be overlooked. Since we at present are concerned with the teaching of Computer Sciences, we are to see that laboratories for the teaching of this subject should help in the realization of the relevant objectives. Laboratories for this purpose should be well planned and adequately equipped.

In this connection here we are presenting a few schemes or plans for the establishment of these laboratories. Let us discuss each of these plans separately for being able to choose any one of them according to our needs.

1. The list of the computer systems with numbers should be prepared after careful consultation of the prescribed syllabus of Computer Science.
2. The provision of the annual budget for purchase of new computers and other computers science goods should be taken into account before booking orders. Priority should be given to those who quote least quotation.
3. The quantity of the computer systems and material depends upon the number of the students in the class.
4. The list of most frequently used computer systems and other connections should be made and consideration of the number of students using them should be made to arrange them for the convenient of the students.

The quantity of Computer science apparatus depends on the method of teaching adopted by the teacher. In the assignment method of teaching the computer systems in large quantities are not required, as all the students do not work at the same time.

The walls and floors of the laboratory should be quite tough and durable. For this purpose the walls should not be less than 45cms in thickness. These should be plastered with good quality of cement and painted at least up to a height of 90 CM from floor. The rest should be white washed or distempered. The floor should also be cemented or tiled for cleanliness. Computer Labs should be dust free. Provision of air condition is very important. Centralized air conditioning is best for computer labs.

The room should be facing north so that proper amount of sun light and fresh airflow may be possible. It should have properly big glazed doors and windows to make it more ventilated and hygienic. The door should open outwards in every case. This system saves space and also convenient for emergency exist. Aluminium fitted doors may be provided so that dust particles may not get inside easily. The windows and doors should have glass panes to bring in proper light in the room.

There should be proper arrangement for fixing curtains on the doors and windows so that the room may be converted into a darkroom when required. Dark room is essential for exhibiting cinema film, slides or Film-strips with the help of projectors.

### **ESSENTIAL INFRASTRUCTURE:-**

#### **Lecture Com Laboratory room**

There should be a black board of 3 x1.15 m immersions. The Lecture-Room should have seating arrangements for 40 students. There may be separate adjustable cushion seats for every student.

The dimensions of this room depend upon the number of students. For group 40 Students a laboratory of 13.5 x 7.5 mt is suggested. This is divided into two parts. One may be used as control cabin, which is also fitted with dark curtains. The store should have almirahs fitted in the walls for storing records and files. Different almirahs may be allotted to different branches of sciences for easy availability. The rooms should be fitted suitable with electricity.

Other fixed type of tables may be kept along the walls lengthwise. In addition to this there may be cupboards for keeping drawing boards etc. The tables kept along the walls of the room should be as high as to come up to the windows.

The Walls of the room should have almirahs fitted for storage of apparatus for storage of apparatus for different branches of science separately. A cupboard may be assigned to keep notebook of the students. There may be a separate place for keeping keys for the cupboards of the students.

The room should be well ventilated and should have required number of doors and windows. A White screen just above the black board should be provided which can be fixed when required to show film to the students. Therefore arrangement for providing black curtains on the doors and windows should also be made.

### **LABORATORY MANAGEMENT:-**

Maintenance of records and handling of students when they work in the laboratory constitute the management of a laboratory.

Name of the students, their group consisting of a specific number should be presented in the lab. Students time table and date on which the laboratory work conducting should be kept in the laboratory the name of the experiment and the nature of the laboratory work to be performed for individuals and group should be maintained.

The period of duration of the practicals should be maintained the nature of the guidance and follow up work to be given to the students must be planned earlier. The Computer teacher should keep in touch with firms and companies who supply computer products and the prices of these items should be kept in the laboratory and several firms, catalogues and their price lists also must be kept.

### **ORGANIZATION OF PRACTICAL FOR PUPILS:-**

Demonstration of practical is an entire responsibility of a teacher. He may plan it for the successful delivery of the theoretical knowledge, skills and application of theory with practice.

Laboratory work is entirely a responsibility of the students. It clearly aims to provide them needed opportunities for the development of essential laboratory skills for learning how scientific knowledge and principles work in the practical situation or how the facts are discovered in computer science. Students are required most of the time to do independent practical work.

The decision about the independent as well as co-operative group work done by the students must be taken quite in advance in time with the curricular needs as well as providing rich experiences and opportunities for the gifted and creative students. The minimum practical work to be done by each and every student of a Computer Sciences class must be made known to all students of the class. The schedule for doing such practical work must also be made known to them in advance.

The student should be allotted seats for doing practical work independently in the laboratory. The students should be provided separate arrangement (properly locked) for keeping the material and equipments allotted to them for doing practical in the laboratory.

Students must exhibit necessary devotion and seriousness for the conduct of laboratory experiments. In no case they should resort to shortcuts, dishonesty and carelessness. They must be quite methodological in doing their experiments, science and honest in observing and recording the process and product outcomes to their experiments and competent enough for deriving valid conclusions and inferences from their experiments. In case of difficulty, they should not hesitate to seek proper guidance and help from the teacher or the persons responsible for such guidance.

The proper follow up of the laboratory work done by the students independently or in-group should be a regular feature for deriving gains through such laboratory work. It should be properly evaluated in terms of its process and product outcomes. The keeping of proper records and maintenance of practical notebooks by the students may help much in this direction. The teacher in charge should regularly check it and necessary guidance thereafter should also be given to the students. The work found unsatisfactory must be asked to get repeated by the students and difficulty, if any should be sorted out then and there while working along with the students in the laboratory.

The students must be told to observe the necessary precautions and disciplinary rules etc. for conducting individual as well as co-operative laboratory work in the laboratories. The teacher along with the assisting staff like laboratory assistants, storekeeper etc. should always be there to help and supervise the students working in the laboratory.

As far as possible the practical work done in laboratory should be in proper tune and close cooperation with the theoretical work done in the classroom lessons or assignments given to the students for independent study and creative output.

The students must be told to have necessary preparation for the conduct of laboratory work in terms of necessary theoretical background of the work and experiments, observation of class room demonstration careful observation and recording of the process and product outcomes of their laboratory work etc.

They must learn the proper way of utilizing laboratory material and equipments without causing any damage or breakage. After finishing their work they should develop proper habit of cleaning dusting and packing etc. before keeping the material and equipments at their fixed places.

### **MAINTENANCE OF RECORDS:-**

It is important to keep the account of the laboratory in full; the following registers should be maintained.

**1. Stock Registers.** They are of three kinds, (a) Register for breakables- In this in the first instance all the breakables are entered in different categories. The repaired systems and their number and date must be entered in this register.

(a) **Non-Breakables-** In this register working systems, connections and other purchases with their numbers are entered along with their cost.

**2.Purchase -Register-** The bills in full, of all article purchased must be entered with all the particulars such as;

1. Name of the firm,
2. Date on which the goods received,
3. Rate of each item,
4. The number of articles purchased,
5. Total cost of the articles.

The number of folio of stock register entered should be shown. The total amount paid to the firm should also be shown.

**3. Necessity indicator register.** The teacher should go on noting down any system, article or other necessary items not in the stock but needed urgently for conducting experimentation in the laboratory. This is of great help in making annual demand and framing budget for laboratory expenditure at the end of each year.

### **RULES FOR STAFF AND PUPILS:-**

#### **DISCIPLINE IN THE LABORATORY RULES FOR THE TEACHER AND LABORATORY STAFF**

1. Teacher and the laboratory staff should not allow any student or person to enter the laboratory in their absence.
2. The teacher and laboratory staff themselves should produce self example for the proper use and maintenance of the laboratory.
3. Teacher and laboratory staff should exercise proper control over the student working in the laboratory.
4. The seats of the students should be fixed. They should not be allowed to move here and there in the laboratory.
5. Full instruction about the conduct of the practicals should be given to students before the beginning of the practicals.
6. The teachers should have full knowledge of the practical items and requirements used by a student in his seat at the time of practical class.

7. All precautions to be adopted by the students during their practicals should be told to the students.
8. The students should switch off electrical connections before leaving his place of work.
9. The work of the students should be under the strict control of the teacher.
10. The disciplinary rules and precautions to be adopted in laboratory should be exhibited.

### **RULES FOR THE STUDENTS IN THE LABORATORY**

The students while working in the laboratory should be instructed to follow the following rules;

1. All computers must be handled with care.
2. No article should be taken outside the laboratory.
3. Use only those articles needed for the practicals.
4. In case of problems, the teacher must be informed.
5. No haste should be done in performing practicals.
6. Computers not in use should not be placed on the table.
7. Nothing should be left on the floor. If there is any obstruction it should be removed at once.
8. After the practicals all computers must be cleaned and switched off.
9. In case of doubts, the teacher must be consulted.
10. Perfect discipline should be maintained and useless talking should be avoided while performing practicals.

### **Web References:-**

<https://www.slideshare.net/GLADIADORVASCO/computer-laboratory-care-and-maintenance>

[https://www.google.co.in/search?q=PLANNING+AND+MAINTENANCE+OF+A+COMPUTER+LABORATORY&source=lnms&sa=X&ved=0ahUKEwj2ou7tNHXAhXLqo8KHZIDBU8Q\\_AUICSgA&biw=1440&bih=745&dpr=1](https://www.google.co.in/search?q=PLANNING+AND+MAINTENANCE+OF+A+COMPUTER+LABORATORY&source=lnms&sa=X&ved=0ahUKEwj2ou7tNHXAhXLqo8KHZIDBU8Q_AUICSgA&biw=1440&bih=745&dpr=1)

**UNIT – IV (MODERN INSTRUCTIONAL STRATEGIES)**

**INTRODUCTION TO MODERN INSTRUCTIONAL STRATEGIES:-**

✚ **Instruction = teaching + learning**

✚ **Instructional Strategy.** What instructional strategy should be utilized to help learners achieve the desired level of mastery for that specific learning objective? When you decide on your instructional strategy, you have decided on an overall approach for addressing the instructional need – it frames the approach that you will subsequently populate with a variety of techniques and technologies to achieve your instructional objective

If the instruction refers to the whole process (sum of teaching and learning processes), as a core concept it must have some features. Some of them as follow:

- ✓ Instruction changes the learners’ attitudes, motivation, and interests,
- ✓ Instruction strengthens psychomotor, cognitive and social skills,
- ✓ Instruction leads concepts, rules, and principle learning,
- ✓ Instruction facilitates individual development and learning to learn skills,
- ✓ Instruction develops off the learners’ and instructors’ self-evaluation skills,
- ✓ Instruction recommends using information technologies,
- ✓ Instruction ensures systematicity,
- ✓ Instruction gives feedback s to curriculum,
- ✓ Instruction supports the governments to achieve their official and national goals. And, etc.

**SIGNIFICANCE AND USES:-**

**MODERN INSTRUCTIONAL STRATEGIES:**



**1. INTERACTIVE WHITEBOARD**

An **interactive whiteboard (IWB)** is a large interactive display in the form factor of a whiteboard. It can either be a standalone touchscreen computer used independently to perform tasks and operations, or a connectable apparatus used as a touchpad to control computers from a projector. They are used in a variety of settings, including classrooms at all levels of education, in corporate board rooms and work groups, in training rooms for professionalsports coaching, in broadcasting studios, and others.

**Classroom uses**

In some classrooms, interactive whiteboards have replaced traditional whiteboards or flipcharts, or video/media systems such as a DVD player and TV combination. Even where traditional boards are used, the IWB often supplements them by connecting to a school network digital video distribution system. In other cases, IWBs interact with online shared annotation and drawing environments such as interactive vector based graphical websites.

**Benefits:-**

Group interaction. Interactive whiteboards promotes collaboration among students and group discussion and participation. They can be an effective tool for brainstorming due to the fact that notes can be taken on the board and saved to be shared and distributed to students later.

**BLOG:**

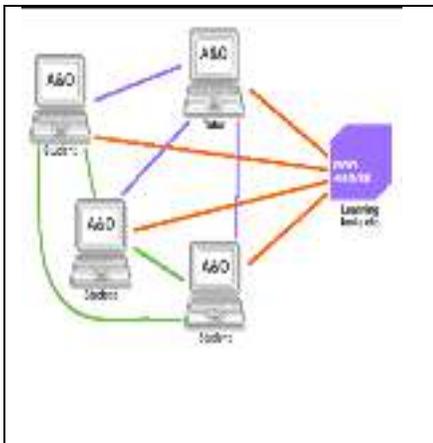
**1. EDUCATIONAL BLOG**

An **edublog** is a **blog** created for educational purposes. Edublogs archive and support student and teacher learning by facilitating reflection, questioning by self and others, **collaboration**<sup>[1]</sup> and by providing contexts for engaging in **higher-order thinking**.<sup>[2][3]</sup> Edublogs proliferated when blogging architecture became more simplified and teachers perceived the instructional potential of blogs as an online resource. The use of blogs has become popular in education institutions including public schools and colleges. Blogs can be useful tools for sharing information and tips among co-workers, providing information for students, or keeping in contact with parents. Common examples include blogs written by or for teachers, blogs maintained for the purpose of classroom instruction, or blogs written about educational policy. Educators who blog are sometimes called edubloggers.

**2. TYPES**

**3. ROLE OF TEACHER IN EDUCATIONAL BLOG**

**WEB BASED LEARNING:-**



**Web-based learning** has got much attention as being an incredible opportunity to study nowadays. Despite of its popularity the notion still remains unclear and confusing.

**Web-based learning is one way to learn, using web-based technologies or tools in a learning process.**

**Web-based learning consists of technology that supports traditional classroom training and online learning environments.**

Web-based learning can be also formal or informal. **Formal web-based learning** is purposed and learning activities are organised by teachers. **Informal learning** takes place while you are searching material from the Internet. It is self-paced, depending on your goals and ambition to learn.

**VIDEO CONFERENCING:-**



**Video conference** refers to a communication over a distance between three or more people where video and audio is transmitted in near real-time. There are various software packages which make this possible.

- ✚ No more disrupted or cancelled lessons
- ✚ Invite lectures from another countries
- ✚ Record your lectures
- ✚ Use collaboration tools
- ✚ Implement the VC system in just 15 minutes

Videotelephony comprises the technologies for the reception and transmission of **audio-video** signals by users at different locations, for communication between people in real-time. A videophone is a **telephone** with a **video display**, capable of simultaneous video and audio for communication between people in **real-time**. Videoconferencing implies the use of this technology for a group or organizational

meeting rather than for individuals, in a videoconference. **Telepresence** may refer either to a high-quality videotelephony system (where the goal is to create the illusion that remote participants are in the same room) or to meetup technology which goes beyond video into robotics (such as moving around the room or physically manipulating objects). Videoconferencing has also been called "visual collaboration" and is a type of **groupware**.

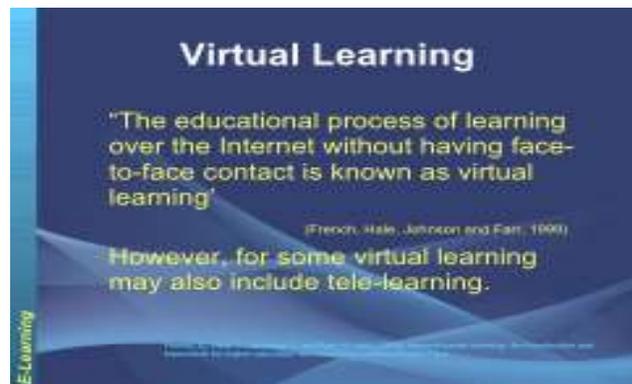
**Impact on education**

Videoconferencing provides students with the opportunity to learn by participating in two-way communication forums. Furthermore, teachers and lecturers worldwide can be brought to remote or otherwise isolated educational facilities. Students from diverse communities and backgrounds can come together to learn about one another, although **language barriers** will continue to persist. Such students are able to explore, communicate, analyze and share information and ideas with one another. Through videoconferencing, students can visit other parts of the world to speak with their peers, and visit museums and educational facilities. Such **virtual field trips** can provide enriched learning opportunities to students, especially those in geographically isolated locations, and to the economically disadvantaged. Small schools can use these technologies to pool resources and provide courses, such as in foreign languages, which could not otherwise be offered.

A few examples of benefits that videoconferencing can provide in campus environments include:

- faculty members keeping in touch with classes while attending conferences;
- guest lecturers brought in classes from other institutions;
- researchers collaborating with colleagues at other institutions on a regular basis without loss of time due to travel;
- schools with multiple campuses collaborating and sharing professors;
- schools from two separate nations engaging in cross-cultural exchanges;
- faculty members participating in thesis defenses at other institutions;
- administrators on tight schedules collaborating on budget preparation from different parts of campus;
- faculty committee auditioning scholarship candidates;
- researchers answering questions about grant proposals from agencies or review committees;
- student interviews with employers in other cities, and
- [teleseminars](#).

**VIRTUAL LEARNING:-**



A **virtual learning** environment (VLE) is a set of teaching and **learning** tools designed to enhance a student's **learning** experience by including computers and the Internet in the **learning** process. ... In general, VLE users are assigned either a teacher ID or a student ID.

A **virtual learning environment** (VLE) in educational technology is a Web-based platform for the digital aspects of courses of study, usually within educational institutions. VLEs typically:

- allow participants to be organized into cohorts, groups and roles
- present resources, activities and interactions within a course structure
- provide for the different stages of assessment
- report on participation; and have some level of integration with other institutional systems.

Institutions of higher and further education use VLEs in order to:

- Economize on the time of teaching staff, and the cost of instruction.
- Facilitate the presentation of online learning by instructors without web authoring experience.
- Provide instruction to students in a flexible manner to students with varying time and location constraints.
- Provide instruction in a manner familiar to the current web-oriented generation of students.
- Facilitate the networking of instruction between different campuses or even colleges.
- Provide for the reuse of common material among different courses.
- Provide automatic integration of the results of student learning into campus information systems.

VLEs are supposed to support many 21st century skills, including:

- Cultural and global awareness: Students have access to a wide network of people and information. Students are able to learn and work with people from all over the world.
- Self-direction: Students are able to work at their own pace.
- Information and communication technology literacy: Students use technology to obtain and present information.
- Problem solving skills: Students are required to demonstrate their knowledge and skills in order to be assessed, and they often participate in group thinking and discussion.
- Time management: Students are required to meet deadlines
  - A true definition of virtual learning
  - At its heart virtual learning is about the learning that takes place outside of the school, or bringing what is outside of the school into the school. So, we are thinking about the online environment as a way of connecting students who may be located physically in a school with their learning that is somewhere else.
  - The benefits and impact of virtual learning
  - There are many ways we can think about the benefits, or the impact, of virtual learning technologies and their use in schools. The first is obviously the area of online learning that I just referred to— where we see happening around the world, as well as in New Zealand, opportunities created to access learning from outside of the school that a student is participating in.
  - A good example of this in New Zealand is in the Virtual Learning Network (VLN), where, throughout the country, we have teachers who are teaching students in schools other than the school the teachers are physically located in, and students accessing the learning from teachers who are not located in the schools that they are attending. So, we are seeing opportunities created to address the drivers that are occurring, where we don't have specialist teachers in many of our rural, or smaller, secondary schools. This is also occurring in some of the urban areas. Through virtual learning,

therefore, we are creating opportunities for students to connect to the learning that is important for them.

- **Virtual learning is not bound by a venue or time**
- Another area that virtual learning is impacting on is the connection between school and home. This may not seem to meet the *virtual learning* definition on first impression, but, if you think about it, we have historically talked about *home-work* and *school-work*. In the online world that distinction disappears. And so, the connection between *home* and *school* becomes something that is quite seamless—whether it is home, as in the physical home that the student lives in, or outside-of-school places such as the local library, local café, a friend’s house, grandma’s house that they might visit after school. The fact that they can continue with their learning in a seamless way and connect with the work that they are doing in online worlds makes the use of a virtual learning environment very high impact.
- **Virtual learning has greater global reach**
- Another factor about virtual learning is the global reach that’s now possible for students. Once they had to rely on resources from the local library. Or, from time-to-time, a visitor to the school could provide them with a feel or an insight into what it might be like in other lands or countries that they might be studying. Now, global reach means that they can reach directly into the lives of those who live in some of those countries and lands. They can talk to experts who have visited there, and are familiar with the geography, the terrain, and some of the social issues that might occur there. And they can connect with learners in those areas to collaborate on projects, to look at topics that are germane to them. So, the global reach is becoming increasingly important as students become prepared to be citizens in a much more globalised society than they have previously.
- **The benefits of virtual learning for teachers**
- And lastly, when we are thinking about virtual learning we can’t forget about the impact on the teachers themselves—the impact that virtual learning opportunities are having for teachers in their own professional learning and development. Many schools are starting to see that engaging in virtual professional learning and development is of benefit to both the school and teacher—not only in the cost-saving from days off, teacher-release days, and travel, but also the benefit of continuity. Where the investment may have been made simply to get to a one-day course, seminar, or workshop, now, teachers can have access to their professional development over many weeks or months, for a similar size investment. What’s more, it connects them with other educators doing similar things that they are, and who are looking for ways to improve their own professional activity and professional futures in that way.

### **ONLINE LEARNING:-**

An online learning course is one you take without meeting a teacher in a classroom. You can study at home or at work - wherever you like, whenever you like, within a prescribed time frame. The courses have a set schedule and are delivered over a 14 week period. Most courses do not require that you be online at a certain time of day or night, but that you are active in the course during the schedule. You cannot start courses late nor finish early.

Online programmes are of equal value to on-campus programmes in terms of entry criteria and overall workload. The only difference is in the way the course is delivered.

As an online learning student, you will:

- earn an internationally recognised degree
- be able to study anywhere that has an internet connection
- have the flexibility to study when it's most convenient for you
- be taught by academics working at the leading edge of your field

- become part of a rich and varied online community
- have access to University support services

How will I learn?

Programmes are delivered in courses that you can complete at times convenient to you.

Our online programmes deliver programme content and opportunities to interact with other students in a number of ways.

We use a variety of platforms to deliver content and allow you to interact with other students. Platforms may include one or more of the following:

- virtual learning environment, e.g. Moodle, Learn or Blackboard Collaborate
- wikis
- blogs
- discussion boards and forums
- video streaming services, e.g. YouTube or Vimeo
- virtual worlds, e.g. SecondLife

During your programme induction, your Programme Director will introduce you to the platforms that will be used for your programme. We don't expect you to know how to use these platforms before your induction.

What are the technical requirements?

To study one of our online programme, you will usually only need a computer with internet access.

If a programme has more advanced requirements, these will be outlined on the degree finder. You can check with the programme director if you have any queries or concerns.

You will be part of a diverse online network of fellow students from around the world and should feel confident interacting with this network through discussion boards, blogs, online tutorials or joint assignments.

### **Traditional Education And Advantages Of Online Learning**

There are several problems with the traditional system of education. First of all, you need to pay thousands of dollars per term to attend a prestigious school. With all those budget cuts, busy classrooms, and course shortages, you won't always get the chance to study exactly what you want.

It's no wonder why millions of students from all around the world opt for online degree programs or take at least one college course through an online platform. Online learning has to be the greatest revolution in contemporary education. It made a huge change in the system and opened great opportunities for everyone who wants to learn something.

Nevertheless, online education is still related to stereotypes. People often think that online students are not smart enough for a traditional college or university, they are lazy, and they don't get "real" degrees. These claims discourage many people from taking online courses, so they get stuck in the traditional educational system that consumes a huge deal of money, nerves, and years of their lives.

Allow us to explain why online learning is more awesome than you think. We have 5 advantages of online learning that will make you reconsider your attitude towards this type of education.

#### **Advantages Of Online Learning**

##### **1. You can learn whatever you want!**

You can pick the program of your dreams in traditional education, too, but that would involve traveling away from home, living in a completely unknown city, and struggling in an extremely competitive learning

environment. With online education, you can take any program or course present in traditional four-year universities.

For example, let's say you're mostly interested in neuroscience. All it takes is a Google search for such online course, and you'll easily find the online programs offered by some of the most prestigious universities from all around the world. You can take such a course even if you have no aspirations to apply that knowledge in your future profession, but you're simply curious to discover new interests and understand how the human brain works. The great variety of online programs and courses is a huge advantage of this type of education. It doesn't matter where you live and what you want to study – you can always find a suitable course or even a degree program that you can follow from home.

## **2. Comfort.**

Forget about attending classes for hours, sitting in an uncomfortable chair, and suffering from back pain by the end of the day. You will not be bound to physical class session when you opt for online education. All lectures and needed materials are provided via online platforms, so you'll easily access them from the comfort of your home. You will not take public transport to get to campus, you won't have to spend money on gas for your car, you won't have to get up early to get dressed for class... the list of conveniences goes on and on.

Comfort is a strong advantage, but it can go both ways. You mustn't allow yourself to get too comfortable when studying from home, so it would be best to abandon the couch for few hours a day and set up an inspirational studying environment in your home. All you need is a large desk and a nice, comfortable chair.

## **3. Online courses look great on a resume.**

It doesn't matter where your career stands at this moment; an online program will always look good on your resume. It will show potential employers that you're committed to learning and you're eager to obtain more knowledge and new skills. Hiring managers don't see online degrees as inferior to traditional ones. A degree is a degree. If you obtain an online degree from a prestigious university, you'll boost your career with the speed of light. You will certainly become a better candidate for a job promotion, and your resume will look much better when you apply for new positions.

## **4. Self-paced learning.**

When you start browsing through interesting online courses and programs, you'll notice the Self-Paced label on most of them. What does this mean? Self-paced learning means that the students can start completing the targets at any time, and he can arrange a learning schedule that meets his individual needs. When you enroll in a traditional college program, you'll have to forget about work, hobbies, and even family. In such setting, studying has to be a priority. That's why many single parents and people who work decide to forget all about their dreams to get a higher degree.

A self-paced system enables them to make progress with rhythm that suits them. This type of system does not require attending live sessions; you can access the materials at any time that works for you. If you have to work or take care of your home and children during the day, you can study at night. That's an advantage the traditional educational system cannot beat.

## **5. Lower costs.**

The fact that online programs are cheaper when compared to the ones held in a traditional campus setting is enough to convince you to consider them. The average tuition for online courses depends on multiple factors, so it varies from one program to another. If, for example, you want to enroll in the Big Data Specialization program provided by University California, San Diego through Coursera, you'll pay \$399. You also have an option to pay \$49 per course. Financial Aid is available for learners who cannot afford this fee, so that's something you should always keep in mind.

We saved the best part for last: many online courses are completely free of charge. MIT, for example, offers all course materials online without any charges. Free courses don't usually come with certificate of completion, but they are still more than useful for anyone who wants to learn from prestigious educators.

**Online Education Is Totally Worth The Effort**

Online courses and degree programs are more convenient and cheaper than their counterparts in traditional education. Those are the two main advantages of online learning that lead many students to opt for online platforms when they want to earn a degree or certificate. The best thing about online learning is that you can learn in a relaxed manner even if you don't want to get certified. You only need passion for learning and a quick online search that will take you to the right course. From that point on, you will be the master of your own education.



**COMPUTER ASSISTED INSTRUCTION (CAI):-**

Computer-assisted instruction (CAI) is an interactive instructional technique whereby a computer is used to present the instructional material and monitor the learning that takes place. CAI uses a combination of text, graphics, sound and video in enhancing the learning process.

**Computer Assisted Instruction**

**Terminology**

Use of computer in education is referred by many names such as

- Computer Assisted Instruction (CAI)
- Computer Aided Instruction (CAI)
- Computer Assisted Learning (CAL)
- Computer Based Education (CBE)
- Computer Based Instruction (CBI)
- Computer Enriched Instruction (CEI)
- Computer Managed Instruction (CMI)

**New Terminology**

- Web Based Training
- Web Based Learning
- Web Based Instruction

Computer-based education (CBE) and computer-based instruction (CBI) are the broadest terms and can refer to virtually any kind of computer use in educational settings. Computer-assisted instruction (CAI) Computer Aided Instruction (CAI) is a narrower term and most often refers to drill-and-practice, tutorial, or simulation activities. Computer-managed instruction (CMI) Computer-managed instruction is an instructional strategy whereby the computer is used to provide learning objectives, learning resources, record keeping, progress

tracking, and assessment of learner performance. Computer based tools and applications are used to assist the teacher or school administrator in the management of the learner and instructional process.

### **Computer Assisted Instruction (CAI)**

A self-learning technique, usually offline/online, involving interaction of the student with programmed instructional materials.

Computer-assisted instruction (CAI) is an interactive instructional technique whereby a computer is used to present the instructional material and monitor the learning that takes place.

CAI uses a combination of text, graphics, sound and video in enhancing the learning process. The computer has many purposes in the classroom, and it can be utilized to help a student in all areas of the curriculum.

CAI refers to the use of the computer as a tool to facilitate and improve instruction. CAI programs use tutorials, drill and practice, simulation, and problem solving approaches to present topics, and they test the student's understanding.

### **Typical CAI provides**

1. text or multimedia content
2. multiple-choice questions
3. problems
4. immediate feedback
5. notes on incorrect responses
6. summarizes students' performance
7. exercises for practice
8. Worksheets and tests.

### **Types of Computer Assisted Instruction**

**1. Drill-and-practice** Drill and practice provide opportunities for students to repeatedly practice the skills that have previously been presented and that further practice is necessary for mastery.

**2. Tutorial** Tutorial activity includes both the presentation of information and its extension into different forms of work, including drill and practice, games and simulation.

**3. Games** Game software often creates a contest to achieve the highest score and either beat others or beat the computer.

**4. Simulation** Simulation software can provide an approximation of reality that does not require the expense of real life or its risks.

5. **Discovery** Discovery approach provides a large database of information specific to a course or content area and challenges the learner to analyze, compare, infer and evaluate based on their explorations of the data.

6. **Problem Solving** This approach helps children develop specific problem solving skills and strategies.

**STEPS FOR DEVELOPING CAI:-**

**MODES OF CAI:-**

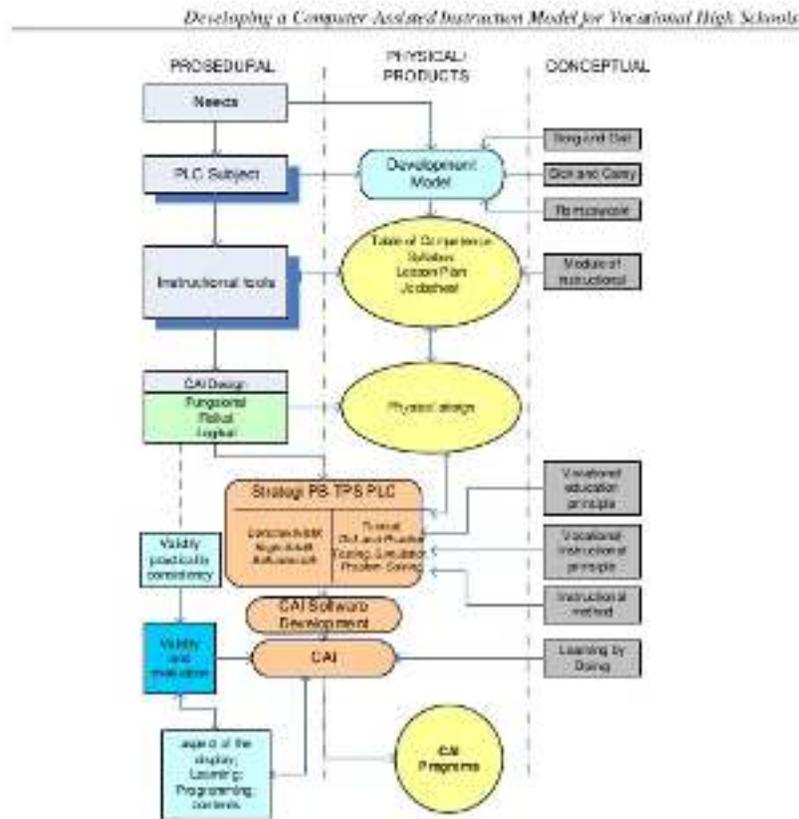


Figure 3. Framework CAI Model (Mappalovsing, 2011)

**BENEFITS (advantages) OF CAI:-**

one-to-one interaction

- great motivator
- freedom to experiment with different options
- instantaneous response/immediate feedback to the answers elicited
- Self pacing - allow students to proceed at their own pace
- Helps teacher can devote more time to individual students
- Privacy helps the shy and slow learner to learns
- Individual attention
- learn more and more rapidly

- multimedia helps to understand difficult concepts through multi sensory approach
- self directed learning – students can decide when, where, and what to learn

### **LIMITATION OF CAI:-**

- may feel overwhelmed by the information and resources available
- over use of multimedia may divert the attention from the content
- learning becomes too mechanical
- non availability of good CAI packages
- lack of infrastructure

### **ROLE OF TEACHER IN CAI:-**

- 1) Learners and teachers' expectations are towards multimedia tools
- 2) 2) Computer skill and technical problems
- 3) 3) Learners and teachers' evaluation
- 4) 4) Teacher s role and learner's progress
- 5) 5) Learner's progress

### **Web Referances:-**

<http://blog.insynctraining.com/48-modern-instructional-design-strategies-techniques-and-technologies>

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[https://en.wikipedia.org/wiki/Videotelephony#Videoconferencing\\_modes](https://en.wikipedia.org/wiki/Videotelephony#Videoconferencing_modes)

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<http://core-ed.org/legacy/thought-leadership/ten-trends/ten-trends-2013/virtual-learning>

<https://www.ed.ac.uk/studying/postgraduate/degree-guide/online-learning/about>

<https://elearningindustry.com/5-advantages-of-online-learning-education-without-leaving-home>

## Unit 5

### Blended learning

Blended learning is a mix of e-learning with classroom instruction. Both environments are partly or fully supervised, depending on the model. It is not a simple matter of using more technology in the classroom or assigning homework that requires using the Internet or other technologies. Blended learning is a more robust teaching model that is adopted by a school or an individual classroom. It is still formal learning, as students are assessed on what they learned both online and face-to-face.

### Definition

“Blended learning is a formal education program in which a student learns at least in part through delivery of content and instruction via digital and online media with some element of student control over time, place, path, or pace.”

### Characteristics of Blended Learning

Blended learning is a new type of education used in many schools, but parents and educators may want to learn more about the characteristics of blended learning before one of these programs starts. Blended learning is available for college and graduate students, but some elementary, middle school and even high schools now offer classes of this type. After looking at some of the characteristics that these programs share, you can see the benefits these programs have for students.

- *Online and Offline Learning*

There are a number of different blended learning programs now available, including flex programs and rotation courses. The one characteristic that these programs share is that each one combines some form of online learning with some type of offline learning. Students in elementary schools may take classes over the Internet in a classroom with one or more teachers and/or assistants standing by to help them complete their work. Colleges often offer hybrid courses that require students take one class on campus during the week and do the rest of their work at home over the Internet.

- *Instructor Involvement*

A common worry among parents is that blended learning programs won't provide their children with the same level of help from teachers that they would get in a traditional class.

These programs always require that an instructor be on hand to help students with all their needs. Students taking online classes inside a school setting will have a teacher in the classroom. Those who take online classes from home can interact with their teachers online through message boards and emails. Teachers check their emails and respond to students several times every day.

- ***Independent Learning***

The biggest benefit to these programs is that it fosters the idea of independent learning in students. Some students have a difficult time in their classes because they learn differently than their peers do. They may do better in classes that require more hands on interaction than they do in classes that require they sit and listen to a teacher talk. Blended learning programs allow students to learn on their own and to use the materials and resources presented to them in ways that work best for them.

- ***Peer Interaction***

Some parents worry that students enrolled in blended learning programs won't spend as much time with their peers as they would in a traditional classroom. Peer interaction is a key characteristic of these programs. Those working in standard classrooms will have their peers sitting right next to them, which lets them work together on assignments. Students who take classes online can interact with others via the class message board or forum and through other means. According to the National Catholic Educational Association, some students find these programs motivating because they can work with other students without assistance from a teacher.

- ***Support for Students***

Another characteristic that blended learning programs share is the support available for students. Though most kids today know how to do basic tasks on a computer, including surfing the web and writing papers, they may need help evaluating online resources, finding the best materials and putting together detailed reports and projects. Instructors working in these programs offer students all the help and support they need both through offline meetings and online contact.

Though the number of schools that offer blended learning programs is still fairly low, the number is on the rise. These programs offer a number of benefits for students and help them do their work online. Some of the characteristics of blended learning include offering technology

and other types of support for students, helping them become independent learners and letting them interact with their peers.

### **Importance and benefits of blended learning :**

1. **It provides a more personalized training experience.** Not every employee knows the same things or has the same questions, which often makes standardized classroom experiences a poor fit for all involved. Adding technology solutions, like an online wiki or content library, allows learners to access just the information they need. Online courses also allow employees the option to choose their own path through topic areas. Although face-to-face instruction and employee-shadowing are still good for getting timely feedback, technology is making strides in this area as well. The net result is a training experience where each learner can focus on the skills and information they themselves need, without having to sit through unnecessary lectures or wade through piles of irrelevant information.
2. **It reduces training costs.** Many blended-learning solutions are less costly than on-site or face-to-face training programs. Furthermore, employees can take training courses at home in their spare time, leaving them to be more focused and productive during the workweek. Finally, digital formats allow courses to be updated and expanded with little cost outside of content development.
3. **It offers 24/7 access to training.** With most digital assets, all that is needed is a connection to the internet, meaning that time and location limitations are a thing of the past. Learners no longer have to wait for a scheduled training to address their concerns and questions, as the online training resources are always available to help.
4. **Modern Learning Management Systems can track employee use and skill development.**

With the right tools, tracking data on employee use and eventual development is much easier. Today's solutions can track which employees accessed which assets and courses, when they did so, how much they watched or read, whether they completed a course, and more. Assessment can be done digitally as well. After using the system for a time, employees will have a track record that can be used to inform development and promotion decisions.

### **Challenges to Blending**

The current literature tends to focus much more on the positives of BLEs than the challenges that institutions, instructors, and learners face from adopting BLEs. Three major categories of challenges addressed in the literature are:

- (1) finding the “right” blend,
- (2) the increased demand on time, and
- (3) overcoming barriers of institutional culture.

These three main challenges will be addressed individually in the following sections.

## **Models of Blended Learning**

### **Rotation model**

Educators are likely already familiar with the **Rotation model** where students within a single class rotate between a number of different learning activities. In a blended learning Rotation model, though, at least one of these modalities is online learning. Other examples of rotation activities might include one-on-one time with the teacher, peer group interactions, teacher-led lessons, or independent study time. In the Rotation model, students learn primarily on a school campus, in a classroom with their teacher. Within the Rotation model, the Christensen Institute defines four sub-models: **Station Rotation**, **Lab Rotation**, **Flipped Classroom**, and **Individual Rotation**.

### **Station Rotation Blended Learning**

Station-Rotation blended learning is a: “...model (that) allows students to rotate through stations on a fixed schedule, where at least one of the stations is an online learning station. This model is most common in elementary schools because teachers are already familiar rotating in “centers” or stations.”

### **Lab Rotation Blended Learning**

‘The Lab Rotation’ model of blended learning, similar to “Station Rotation,’ works by “allow(ing) students to rotate through stations on a fixed schedule...in a dedicated computer lab allow(ing) for flexible scheduling arrangements with teachers...enabl(ing) schools to make use of existing computer labs.”

### **The ‘Flipped Classroom’ Blended Learning**

Perhaps the most widely known version of blended learning, a ‘Flipped Classroom’ is one where students are introduced to content at home, and practice working through it at school supported by a teacher and/or peers. In this way, traditional roles for each space are ‘flipped.’

### **Flex Blended Learning**

The 'Flex' is included in types of Blended Learning and its model is one in which... "a course or subject in which online learning is the backbone of student learning, even if it directs students to offline activities at times.

Students move on an individually customized, fluid schedule among learning modalities. The teacher of record is on-site, and students learn mostly on the brick-and-mortar campus, except for any homework assignments. The teacher of record or other adults provide face-to-face support on a flexible and adaptive as-needed basis through activities such as small-group instruction, group projects, and individual tutoring."

### **Self-Directed Blended Learning**

In Self-Directed blended learning, students use a combination of online and face-to-face learning to guide their own personalized inquiry, achieve formal learning goals, connect with mentors physically and digitally, etc. As the learning is self-directed, the roles of 'online learning' and physical teachers change, and there are no formal online courses to complete.

In Self-Directed blended learning, one challenge for teachers is to be able to judge the and (somehow) success of the learning experience without de-authenticating it.

For students, the challenge is to seek out models of products, processes, and potential that can provide the kind of spark that can sustain learning while being self-aware enough to know what's working and why, and to make adjustments accordingly. Some students need very little to soar, while others need support through very clear pathways that they can guide themselves through with autonomy and self-criticism.

### **Remote Blended Learning (also referred to as *Enriched Virtual*)**

In Enriched Virtual blended learning, the student's focus is on completing online coursework while only meeting with the teacher intermittently/as-needed.

This approach differs from the Flipped Classroom model in the balance of online to face-to-face instructional time. In an Enriched Virtual blended learning model, students wouldn't see/work with/learning from a teacher on a daily basis face-to-face but would in a 'flipped' setting.

**What are the advantages of blended learning?*****Larger groups***

‘More is more’. With blended learning you are able to engage learning in large groups. First you will give them an instruction and after that, put the students to work. During this time you can relax...., but it’s also possible to give some more instruction in for students who are in need of more information. This is one of the main benefits of blended learning.

***Own pace***

Participants can partly work at their own pace and still have face-to-face education. If you’re faster than the other participants, you don’t have to wait for them. The other way around, if you’re slower, you can take your time. If you are a hard working mother and decide to attend a course, beside your normal job, it may be difficult with your time management. You can, to a great extent, decide when you’re studying.

***Reduction in costs***

Less room, less teachers, and with that said; a less amount of money.

***Fun***

It’s just fun! From elementary school to university students and advanced courses, blended learning has proven to be more engaging for various participants.

**What are the disadvantages of blended learning?*****Lack of motivation***

There are also some cons to blended learning. The type of blended learning can worsen the motivation and willingness of your participants. Not every blended learning model is applicable to every age category. Just like you don’t give young children a book with long texts and few images. When children start reading, you give them books with many images and few words. After several years you can give them a book with more words and less images. If you expect young children to do all their homework and prepare lessons on their computer at home, you are wrong.

***Basic technology knowledge***

You expect participants to have a basic knowledge of technology. If children don't know what to do, because of the lack of technology knowledge, they will get annoyed. Because participants have to focus on a new system and new knowledge, it might cause a cognitive overload. That's not what you want to happen!

***Plagiarism and credibility problem***

'There is no climate change' (...well, according to Donald Trump). Children could easily write this down, because they don't have the knowledge of the unverified online resources. Besides this, it's hard to withstand the temptation of looking up things on the web. Participants have to think by themselves what the answer could be and search the answer on the internet.

## Unit 6

### Seminar

A seminar is a form of academic instruction, either at an academic institution or offered by a commercial or professional organization.[citation needed] It has the function of bringing together small groups for recurring meetings, focusing each time on some particular subject, in which everyone present is requested to participate. This is often accomplished through an ongoing Socratic dialogue[1] with a seminar leader or instructor, or through a more formal presentation of research. It is essentially a place where assigned readings are discussed, questions can be raised and debates can be conducted.

### *Definition*

- Seminars are simply a group of people coming together for the discussion and learning of specific techniques and topics.
- Usually there are several keynote speakers within each seminar, and these speakers are experts in their own fields or topic.

### *Seminar As a Method of Teaching*

- Seminar is a form of a class organization that utilizes a scientific approach for the analysis of a problem chosen for discussion.
- It is a discussion method of teaching where an informal group of 10-15 ( not more than 25 ) learners participate to solve problems in a scientific approach and analysis.
- It is an organized, guided discussion with a focus on the discovery of new relationship by the participating individuals. • It differs from intellectual initiative. The student plays an active role in seminar.
- The objective of the seminar is to give students opportunity to participate in methods of scientific analysis and research procedures.
- Students are expected to do considerable library search prior to the seminar.
- A seminar group is mainly concerned with academic matters rather than individual students and commonly involves the reading of an essay or paper by one group member followed by a discussion by the total group on the topic.
- The role of a teacher is to help students to select, formulate and resolve the most significant problems and suggest the available sources of information. • As the seminar progresses, the students assume greater responsibility for addressing the problems and conducting discussion.

### *Characteristics*

- Teacher is the leader.

- The group generally consists of 10 to 15 participants.
- An ideal seminar lasts for 1-2 hrs.
- The topic is initially presented by the presenter followed by group discussion.
- The leader should keep the discussion within limits so the focus of discussion can be mentioned.
- Care should be taken to avoid stereotypes.
- In student seminars, students present their data in an informal way under the leadership of the teacher, followed by a teacher monitored discussion.
- All members take part in discussion in an informal but orderly manner.
- The chairman should be skilled in encouraging the timid participants.
- A student secretary may record the problems that come up and the solutions given to them.

### ***Organizing A Seminar***

- Define the purpose of the seminar.
- Relate the topic of seminar and discussion to the main concept or the objectives to be attained.
- Direct and focus on the discussion topic.
- Help students to express their ideas and keep the discussion at a high level of interest so that the students listen attentively to those who contribute the ideas.
- Plan comments and questions that relate to the subject and also guide and direct the discussion.
- Set time limitations for each person's contribution.
- Guard against monopoly of the discussion by any member of the seminar.
- Plan for summary at intervals during the discussion and also at the end of the discussion and relate the ideas expressed to the purpose of discussion.
- Have the discussion recorded by a student as a recording secretary or by tape recording.
- Plan for teacher and student self evaluation of the progress made towards the immediate objectives.

### ***Role Of A Teacher***

- Select the topic.(Give reasonable time for preparation).
- Remain in the background in the seminar, but sit where the whole group can be seen.
- Prepare to help out in the initial stages of using this method in case of long silence.
- Be sure that essential points are not overlooked and that gross inadequacies are corrected (preferably by the other members of the class).

- Make sure that all members have a share in the discussion and that irrelevant discussion is avoided.

### ***Advantages***

- Student plays an active role; it pre supposes that the student has background knowledge.
- A properly conducted seminar has potentials to teach students the method of scientific analysis and technique or research.
- Individual student and the group as a whole try to solve the problem.
- Exchange of facts and efforts to crystalize group opinion is a clear advantage in seminar method.
- The problem solving skills of the students are sharpned by participation.
- The students develop vocabulary, articulation, problem solving and critical thinking skills as they participate in the seminar.
- A seminar helps in self learning and promotes independent thinking.
- Ability to see own problems is increased because of personal difficulties can be compared with those of the group.
- Skillfully directed seminar promotes group spirit and co- operativeness.

### ***Disadvantages***

- Seminar is a time consuming process.
- It cannot be applied to new students.
- Timid students may initially feel nervous.
- If subject knowledge is poor, unnecessary discussions arise.
- The approach to problem solving extends to student's professional and personal activities.

## **Symposium**

### ***Definition***

1. Symposium is defined as a teaching technique that serves as an excellent method for informing the audience, crystallizing their opinion and preparing them for arriving at decision regarding a particular issue or a topic.
2. Symposium is a discussion method in which different view points on a single aspect of a topic is discussed.
3. Symposium is a series of speeches on single aspect of a topic.

### ***Difference Between Seminar & Symposium Seminar Symposium***

- Topics are related to recent trends and developments in a discipline Topics are related to controversial issues in a discipline Multiple aspects of the topic under consideration is discussed Single aspect of the topic is discussed

- Chairperson has to exert less control Chairperson has to exert more control Less time for discussion involving participants More time for discussion involving participants
- Comparitively less preparation from the sides of participants Demand more preparation from the side of participants

### ***Purposes***

- To identify and understand various aspects of a theme.
- To develop the ability arrive a decision and provide judgement for a problem.
- To develop values and feelings regarding a problem.
- To provide understanding to the students or listerners on a theme or problem to specifically develop certain values and feelings.
- To enable the listeners form policies regarding a theme or a problem.
- To investigate a problem from several points of view.
- To boost students' abilities to speak in the group.
- To encourage the students to study independently.

### ***Characteristics***

- Symposium provides a broad understanding of a topic or problem.
- The listener is provided with an opportunity to take decisions about a problem.
- This method is used in higher classes for specific theme or a problem.
- It develops a feelings of cooperation and adjustment.
- Symposium technique helps in acheiving the objectives of synthesis and evaluation.
- It provides different views on the topic of the symposium.

### ***Principles***

- The speeches may be persuasive, argumentative and informative. • Original presentation is objective and accurate.
- The method always includes a summary at conclusion. • Each speech proceeds without interruption.
- Each speech proceeds without interruption .
- The chairman of the symposium introduces the topic, suggests its importance and sometimes indicates the general approaches.
- All members of the syposium performing group can sit in a straight line behind the table; or in adjoining chairs with the chairman in the middle or to one side of the speakers.
- The symposium presents two conflicting points of view, the reading arrangement can seperate the speakers on the platform to indicate differences in opinin or to preserve peace.

### ***Guidelines***

- The chairman of the symposium introduces the topic and suggests something of its importance. • Two or more speakers talk from 10 to 20 minutes.

- The speech may be persuasive, argumentative, informative or evocative. Each speech proceeds without interruption.
- The speeches are followed by questions or comments from the audience as in the panel form.
- The speeches are followed by questions or comments from the audience as in the panel form.

#### ***Advantages***

- Symposium can be used to address a large group or class.
- This method can be frequently used to present broad topics for discussion at conventions and organization of meetings.
- In symposium, the principle of organization is high as the speeches are prepared beforehand.
- It gives a deeper insight into a topic.
- It directs the students to continuous independent study.
- This method can be used in political meetings.

#### ***Disadvantages***

- Symposium does not provide adequate opportunity for all the students to participate actively. It has limited audience participation.
- The speech is limited to 10 to 20 minutes.
- Questions and Answer session is limited to 3 to 4 minutes.
- It has possibility of overlapping of subjects.
- The chairman has no control over the speakers as they have full freedom to prepare the theme for discussion. They can present any aspect of the theme or problem.
- There is a possibility of repetition of content. The different aspects of the theme are not prepared separately. It creates difficulty of understanding for
- The different aspects of the theme are not presented simultaneously. Therefore the listeners are not able to understand the theme correctly.
- The listeners remain passive in the symposium because they are not given an opportunity to seek clarification and question in between the symposium.

#### **Group discussion**

Group work or cooperative learning is a method of instruction that gets students to work together in groups. Employers value a person's ability to work cooperatively. Indeed, studies show that they value it more highly than the ability to work independently. This is because, in most contemporary workplaces, people work in teams, which are often cross-disciplinary and quite diverse (DETYA, 2000). The value, to students, of cooperative learning has long been well recognised.

This page discusses the use of group work as a fully-fledged teaching strategy that requires students to engage in learning activities within the same group over a period while working on a substantial task with a shared outcome (e.g. a report or a project).

### ***Benefits :***

- allows students to become active participants in their learning
- helps students develop skills valued by employers (such as problem solving, negotiation, conflict resolution, leadership, critical thinking and time management)
- exposes students to diverse ideas and approaches
- acknowledges and utilises individual students' strengths and expertise
- through discussion, helps students articulate their ideas, refine concepts and develop interpersonal and communication skills
- allows students to experience situations that resemble the workplace, e.g. authentic real world projects, and
- facilitates a deeper understanding of course content

For teachers, group-based learning can often reduce the marking and feedback load associated with individual assessment.

### ***Challenges***

Although group work has the potential to encourage positive student learning experiences, research evidence suggests that this potential is not always realised (Fink, 2004, Pieterse & Thompson 2010). Although some students report that their group work projects or tasks are the best learning experiences of University, others find them the worst, and feel reluctant to work in groups again.

Some students (particularly students who do not feel confident about their ability to communicate, or to communicate in English) prefer to work independently, and find the group experience challenging and confronting.

Added to this tension is group work's appeal for teachers in the face of increasing class sizes and staff workloads (Burdett, 2003). But teachers often underestimate the effort involved in organising effective group work. Staff have commented that group work can be time consuming and difficult to implement.

Nevertheless, given the benefits for learning and future employability, it is important that all students have the chance to work in groups during their study at the university.

When it comes to developing students' group work skills, there is no single best approach or assessment strategy. It all depends on your particular learning and teaching context and objectives. The challenge is to choose a range of strategies that will allow your students to develop effective group work skills within the context of your discipline.

### ***Strategies***

The page [Ideas for Effective Group Work](#) is a useful quick guide to some group work strategies you might use.

- **Preparing for Group Work**

All about expectations, group setup, the first meeting, group dynamics, and dealing with uncertainty and change.

- **Developing Students' Group Work Skills**

Help students learn how to identify group issues, listen reflectively, give constructive feedback, structure discussions, manage their groups, give group presentations and compile reports, review individuals' contributions and deal with common group work issues

- **Facilitating and Monitoring Group Work**

Your role in facilitating and monitoring group work.

- **Helping Students Reflect on their Group Work**

Getting your students to monitor their development, reflect on their performance and identify how they can improve.

### **Panel discussion**

A panel discussion is a public exchange of ideas, giving experts and audience members the chance to discuss a particular topic. Panel discussions are often used to delve into politics, issues affecting communities, and academic topics. Start organizing several weeks in advance if possible, so you can recruit participants and organize the event.

There are three sets of participants in a panel discussion.

They are :

1. The panel members who consist of experts in the field concerned.
2. The audience of selected students/trainees/participants and teachers. who ask questions of the panellist.
3. The moderator who initiates the discussion, questions, synthesizes and summarizes the key points.

The word ‘**panel**’ means a group of experts. The discussion held among these expert members in front of an audience could be called panel discussion.

The panel would change from subject to subject, but there would be an anchor person, who would introduce the panelists, receive questions and distribute them to the panelists upon their specialization..

The panel for a topic ‘ **The effect of housework on children**’ may include a child specialist, a child psychologist, a teacher, an educational administrator and a journalist.

#### *How is a panel discussion set up?*

1. Experts in the field are invited as panelists.
2. There is an invited audience of trainers and trainees or teachers and students.
3. Questions on the proposed topic are collected in advance from the audience and handed over to the panelists
4. Questions are generally classified according to the sub-topic/ aspect/ dimension of the proposed theme. The panelists come prepared to the panel discussion.

#### *How is a panel discussion conducted?*

1. The moderator introduces the theme of the discussion to the participants. The moderator also initiates the discussion on the issue under consideration.
2. The questions are then addressed to the panelists in a pre-determined order.
3. The panelists are called (in a pre-determined order) to express their views
4. Later, panel members may react to, respond to or complement the views expressed by co-panelists.
5. At the end of the session, the moderator integrates and synthesizes the different points of view and presents them to the audience.
6. If there is time, the moderator can call for further questions
7. Finally, the moderator sums up the discussion and highlights the key points.



#### **What are the advantages of a panel discussion?**

1. It facilitates clarification on knotty issues.
2. It highlights the multi-dimensionality of the issue under discussion.
3. It helps to develop critical thinking in both panelists and the audience
4. It fosters logical thinking

5. It develops presentation skills.
6. It teaches students to think of the issues under consideration and ask relevant questions.

### **What Is A Workshop?**

There are probably as many answers to this question as there are workshops and workshop presenters but, in general, a workshop is a single, short (although short may mean anything from 45 minutes to two full days) educational program designed to teach or introduce to participants practical skills, techniques, or ideas which they can then use in their work or their daily lives. Most workshops have several features in common:

- They're generally small, usually from 6 to 15 participants, allowing everyone some personal attention and the chance to be heard.
- They're often designed for people who are working together, or working in the same field.
- They're conducted by people who have real experience in the subject under discussion.
- They're often participatory, i.e. participants are active, both in that they influence the direction of the workshop and also in that they have a chance to practice the techniques, skills, etc. that are under discussion.
- They're informal; there's a good deal of discussion in addition to participation, rather than just a teacher presenting material to be absorbed by attentive students.
- They're time limited, often to a single session, although some may involve multiple sessions over a period of time (e.g. once a week for four weeks, or two full-day sessions over a weekend).
- They're self-contained. Although a workshop may end with handouts and suggestions for further reading or study for those who are interested, the presentation is generally meant to stand on its own, unlike a course, which depends on large amounts of reading and other projects (papers, presentations) in addition to classroom activities.

### **Collaborative Learning**

- Collaborative learning is an umbrella term for a variety of approaches in education that involve joint intellectual effort by students or students and teachers. Collaborative learning refers to methodologies and environments in which learners engage in a common task in which each individual depends on and is accountable to each other. It involves use of small groups so that all students can maximise their learning and that of their peers. It is a process of shared creation: two or more individuals interacting to create a shared understanding of a concept, discipline or area of practice that none had previously possessed or could have come to on their own. Collaborative learning

activities can include collaborative writing, group projects, and other activities.

The idea of collaborative learning is linked to cooperative learning and concepts found in learning organisations, learning communities and communities of professional learning. The NSW Education Standards Authority (NESA) recommends, under the Professional Teaching Standards, that teachers work collegially and in teams to enhance their professional practice. Teachers are also encouraged to collaborate with others to further their own learning.

### **Definition of Team Teaching**

Davis (1995) provides this succinct definition of team teaching: “All arrangements that include two or more faculty in some level of collaboration in the planning and delivery of a course” (p. 8).

### ***Types of Team Teaching***

Team teaching includes a number of different approaches. Some of the more common are

- Interactive team teaching – two faculty members present in front of the class simultaneously.
- Rotational format team teaching – faculty alternate teaching the class. This rotational format has a number of variations depending on the subject matter and the number of faculty involved.
- Participant-observer team teaching – all participating faculty are present for all the classes, but only one is “teaching” at a time. Roles that the other teachers could play as participating observer(s) are model learner, observer, panel member, or resource (Klein, 1990).
- Team coordination – faculty arrange and integrate a curriculum so as to maximize learning and connections using paired or linked courses, an integrated cluster of independent courses, or freshman interest groups (McDaniels and Colarulli, 1997). Though not necessarily team teaching per se, this curriculum-level approach to interdisciplinarity can help to achieve some of the expected gains of team teaching.

### ***Benefits Team Teaching Provides for Faculty***

Literature on teaching and learning suggests a number of benefits faculty gain from participating in team teaching (Austin, 2002; Belenky et al., 1986; Cochran-Smith and Lytle, 1992; Cochran-Smith and Lytle, 1993; Focus on Faculty Newsletter, 2002; Freire, 1971; Letterman and Dugan, 2004; McDaniel, 1987; McLaughlin and Talbert, 1993; National Teaching and Learning Forum Newsletter, 2006; Shulman, 1986; Smith, 1994; Speaking of Teaching Newsletter 2007). Specifically, faculty can

- Learn about teaching
- Improve their own teaching skills
- Have opportunities to socialize graduate students into the world of teaching
- Step out of their comfort zone
- Have opportunities for creative assignments
- Become informed and encouraged in interdisciplinary research
- See teaching through the learners' eyes
- Avoid the lonely, repetitive, fragmented experience of solo teaching
- Gain new insights into their disciplines
- Develop clearer perspective on the differences between disciplines
- Build collegial relationships
- Foster respect
- Build bridges of understanding across disciplines

***Benefits Team Teaching Provides for Students***

Students also appear to benefit from team-taught courses (Benjamin, 2000; Harris and Watson, 1997; Johnson, Johnson, Smith, 2000; Smith, 1994). The literature suggests that team teaching can

- Deepen students' analytical abilities
- Help to build bridges of understanding across disciplines for both faculty and students
- Build greater curricular coherence for students
- Create a greater sense of academic community
- Provide explicit structures for academic and social engagement (this is particularly necessary at commuter campuses)
- Improve student-teacher relationships
- Make classes more interesting and challenging because of the novelty

- Improve student learning outcomes, retention rates, interpersonal skills, communication skills, analysis and judgment, and diversity

### ***Challenges that Team Teaching Poses to Faculty***

Scholarly discussion on the drawback of team teaching is limited faculty (Klein, 1990; Letterman and Dugan, 2004). The literature does suggest that team teaching can be detrimental to faculty performance when

- Lack of sufficient time for collaborative work exists
- Lack of training in group dynamics exists
- Problems with overlapping roles exist
- Territorial and status conflicts exist
- One discipline dominates the process
- Insufficient funding and inadequate logistics are provided
- Individual autonomy is lost

### ***Challenges that Team Teaching Poses to Students***

Students report that team teaching is ineffective when

- Instructors are not flexible in addressing students' learning styles
- Confusion about learning expectations exists
- Disparity in evaluation exists

### **Portfolio**

A **portfolio** is a collection of student work that can demonstrate learning and be used as an effective assessment tool. The portfolio complexity can range from a simple collection of teacher-identified student assignments to a more complex student-driven product demonstrating learning standards with the teacher evaluating mastery of content for a grade. A portfolio can be completed as a short-term project or a comprehensive one that spans over the school year. We will discover the value of portfolios, innovative ideas, and examples of best practices to implement portfolios in elementary, middle, and high school classrooms.

Assume you are a middle school teacher exploring the use of student portfolios. You discover this valuable tool could be used as an assessment, provides experiences for students to be creative and reflect on their learning progress, and demonstrates mastery of content standards to parents, teachers, and for future college admissions and employment opportunities.

### **Electronic portfolio**

An electronic portfolio (also known as an eportfolio, e-portfolio, digital portfolio, or online portfolio)[1] is a collection of electronic evidence assembled and managed by a user, usually on the Web. Such electronic evidence may include input text, electronic files, images, multimedia, blog entries, and hyperlinks. E-portfolios are both demonstrations of the user's abilities and platforms for self-expression. If they are online, users can maintain them dynamically over time.

One can regard an e-portfolio as a type of learning record that provides actual evidence of achievement. Learning records are closely related to the learning plan, an emerging tool which individuals, teams, communities of interest, and organizations use to manage learning.[citation needed] To the extent that a personal learning environment captures and displays a learning record, it may also operate as an electronic portfolio.

E-portfolios, like traditional portfolios, can facilitate students' reflection on their own learning, leading to more awareness of learning strategies and needs.[2] Comparative research by M. van Wesel and A. Prop between paper-based portfolios and electronic portfolios in the same setting tentatively suggests that use of an electronic portfolio may lead to better learning outcomes.[3]

### **Features of an electronic portfolio:**

***A secure space*** Learner Journey provides a safe online space to store and share your work, promoting e-safety. You can decide who is allowed to access, and who can create a profile, on your organisation's system.

***Bespoke themes*** Every profile can be personalised with a range of themes - from pre school to business users. We can also create bespoke eportfolio themes for your organisation, giving your Learner Journey system your branding.

***A social network*** Share achievements and message friends on a social network that's just for your organisation. The messaging system is available to all Learner Journey users and can be monitored by your Admin.

***Easy to use*** Learner Journey features simple drag-and-drop technology - even the least tech-savvy can use it. Build a profile using different media, then drag each item around to create the perfect account of your learning.

***Map learning*** Building a Learner Journey profile creates a digital map of learning - and provides evidence of achievements or awards. Users can populate their profile with documents, text, images and videos.

**Unlimited support** For complete peace of mind, Learner Journey comes with expert help and advice - and our 24/7 Support is free. Get assistance via freephone, email and live web chat whenever you need it.

### **Developing An E-Portfolio**

#### ***How do I develop my e-Portfolio?***

Understand the purpose of your e-Portfolio. The e-Portfolio will be used to demonstrate your achievement and mastery of particular core competencies, so all the materials you select or develop, and all your discussion and reflections, should be relevant to demonstrating your mastery of these objectives.

Understand the criteria for evaluation. Be sure that you understand the standard established to determine whether your e-Portfolio, as a final product, meets its intended purpose. You need to understand the principles on which your e-Portfolio will be judged so that you can select work samples that meet the evaluation criteria. Follow the guidelines for the organization and presentation of the e-Portfolio, be concise, and consult with your e-Portfolio advisor. See Competency Statement Rubrics (what specifically needs to be addressed for an ACCEPTABLE or SATISFACTORY statement of competency).

Closely read and think carefully about each competency (see Statement of Core Competencies). Consider carefully what each part of a multi-part competency might mean. Do you understand and can you explain its importance within the field of librarianship and information science?

Think about the organization and presentation of your e-Portfolio. Review the Canvas e-Portfolio tutorials. If not using Canvas and the required template for your e-Portfolio, make sure to discuss your alternative with your e-Portfolio advisor and obtain approval.

Collect evidence of your achievements for potential inclusion in your e-Portfolio and add them to your Canvas e-Portfolio Artifacts section. At this point, do not worry about making final decisions; this stage is like brainstorming—just collect as much material which might be relevant as you can. Essays, projects, any of your assignments, special projects completed at your workplace, or evidence (work produced) of knowledge acquired as a result of attending a conference or workshop in your area of study may be appropriate for consideration at this stage. Work products should not be more than two years old. At some point you may need to apply some of your knowledge and develop a new product to demonstrate mastery. Remember that evidence of competency and proficiency need not be limited solely to work done in this program. The issue is evidence of competence, not how or where you developed it. Simple completion of a course or regurgitation of information does not constitute evidence of mastery.

It is important to have as much evidence as possible before you as you begin the selection process so that you can be certain of choosing the work that best demonstrates your achievements. This is the work you want in your e-Portfolio. The e-Portfolio is not simply an amalgam of everything that you have done but a carefully selected collection or synthesis of your evidence.

Select the materials which will become part of your e-Portfolio. First, sort all the materials according to an appropriate organizational scheme. Use the iSchool MLIS Student Success Planner to help organize your portfolio evidence. Use this handbook and examples as a guide, and assess each item, selecting those that best represent your skills and accomplishments in satisfaction of the program objectives, and which meet the evaluation criteria. Remember that you may be submitting work already assessed by someone else, e.g., a course instructor, but that a different faculty member, your e-Portfolio advisor, will be assessing the same work as a measure of particular competence, and may reach different conclusions due to a different context.

The Statements of Competency (where you present your understanding of the competency and your selected evidence, and make the case for your mastery of the competency) are the most important parts of the e-Portfolio.

Begin by working with those competencies that are most familiar to you and for which you feel you have good evidence. Finish one or two, and submit them to your e-Portfolio advisor at the earliest opportunity. Take advantage of the opportunity to get early feedback from your e-Portfolio advisor.

There are approximately 12 weeks of semester work time before the e-Portfolio deadline. Set up your own schedule, and write and submit your work in a timely manner so that you do not run out of time as the semester ends.

Evaluate your e-Portfolio as a whole and make adjustments as necessary. At this point it is important to put yourself in your e-Portfolio advisor's place. Try to take an objective look at your e-Portfolio; you might also have peers or colleagues provide a preliminary judgment of your e-Portfolio. A colleague can raise helpful questions for you, of clarity, completeness, and congruence with objectives. Assume that your e-Portfolio advisor knows nothing about you or your work: your e-Portfolio must speak to an independent audience without your background or experience.

### **Describe the Advantages of Portfolio Assessment for Students**

Portfolios are collections of student activities, accomplishments and achievements to demonstrate growth over time, offering an alternative authentic assessment for students and teachers. Working portfolios contain works in process as well as finished works. Display

portfolios showcases students' best work and assessment portfolios demonstrate the specific curriculum standards students have learned. While each type of portfolio has value, the portfolio assessment has many advantages for students.

### **Self-Evaluation**

Assessment portfolios require students to continuously reflect and perform self-evaluations of their work. Teachers should convey to students the purpose of the portfolio, what constitutes quality work and how the portfolio is graded. As students judge their work using explicit criteria to identify strengths and weaknesses, they are monitoring their own progress. According to the article, "Student Self-Evaluation: What Research Says And What Practice Shows," by Carol Rolheiser and John A. Ross, students who participate in self-evaluations are motivated, have a positive outlook and develop cognitive skills.

### **Individualized**

Portfolios permit individualized assessment. Some students are not good test-takers and portfolios offer them an alternative to demonstrate mastery of content. Numerous work samples can show students moving from basic to advanced skills, demonstrating continued learning growth. Because assessment portfolios are individualized, students and teachers have the opportunity to choose the documents they want to include in the portfolio and to make decisions about how to improve the student's work.

### **Promote Communication**

Assessment portfolios promote communication between teachers and students. Some shy students who fail to initiate conversations within the classroom benefit from one-on-one interaction with the teacher, while other students may enjoy speaking about their accomplishments. During conferences, students can discuss their progress, ask questions and receive suggestions and strategies for improving work. Dialogues with peers and parents also help students in meaningful reflection and goal-setting.

### **Accountability**

Portfolio assessment can hold students accountable for mastering content standards in a subject area. Portfolios offer students tangible evidence to show their academic achievements as well as their participation in community service projects. Because high school graduation is contingent on mastery of essential elements of the curriculum, portfolios can give students an alternate avenue to show documentation of skills. In addition, many colleges and employers request portfolios to see if students have basic skills, problem solving and collaborative work skills.

## Unit 7

### Multimedia

*Definition: Multimedia combines five basic types of media into the learning environment: text, video, sound, graphics and animation, thus providing a powerful new tool for education.*

### Introduction

The world in which we live is changing rapidly and the field of education is experiencing these changes in particular as it applies to Media Services. The old days of an educational institution having an isolated audio-visual department are long gone! The growth in use of multimedia within the education sector has accelerated in recent years, and looks set for continued expansion in the future.

Teachers primarily require access to learning resources, which can support concept development by learners in a variety of ways to meet individual learning needs. The development of multimedia technologies for learning offers new ways in which learning can take place in schools and the home. Enabling teachers to have access to multimedia learning resources, which support constructive concept development, allows the teacher to focus more on being a facilitator of learning while working with individual students. Extending the use of multimedia learning resources to the home represents an educational opportunity with the potential to improve student learning.

The elements used in multimedia have all existed before. Multimedia simply combines these elements into a powerful new tool, especially in the hands of teachers and students. Interactive multimedia weaves five basic types of media into the learning environment: text, video, sound, graphics and animation. Since the mode of learning is interactive and not linear, a student or teacher can choose what to investigate next. For example, one does not start on the first page of a linear document and read to the end. Interactive multimedia learning mode is more like constructing a spider's web, with one idea linked to another, allowing choices in the learner's path.

The multimedia technologies that have had the greatest impact in education are those that augment the existing curriculum, allowing both immediate enhancement and encouraging further curriculum development. For example, the WWW serves as a storehouse of information that individual learners can search for subject matter content that specifically fits their learning agendas. Multimedia applications for computers have been developed for single computing platforms such as the PC, Apple Mac and games machines.

### **The Elements of Multimedia application**

It is very tempting to use the latest computer wizardry to represent information and develop computer enhanced learning materials. However, the instructional design of these systems should be based on a careful examination and analysis of the many factors, both human and technical, relating to visual learning. When is sound more meaningful than a picture? How much text is too much? Does the graphic overwhelm the screen? For a student, this allows them to test all of their skills gained in every subject area. Students must be able to select appropriate multimedia tools and apply them to the learning task within the learning environment in order for effective learning to take place.

A *Multimedia Learning* environment involves a number of components or elements in order to enable learning to take place. Hardware and software are only part of the requirement. As mentioned earlier, multimedia learning integrates five types of media to provide flexibility in expressing the creativity of a student and in exchanging ideas.

#### **Text**

Out of all of the elements, text has the most impact on the quality of the multimedia interaction. Generally, text provides the important information. Text acts as the keystone tying all of the other media elements together. It is well written text that makes a multimedia communication wonderful.

#### **Sound**

Sound is used to provide emphasis or highlight a transition from one page to another. Sound synchronized to screen display, enables teachers to present lots of information at once. This approach is used in a variety of ways, all based on visual display of a complex image paired with a spoken explanation (for example, art – pictures are ‘glossed’ by the voiceover; or math – a proof fills the screen while the spoken explanation plays in the background). Sound used creatively, becomes a stimulus to the imagination; used inappropriately it becomes a hindrance or an annoyance. For instance, a script, some still images and a sound track, allow students to utilize their own power of imagination without being biased and influenced by the inappropriate use of video footage. A great advantage is that the sound file can be stopped and started very easily.

#### **Video**

The representation of information by using the visualization capabilities of video can be immediate and powerful. While this is not in doubt, it is the ability to choose how we view, and interact, with the content of digital video that provides new and exciting possibilities for the use of digital video in education. There are many instances where students, studying particular processes, may find themselves faced with a scenario that seems highly complex when conveyed

in purely text form, or by the use of diagrams and images. In such situations the representational qualities of video help in placing a theoretical concept into context.

Video can stimulate interest if it is relevant to the rest of the information on the page, and is not ‘overdone’. Video can be used to give examples of phenomena or issues referred to in the text. For example, while students are reading notes about a particular issue, a video showing a short clip of the author/teacher emphasizing the key points can be inserted at a key moment; alternatively, the video clips can be used to tell readers what to do next. On the other hand, it is unlikely that video can completely replace the face-to-face lecture: rather, video needs to be used to supplement textual information.

One of the most compelling justifications for video may be its dramatic ability to elicit an emotional response from an individual. Such a reaction can provide a strong motivational incentive to choose and persist in a task.

The use of video is appropriate to convey information about environments that can be either dangerous or too costly to consider, or recreate, in real life. For example: video images used to demonstrate particular chemical reactions without exposing students to highly volatile chemicals, or medical education, where real-life situations can be better understood via video.

### **Animation**

Animation is used to show changes in state over time, or to present information slowly to students so they have time to assimilate it in smaller chunks. Animations, when combined with user input, enable students to view different versions of change over time depending on different variables.

Animations are primarily used to demonstrate an idea or illustrate a concept. Video is usually taken from life, whereas animations are based on drawings. There are two types of animation: Cel based and Object based. Cel based animation consists of multiple drawings, each one a little different from the others. When shown in rapid sequence, for example, the operation of an engine’s crankshaft, the drawings appear to move. Object based animation (also called slide or path animation) simply moves an object across a screen. The object itself does not change. Students can use object animation to illustrate a point – imagine a battle map of Gettysburg where troop movement is represented by sliding arrows.

### **Graphics**

Graphics provide the most creative possibilities for a learning session. They can be photographs, drawings, graphs from a spreadsheet, pictures from CD-ROM, or something pulled from the Internet. With a scanner, hand-drawn work can be included. Standing commented that, “the capacity of recognition memory for pictures is almost limitless”. The reason for this is that

images make use of a massive range of cortical skills: color, form, line, dimension, texture, visual rhythm, and especially imagination.

### **Multimedia Formats**

Multimedia elements (like audio or video) are stored in media files.

The most common way to discover the type of a file, is to look at the file extension.

Multimedia files have formats and different extensions like: .swf, .wav, .mp3, .mp4, .mpg, .wmv, and .avi.

#### Common Video Formats

MP4 is the new and upcoming format for internet video. MP4 is recommended by YouTube. MP4 is supported by Flash Players.

MP4 is supported by HTML5.

### **Multimedia Hardware Requirements**

#### *CPU*

Central Processing Unit (CPU) is an essential part in any computer. It is considered as the brain of computer, where processing and synchronization of all activities takes place. The efficiency of a computer is judged by the speed of the CPU in processing of data. For a multimedia computer a Pentium processor is preferred because of higher efficiency.

#### *Monitor*

The monitor is used to see the computer output. Generally, it displays 25 rows and 80 columns of text. The text or graphics in a monitor is created as a result of an arrangement of tiny dots, called pixels. Resolution is the amount of details the monitor can render. Resolution is defined in terms of horizontal and vertical pixel (picture elements) displayed on the screen.

#### *Video Grabbing Card*

We need to convert the analog video signal to digital signal for processing in a computer. Normal computer will not be able to do it alone. It requires special equipment called video grabbing card and software to this conversion process. This card translates the analog signal it receives from conventional sources such as a VCR or a video camera, and converts them into digital format.

### *Sound Card*

Today's computers are capable of creating the professional multimedia needs. Not only you can use computer to compose your own music, but it can also be used for recognition of speech and synthesis. It can even read back the entire document for you. But before all this happens, we need to convert the conventional sound signal to computer understandable digital signals. This is done using a special component added to the system called sound card.

### *CD-Rom*

CD-ROM is a magnetic disk of 4.7 inches diameter and it can contain data up to 680 Megabytes. It has become a standard by itself basically for its massive storage capacity, faster data transfer rate. To access CD-ROM a very special drive is required and it is known as CD-ROM drive.

### **Multimedia Software Requirements**

For the creation of multimedia on the PC there are hundreds of software packages that are available from manufacturers all over the world.

These software packages can cost anything from being absolutely free (normally this software is called freeware or shareware) to anything upwards of £500.

Here is a summary of just a few of these programs.

#### *Adobe CS4*

Adobe CS4 is a collection of graphic design, video editing, and web development applications made by Adobe Systems many of which are the industry standard that includes

#### *Adobe Dreamweaver*

Although a hybrid WYSIWYG and code-based web design and development application, Dreamweaver's WYSIWYG mode can hide the HTML code details of pages from the user, making it possible for non-coders to create web pages and sites. WYSIWYG (What You See Is What You Get) web development software that allows users to create websites without using HTML, everything can be done visually.

#### *Adobe Fireworks*

A graphics package that allows users to create bitmap and vector graphics editor with features such as: slices, the ability to add hotspots etc.) for rapidly creating website prototypes and application interfaces.

***Gimp***

Is an alternative to Photoshop and cheaper but not quite as good.

***Google Sketchup***

SketchUp is a 3D modeling program designed for architects, civil engineers, filmmakers, game developers, and related professions.

***Microsoft Frontpage***

As a WYSIWYG editor, FrontPage is designed to hide the details of pages' HTML code from the user, making it possible for novices to easily create web pages and sites.

***Apple Quicktime***

QuickTime is an extensible proprietary multimedia framework developed by Apple, capable of handling various formats of digital video, 3D models, sound, text, animation, music, panoramic images, and interactivity.

***Photoshop Pro***

Adobe Photoshop, or simply Photoshop, is a graphics editing program developed and published by Adobe Systems. It is the current market leader for commercial bitmap and image manipulation software, and is the flagship product of Adobe Systems. It has been described as “an industry standard for graphics professionals”

***Microsoft Powerpoint***

Powerpoint Presentations are generally made up of slides may contain text, graphics, movies, and other objects, which may be arranged freely on the slide.

***Adobe Flash Player***

Adobe Flash (formerly Macromedia Flash) is a multimedia platform that is popular for adding animation and interactivity to web pages. Originally acquired by Macromedia, Flash was introduced in 1996, and is currently developed and distributed by Adobe Systems.

Flash is commonly used to create animation, advertisements, and various web page Flash components, to integrate video into web pages, and more recently, to develop rich Internet applications.

### *Adobe Shockwave*

Adobe Shockwave (formerly Macromedia Shockwave) is a multimedia player program, first developed by Macromedia, acquired by Adobe Systems in 2005. It allows Adobe Director applications to be published on the Internet and viewed in a web browser on any computer which has the Shockwave plug-in installed.

### **Inline Multimedia Objects**

Use the media element to insert an image, video, or other multimedia object into your document. Since not all display tools will be able to display all types of objects, you can provide fallback elements in the contents of a media element. See Processing Expectations for details on how fallback elements are handled.

## Unit 8

### Elements of C Programming Language

As every language has some basic geometrical rules and elements, similarly C language has some elements and rules for building a program which has some meaning.

**Character Set:** In Real world to communicate with people we use language like Hindi English Urdu extra which is constructed and Defined by some characters, words extra. Similarly in C programming language we have various characters to communicate with the computer in order to produce a meaningful program and can produce an output.

#### Character Set In C Language

Type	Set
Lowercase	a-z
Uppercase	A-Z
Digits	0-9
special characters	!,@,#,\$,%
White space	space, tab, and new lines

#### Constants/Literals

A constant is a value or an identifier whose value cannot be altered in a program. For example: 1, 2.5, "C programming is easy", etc.

As mentioned, an identifier also can be defined as a constant.

```
const double PI = 3.14
```

Here, PI is a constant. Basically what it means is that, PI and 3.14 is same for this program. Below are the different types of constants you can use in C.

#### 1. Integer constants

An integer constant is a numeric constant (associated with number) without any fractional or exponential part. There are three types of integer constants in C programming:

- decimal constant(base 10)
- octal constant(base 8)
- hexadecimal constant(base 16)

For example:

```
Decimal constants: 0, -9, 22 etc
```

Octal constants: 021, 077, 033 etc  
 Hexadecimal constants: 0x7f, 0x2a, 0x521 etc

In C programming, octal constant starts with a 0 and hexadecimal constant starts with a 0x.

## 2. Floating-point constants

A floating point constant is a numeric constant that has either a fractional form or an exponent form. For example:

```
-2.0
0.0000234
-0.22E-5
```

**Note:** E-5 =  $10^{-5}$

## 3. Character constants

A character constant is a constant which uses single quotation around characters. For example: 'a', 'l', 'm', 'F'

## 4. Escape Sequences

Sometimes, it is necessary to use characters which cannot be typed or has special meaning in C programming. For example: newline(enter), tab, question mark etc. In order to use these characters, escape sequence is used.

For example: `\n` is used for newline. The backslash ( `\` ) causes "escape" from the normal way the characters are interpreted by the compiler.

Escape Sequences	
Escape Sequences	Character
<code>\b</code>	Backspace
<code>\f</code>	Form feed
<code>\n</code>	Newline
<code>\r</code>	Return
<code>\t</code>	Horizontal tab
<code>\v</code>	Vertical tab
<code>\\</code>	Backslash

Escape Sequences	
Escape Sequences	Character
\'	Single quotation mark
\"	Double quotation mark
\?	Question mark
\0	Null character

### 5. String constants

String constants are the constants which are enclosed in a pair of double-quote marks. For example:

```
"good"           //string constant
""              //null string constant
"  "           //string constant of six white space
"x"            //string constant having single character.
"Earth is round\n" //prints string with newline
```

### 6. Enumeration constants

Keyword enum is used to define enumeration types. For example:

```
enum color {yellow, green, black, white};
```

Here, color is a variable and yellow, green, black and white are the enumeration constants having value 0, 1, 2 and 3 respectively. For more information, visit page: [C Enumeration](#).

### Variables

In programming, a variable is a container (storage area) to hold data.

To indicate the storage area, each variable should be given a unique name ([identifier](#)). Variable names are just the symbolic representation of a memory location. For example:

```
int playerScore = 95;
```

Here, playerScore is a variable of integer type. The variable is assigned value: 95.

The value of a variable can be changed, hence the name 'variable'.

In C programming, you have to declare a variable before you can use it.

### Rules for naming a variable in C

1. A variable name can have letters (both uppercase and lowercase letters), digits and underscore only.
2. The first letter of a variable should be either a letter or an underscore. However, it is discouraged to start variable name with an underscore. It is because variable name that starts with an underscore can conflict with system name and may cause error.
3. There is no rule on how long a variable can be. However, only the first 31 characters of a variable are checked by the compiler. So, the first 31 letters of two variables in a program should be different.

C is a strongly typed language. What this means it that, the type of a variable cannot be changed.

### **Operators in C Language**

C language supports a rich set of built-in operators. An operator is a symbol that tells the compiler to perform a certain mathematical or logical manipulation. Operators are used in programs to manipulate data and variables.

C operators can be classified into following types:

- Arithmetic operators
- Relational operators
- Logical operators
- Bitwise operators
- Assignment operators
- Conditional operators
- Special operators

### **Arithmetic operators**

C supports all the basic arithmetic operators. The following table shows all the basic arithmetic operators.

<b>Operator</b>	<b>Description</b>
+	adds two operands
-	subtract second operands from first
*	multiply two operand
/	divide numerator by denominator
%	remainder of division
++	Increment operator - increases integer value by one
--	Decrement operator - decreases integer value by one

### Relational operators

The following table shows all relation operators supported by C.

Operator	Description
==	Check if two operand are equal
!=	Check if two operand are not equal.
>	Check if operand on the left is greater than operand on the right
<	Check operand on the left is smaller than right operand
>=	check left operand is greater than or equal to right operand
<=	Check if operand on left is smaller than or equal to right operand

### Logical operators

C language supports following 3 logical operators. Suppose **a = 1** and **b = 0**,

Operator	Description	Example
&&	Logical AND	(a && b) is false
	Logical OR	(a    b) is true
!	Logical NOT	(!a) is false

### Bitwise operators

Bitwise operators perform manipulations of data at **bit level**. These operators also perform **shifting of bits** from right to left. Bitwise operators are not applied to **float** or **double**(These are datatypes, we will learn about them in the next tutorial).

Operator	Description
&	Bitwise AND
	Bitwise OR

^	Bitwise exclusive OR
<<	left shift
>>	right shift

### Assignment Operators

Assignment operators supported by C language are as follows.

Operator	Description	Example
=	assigns values from right side operands to left side operand	a=b
+=	adds right operand to the left operand and assign the result to left	a+=b is same as a=a+b
-=	subtracts right operand from the left operand and assign the result to left operand	a-=b is same as a=a-b
*=	multiply left operand with the right operand and assign the result to left operand	a*=b is same as a=a*b
/=	divides left operand with the right operand and assign the result to left operand	a/=b is same as a=a/b
%=	calculate modulus using two operands and assign the result to left operand	a%=b is same as a=a%b

### Conditional operator

The conditional operators in C language are known by two more names

1. **Ternary Operator**
2. **? : Operator**

It is actually the **if** condition that we use in C language decision making, but using conditional operator, we turn the **if** condition statement into a short and simple operator.

### Special operator

Operator	Description	Example
sizeof	Returns the size of an variable	<b>sizeof(x)</b> return size of the variable <b>x</b>
&	Returns the address of an variable	<b>&amp;x ;</b> return address of the variable <b>x</b>
*	Pointer to a variable	<b>*x ;</b> will be pointer to a variable <b>x</b>

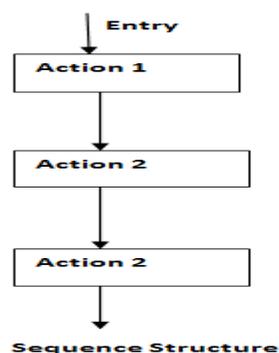
### Control Structure

**Control structures** form the basic entities of a “**structured programming language**“. We all know languages like C/C++ or Java are all structured programming languages. **Control structures are used to alter the flow of execution of the program.** Why do we need to alter the program flow ? The reason is “**decision making**“! In life, we may be given with a set of option like doing “Electronics” or “Computer science”. We do make a decision by analyzing certain conditions (like our personal interest, scope of job opportunities etc). With the decision we make, we alter the flow of our life’s direction. This is exactly what happens in a C/C++ program. We use control structures to make decisions and alter the direction of program flow in one or the other path(s) available.

There are **three types** of control structures available in C and C++

- 1) **Sequence structure (straight line paths)**
- 2) **Selection structure (one or many branches)**
- 3) **Loop structure (repetition of a set of activities)**

All the 3 control structures and its flow of execution is represented in the flow charts given below.



We have to keep in mind one important fact:- all program processes can be implemented with these 3 control structures only. That’s why I wrote “**control structures are the basic entities of a structured programming language**“. To implements these “control structures” in a C/C++ program, the language provides ‘control statements’. So to implement a particular control

structure in a programming language, we need to learn how to use the relevant control statements in that particular language.

The control statements are:-

- **Switch**
- **If**
- **If Else**
- **While**
- **Do While**
- **For**

### Looping Statement in C

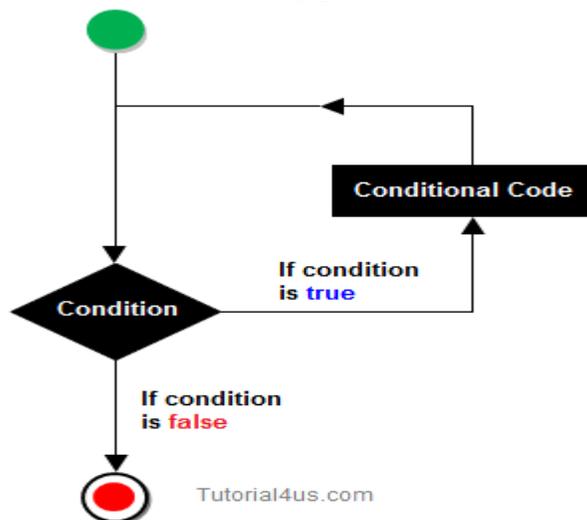
**Looping statement** are the statements execute one or more statement repeatedly several number of times. In C programming language there are three types of loops; while, for and do-while.

#### Why use loop ?

When you need to execute a block of code several number of times then you need to use looping concept in C language.

#### Advantage with looping statement

- Reduce length of Code
- Take less memory space.
- Burden on the developer is reducing.
- Time consuming process to execute the program is reduced.



#### Types of Loops.

There are three type of Loops available in 'C' programming language.

- while loop

- for loop
- do..while

### Array of Structures in C

Declaring an array of structure is same as declaring an array of fundamental types. Since an array is a collection of elements of the same type. In an array of structures, each element of an array is of the structure type.

Let's take an example:

```
struct car
{
    char make[20];
    char model[30];
    int year;
};
```

### C functions

Function is a group of statements that together perform a task. Every C program has at least one function, which is **main()**, and all the most trivial programs can define additional functions.

You can divide up your code into separate functions. How you divide up your code among different functions is up to you, but logically the division is such that each function performs a specific task.

A function **declaration** tells the compiler about a function's name, return type, and parameters. A function **definition** provides the actual body of the function.

The C standard library provides numerous built-in functions that your program can call. For example, **strcat()** to concatenate two strings, **memcpy()** to copy one memory location to another location, and many more functions.

A function can also be referred as a method or a sub-routine or a procedure, etc.

Defining a Function

The general form of a function definition in C programming language is as follows –

```
return_type function_name( parameter list ) {
    body of the function
}
```

A function definition in C programming consists of a *function header* and a *function body*. Here are all the parts of a function –

- **Return Type** – A function may return a value. The **return\_type** is the data type of the value the function returns. Some functions perform the desired operations without returning a value. In this case, the return\_type is the keyword **void**.
- **Function Name** – This is the actual name of the function. The function name and the parameter list together constitute the function signature.

- **Parameters** – A parameter is like a placeholder. When a function is invoked, you pass a value to the parameter. This value is referred to as actual parameter or argument. The parameter list refers to the type, order, and number of the parameters of a function. Parameters are optional; that is, a function may contain no parameters.
- **Function Body** – The function body contains a collection of statements that define what the function does.

### Library function

C Standard library functions or simply C Library functions are inbuilt [functions](#) in C programming.

The prototype and data definitions of the functions are present in their respective header files, and must be included in your program to access them.

**For example:** If you want to use `printf()` function, the header file `<stdio.h>` should be included.

```
#include <stdio.h>
int main()
{
    // If you use printf() function without including the <stdio.h>
    // header file, this program will show an error.
    printf("Catch me if you can.");
}
```

There is at least one function in any C program, i.e., the `main()` function (which is also a library function). This function is automatically called when your program starts.

Developing simple C program

Program to Add Two Integers

```
#include <stdio.h>
int main()
{
    int firstNumber, secondNumber, sumOfTwoNumbers;

    printf("Enter two integers: ");

    // Two integers entered by user is stored using scanf() function
    scanf("%d %d", &firstNumber, &secondNumber);

    // sum of two numbers in stored in variable sumOfTwoNumbers
    sumOfTwoNumbers = firstNumber + secondNumber;

    // Displays sum
    printf("%d + %d = %d", firstNumber, secondNumber, sumOfTwoNumbers);

    return 0;
}
```

Output

Enter two integers: 12

11

12 + 11 = 23

## C++ Classes and Objects

**Class:** The building block of C++ that leads to Object Oriented programming is a **Class**. It is a user defined data type, which holds its own data members and member functions, which can be accessed and used by creating an instance of that class. A class is like a blueprint for an object. For Example: Consider the Class of **Cars**. There may be many cars with different names and brand but all of them will share some common properties like all of them will have *4 wheels, Speed Limit, Mileage range* etc. So here, Car is the class and wheels, speed limits, mileage are their properties.

- A Class is a user defined data-type which has data members and member functions.
- Data members are the data variables and member functions are the functions used to manipulate these variables and together these data members and member functions defines the properties and behavior of the objects in a Class.
- In the above example of class *Car*, the data member will be *speed limit, mileage* etc and member functions can be *apply brakes, increase speed* etc.

An **Object** is an instance of a Class. When a class is defined, no memory is allocated but when it is instantiated (i.e. an object is created) memory is allocated.

**Declaring Objects:** When a class is defined, only the specification for the object is defined; no memory or storage is allocated. To use the data and access functions defined in the class, you need to create objects.

**Syntax:**

```
ClassName ObjectName;
```

**Accessing data members and member functions:** The data members and member functions of class can be accessed using the dot('.') operator with the object. For example if the name of object is *obj* and you want to access the member function with the name *printName()* then you will have to write *obj.printName()* .

## Polymorphism

The word **polymorphism** means having many forms. Typically, polymorphism occurs when there is a hierarchy of classes and they are related by inheritance.

C++ polymorphism means that a call to a member function will cause a different function to be executed depending on the type of object that invokes the function.

## C++ Inheritance

One of the most important concepts in object-oriented programming is that of inheritance. Inheritance allows us to define a class in terms of another class, which makes it

easier to create and maintain an application. This also provides an opportunity to reuse the code functionality and fast implementation time.

When creating a class, instead of writing completely new data members and member functions, the programmer can designate that the new class should inherit the members of an existing class. This existing class is called the **baseclass**, and the new class is referred to as the **derived** class.

The idea of inheritance implements the **is a** relationship. For example, mammal IS-A animal, dog IS-A mammal hence dog IS-A animal as well and so on.

#### Base and Derived Classes

A class can be derived from more than one classes, which means it can inherit data and functions from multiple base classes. To define a derived class, we use a class derivation list to specify the base class(es). A class derivation list names one or more base classes and has the form –

```
class derived-class: access-specifier base-class
```

Where access-specifier is one of **public**, **protected**, or **private**, and base-class is the name of a previously defined class. If the access-specifier is not used, then it is private by default.

### C++ Overloading (Operator and Function)

C++ allows you to specify more than one definition for a function name or an operator in the same scope, which is called function overloading and operator overloading respectively.

An overloaded declaration is a declaration that is declared with the same name as a previously declared declaration in the same scope, except that both declarations have different arguments and obviously different definition (implementation).

When you call an overloaded function or operator, the compiler determines the most appropriate definition to use, by comparing the argument types you have used to call the function or operator with the parameter types specified in the definitions. The process of selecting the most appropriate overloaded function or operator is called overload resolution.

### Function Overloading in C++

You can have multiple definitions for the same function name in the same scope. The definition of the function must differ from each other by the types and/or the number of arguments in the argument list. You cannot overload function declarations that differ only by return type.

Following is the example where same function print() is being used to print different data types –

```
Live Demo
#include <iostream>
using namespace std;
```

```
class printData {
public:
    void print(int i) {
        cout << "Printing int: " << i << endl;
    }
    void print(double f) {
        cout << "Printing float: " << f << endl;
    }
    void print(char* c) {
        cout << "Printing character: " << c << endl;
    }
};

int main(void) {
    printData pd;

    // Call print to print integer
    pd.print(5);

    // Call print to print float
    pd.print(500.263);

    // Call print to print character
    pd.print("Hello C++");

    return 0;
}
```

When the above code is compiled and executed, it produces the following result –

```
Printing int: 5
Printing float: 500.263
Printing character: Hello C++
Operators Overloading in C++
```

You can redefine or overload most of the built-in operators available in C++. Thus, a programmer can use operators with user-defined types as well.

Overloaded operators are functions with special names: the keyword "operator" followed by the symbol for the operator being defined. Like any other function, an overloaded operator has a return type and a parameter list.

```
Box operator+(const Box&);
```

declares the addition operator that can be used to add two Box objects and returns final Box object. Most overloaded operators may be defined as ordinary non-member functions or as class member functions. In case we define above function as non-member function of a class then we would have to pass two arguments for each operand as follows –

Box operator+(const Box&, const Box&);

Following is the example to show the concept of operator over loading using a member function. Here an object is passed as an argument whose properties will be accessed using this object, the object which will call this operator can be accessed using this operator as explained below –

Live Demo

```
#include <iostream>
using namespace std;

class Box {
public:
    double getVolume(void) {
        return length * breadth * height;
    }
    void setLength( double len ) {
        length = len;
    }
    void setBreadth( double bre ) {
        breadth = bre;
    }
    void setHeight( double hei ) {
        height = hei;
    }

    // Overload + operator to add two Box objects.
    Box operator+(const Box& b) {
        Box box;
        box.length = this->length + b.length;
        box.breadth = this->breadth + b.breadth;
        box.height = this->height + b.height;
        return box;
    }

private:
    double length;    // Length of a box
    double breadth;  // Breadth of a box
    double height;   // Height of a box
};
```

```
// Main function for the program
int main() {
    Box Box1;          // Declare Box1 of type Box
    Box Box2;          // Declare Box2 of type Box
    Box Box3;          // Declare Box3 of type Box
    double volume = 0.0; // Store the volume of a box here

    // box 1 specification
    Box1.setLength(6.0);
    Box1.setBreadth(7.0);
    Box1.setHeight(5.0);

    // box 2 specification
    Box2.setLength(12.0);
    Box2.setBreadth(13.0);
    Box2.setHeight(10.0);

    // volume of box 1
    volume = Box1.getVolume();
    cout << "Volume of Box1 : " << volume <<endl;

    // volume of box 2
    volume = Box2.getVolume();
    cout << "Volume of Box2 : " << volume <<endl;

    // Add two object as follows:
    Box3 = Box1 + Box2;

    // volume of box 3
    volume = Box3.getVolume();
    cout << "Volume of Box3 : " << volume <<endl;

    return 0;
}
```

When the above code is compiled and executed, it produces the following result –

```
Volume of Box1 : 210
Volume of Box2 : 1560
Volume of Box3 : 5400
```

## Unit 9

## HTML Introduction

HTML is the standard markup language for creating Web pages.

- HTML stands for Hyper Text Markup Language
- HTML describes the structure of Web pages using markup
- HTML elements are the building blocks of HTML pages
- HTML elements are represented by tags
- HTML tags label pieces of content such as "heading", "paragraph", "table", and so on
- Browsers do not display the HTML tags, but use them to render the content of the page

## Elements of HTML

An HTML element is defined by a starting tag. If the element contains other content, it ends with a closing tag, where the element name is preceded by a forward slash as shown below with few tags –

Start Tag	Content	End Tag
<p>	This is paragraph content.	</p>
<h1>	This is heading content.	</h1>
<div>	This is division content.	</div>

- So here <p>....</p> is an HTML element, <h1>...</h1> is another HTML element. There are some HTML elements which don't need to be closed, such as <img.../>, <hr /> and <br /> elements. These are known as void elements.
- HTML documents consists of a tree of these elements and they specify how HTML documents should be built, and what kind of content should be placed in what part of an HTML document.
- HTML Tag vs. Element
- An HTML element is defined by a *starting tag*. If the element contains other content, it ends with a *closing tag*.

- For example, <p> is starting tag of a paragraph and </p> is closing tag of the same paragraph but <p>This is paragraph</p> is a paragraph element.
- Nested HTML Elements
- It is very much allowed to keep one HTML element inside another HTML element –
- Example
- Live Demo

```

• <!DOCTYPE html>
• <html>
•
•   <head>
•     <title>Nested Elements Example</title>
•   </head>
•
•   <body>
•     <h1>This is <i>italic</i> heading</h1>
•     <p>This is <u>underlined</u> paragraph</p>
•   </body>
•
• </html>

```

## Heading section

HTML defines six levels of headings. A heading element implies all the font changes, paragraph breaks before and after, and any white space necessary to render the heading. The heading elements are H1, H2, H3, H4, H5, and H6 with H1 being the highest (or most important) level and H6 the least. For example:

```

<H1>This is a top level heading</H1> Here is some text.
<H2>Second level heading</H2> Here is some more text.

```

Use the DIV element together with header elements when you want to make the hierarchical structure of a document explicit. This is needed as header elements themselves only contain the text of the header, and do not imply any structural division of documents into sections. Header elements have the same content model as paragraphs, that is text and character level markup, such as character emphasis, inline images, form fields and math.

Headers play a related role to lists in structuring documents, and it is common to number headers or to include a graphic that acts like a bullet in lists. HTML 3.0 recognizes this with attributes that assist with numbering headers and allow authors to specify a custom graphic.

## **HTML Body Section**

### **Definition**

HTML body section is a main contain section of web page all contain that will be seen when the user loads the webpage.

HTML body section supported all the contains such as text, hyper-links, images, Special Character, lists, tables, frames, forms etc.

It's most powerful section and important section to display web page.

### **Basic Body Section Tags**

Tag      Description

<a>      Defines the internal link, external link and Subdirectory link.

<br />    Defines the single line break.

<code>      Defines the computer code on text base.

<div>      Defines the division section in a document.

<form>      Defines the HTML form for use in input documents

<frame>      Defines the many individual part

<hr />    Defines the horizontal line.

<p>      Defines the paragraph in web documents.

<pre>      Defines the preformatted text.

<span>      Defines a section in a web document.

<table>      Defines the table.

<textarea>      Defines the multiline text.

### **HTML Images Syntax**

In HTML, images are defined with the <img> tag.

The <img> tag is empty, it contains attributes only, and does not have a closing tag.

The src attribute specifies the URL (web address) of the image:

```

```

### **Hyperlink**

The tags used to produce links are the `<a>` and `</a>`.

The `<a>` tells where the link should start and the `</a>` indicates where the link ends.

Everything between these two will work as a link.

The target of the link is added to the `<a>` tag using the `href="http://www.whateverpage.com"` setting.

The example below shows how to make the word **here** work as a link to yahoo.

```
Click <a href="http://www.yahoo.com">here</a> to go to yahoo.
```

You simply:

- Specify the target in the `<a href=" ">`.
- Then add the text that should work as a link.
- Finally add an `</a>` tag to indicate where the link ends.

### **Create a website by using one of the Microsoft FrontPage 2003 web page and website templates.**

- Choose "File" from the toolbar, and click on "New."
- A new task pane opens on the right side of your screen.
- Select from the template options, existing pages or search for templates online.
- When you find your template, select it and then click "OK."
- You will see a folder list and website panes after you create your website.

## **The Top 10 Most Important Elements Of A Website Design**

### **1 Navigation**

The website design should be easy to navigate and the menu items should easily accessible from any page. The viewer should always know exactly where they are on the website and have easy access to where they would like to be. A site map is a great idea and will be used if available. This sounds elementary but most websites could be improved in this area.

Remember, there is a fine line between an interactive menu and an annoying one, so functionality should be the idea.

## **2 Visual Design**

People are visually oriented creatures, and utilizing great graphics is a good way to make your website more appealing. Your website has about 1/10th of a second to impress your visitor - and potential customer - and let them know that your website - and business (by proxy) - is trustworthy and professional. However, it's important not to go overboard with too much. Scrolling text, animation, and flash intros should be used sparingly in your web design and only to emphasize a point for maximum effect.

## **3 Content**

This is the backbone of your website. Not only does your content play a major role in your search engine placement, it is the reason most visitors are seeking from your website in the first place. Your website text should be informative, easy to read, and concise. Well thought out web content and copy will do more than anything else to make your website design engaging, effective and popular.

## **4 Web Friendly**

No matter how informative, beautiful, and easy to use your website design is, it's useless unless it's web-friendly. It is important that your web designers know the keys to making your website work on all the major browsers, and that they utilize meta tags, alt tags, are fully versed in SEO (Search Engine Optimization). Many factors effect your search engine placement and visual appearance of your site, so make sure your web designers know their stuff.

## **5 Interaction**

A truly effective website design engages your visitors immediately and continues to hold their attention through EVERY page, as well as influences them to contact you. This is called 'conversion', and is probably your website's ultimate goal. Again, there is a fine line between 'interaction' and 'annoyance', so the level of interaction should never outweigh the benefit.

## **6 Information Accessibility**

Not all visitors to your website are interested in, or have the time to peruse the entire site. They may need to access only a phone number or address, or just a certain bit of info. For this reason it's important to place key information in plain site, in an area that's easily accessible. We've all had the experience of not being able to locate some needed information on a website, and the result is always a frustrated visitor. The experience is annoying at best, and a disgruntled

visitor won't stay on your site very long and is unlikely not to return, much less do business with you.

### **7 Intuitiveness**

A great website anticipates what your visitor is thinking and caters directly to their needs, and has elements arranged in a way that makes sense. If a visitor is searching for one of your products or services on a search engine or directory where your site is listed, it's important that your website have a landing page that is directly relevant to what they searched for rather than forcing them to filter through all of your information. Remember, the shortest distance between two points is a straight line.

### **8 Branding**

Your website should be a direct reflection of your business and your brand. Your visitor should immediately make a visual connection between your logo, print material, and brick-and-mortar location. A website that does this not only contributes to the memorability of your branding, but adds a level of credibility and enhanced image of that of your overall business.

### **9 Turnaround Time**

The number one complaint of website design customers is the time it takes to get the site up and running. Unfortunately, a firm that takes unusually long to complete your website is par for the course. The longer it takes to complete the website, the more business - and value - you lose. A website that isn't on the web isn't and working properly isn't going to bring you any business!

### **10 Conversion**

Your website can be the most important client generator your business can have, and must place the primary emphasis on bringing in new clients and making additional services available to existing clients through increased awareness of all the services you offer. Providing them with the tools they need to do business with you in an easy and enjoyable way will increase your website conversion and bring you the kind of success you seek.

### **The Difference Between Blog and Website**

Blogs are a type of website. The only real difference between a blog and other types of website is that blogs are regularly updated with new content displayed in a reversed chronological order (newer posts first).

Typical websites are static in nature where content is organized in pages, and they are not updated frequently. Whereas a blog is dynamic, and it is usually updated more frequently. Some bloggers publish multiple new articles a day.

Blogs can be a part of the larger website. Often businesses have a blog section where they regularly create content to inform and educate their customers. Because you can use WordPress to create a website and blog, a lot of business owners use WordPress to build their small business website.

In simple terms, all blogs can be a website or part of a website. However, not all websites can be called blogs.

For example, WPBeginner is a blog and a website. Our website has other content which is published in a non-blog format like glossary, about us, and contact pages.