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# UNIT- I ICT AND SCHOOL EDUCATION -I

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*ICT and school  
Education - I*

## **STRUCTURES**

- 1.1 Introduction
- 1.2 Objectives
- 1.3 ICT-Meaning
- 1.4 ICT-Definition
- 1.5 Need for ICT in Education
- 1.6 Evolution of Information Technology
- 1.7 Information and communication technology in School Education
- 1.8 Let Us Sum up
- 1.9 Unit-end Exercises
- 1.10 Answers to Check Your Progress
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### **1.1 INTRODUCTION**

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Schools use a diverse set of ICT tools to communicate, create, disseminate, store, and manage information. In some contexts, ICT has also become integral to the teaching-learning interaction, through such approaches as replacing chalkboards with interactive digital whiteboards, using students' own smart phones or other devices for learning during class time, and the "flipped classroom" model where students watch lectures at home on the computer and use classroom time for more interactive exercises. When teachers are digitally literate and trained to use ICT, these approaches can lead to higher order thinking skills, provide creative and individualized options for students to express their understandings, and leave students better prepared to deal with ongoing technological change in society and the workplace.

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### **1.2 OBJECTIVES**

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At the end of the unit, you will be able to:

- Define the meaning and definition
- Explain the need for ICT in Education
- Describe the Evolution of information and technology
- Analyse the information communication technology in school Education

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### **1.3 ICT-MEANING**

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Information and communications technology (ICT) refers to all the technology used to handle telecommunications, broadcast media, intelligent building management systems, audiovisual processing and transmission systems, and network-based control and monitoring functions.

ICT is technology that supports activities involving information. Such activities include gathering, processing, storing and presenting data. Increasingly these activities also involve collaboration and communication. Hence IT has become ICT: information and communication technology.

Although ICT is often considered an extended synonym for information technology (IT), its scope is more broad.

ICT has more recently been used to describe the convergence of several technologies and the use of common transmission lines carrying very diverse data and communication types and formats.

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### **1.4 ICT-DEFINITION**

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Information and communications technology (ICT) is the use of any computers, storage, networking and other physical devices, infrastructure and processes to create, process, store, secure and exchange all forms of electronic data. Typically, ICT is used in the context of enterprise operations as opposed to personal or entertainment technologies. The commercial use of IT encompasses both computer technology and telephony.

Converging technologies that exemplify ICT include the merging of audiovisual, telephone and computer networks through a common cabling system. Internet service providers (ISPs) commonly provide internet, phone and television services to homes and businesses through a single optical cable. The elimination of the telephone networks has provided huge economic incentives to implement this convergence, which eliminates many of the costs associated with cabling, signal distribution, user installation, servicing and maintenance costs.

#### **Techopedia**

The term information technology was coined by the Harvard Business Review, in order to make a distinction between purpose-built machines designed to perform a limited scope of functions and general-purpose computing machines that could be programmed for various tasks. As the IT industry evolved from the mid-20<sup>th</sup> century, computing capability advanced while device cost and energy consumption fell lower, a cycle that continues today when new technologies emerge.

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### **1.5 NEED FOR ICT IN EDUCATION**

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“Smart technology” is the familiar terminology that is widely being used in every being’s life. Smartphones, tablets, gadgets, smart

televisions, etc., are the products of smart technology that have made human life smarter, easier and accessible.

Smart technology has not only enhanced the way of living but also became an integrated part of everyone's life.

- The Information and Communication technology to be precise has become a driving force behind economic growth and a developmental tool as well.
- ICT is an extended term for Information technology which is a technological source to make information available at the right time, right place in the right form to the right user. Earlier, one had to wait for the newspapers to get the information across the world.
- Now with the smarter technology, information can be accessed from anywhere using smartphones and gadgets. All this is made possible with the help of Information and Communication Technology.
- Information technology has been influencing our lives in the recent years in the fields of education, healthcare, and business. Going an extra mile, Information and communication technology in schools has had a major impact.
- Information and communication technology in schools can be used as a school communication tool to improve student learning and better teaching techniques. With the advancement of technology in education, schools adopt school communication software to transmit, store, share or exchange information.
- In this technological era, ICT in education has compelled many schools to get accustomed to smart technology. This school communication software uses computers, the internet, and multimedia as the medium of communication.
- Computer-based learning: Computer-based learning is one of the modules of school communication tool that helps students to enhance their learning skills through computer aided education.
- It imparts computer knowledge in students and enables them to obtain large amounts of information from various websites.
- After two decades of introducing computers to schools, education has been revolutionized ever since then.
- It reduces time spent on mechanical tasks such as rewriting, producing graphs and increases the scope of searching. It not only helps in finding information but also in organizing information making it easier to share with others.

### **Internet:**

Internet tools like Email, social networks, newsgroups and video transmission have connected the world like never before.

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- Students can now communicate using emails and social networking groups that provide knowledge based information.
- Distance learning, online learning is also enabled through the internet. Students can learn online and also talk to experts online.
- Notes, readings, tutorials, assignments can be received by students from anywhere. The Internet provides major information in texts, audios, videos and graphics which can be accessed by the individual.
- Online learning allows students to interact with each other and faculty to interact with students.

### **Classroom Learning:**

With the introduction of ICT in education, classroom learning is one attribute that makes learning experiential and experimental to students.

- Students can listen to the instructor or teacher, receive visual cues through PowerPoint images, handouts or whiteboard lists and participate actively.
- This helps in immediate interaction and students have opportunities to ask questions and participate in live discussions.
- This school communication software module further benefits in building and maintaining personal and professional relationships as classrooms offer greater personal contact with other students and teachers.

### **Video conferencing:**

This is yet another medium of communication wherein students can communicate with other students or instructors online.

It enables students to become active participants in their own learning. Video Conferencing is a powerful communication tool that has the potential to change the way we deliver information to students.

It is just one of the today's integrative technologies that empower students to prepare for a better future.

Here are few characteristics that make ICT in education a prominent school communication tool.

- It offers the wide variety of services.
- It is reliable and provides interactive learning experiences.
- It is flexible and provides comfortable learning.
- It motivates students to learn.
- It facilitates communication and promotes creativity.
- It also provides access to the digital library where information can be retrieved and stored beyond textbooks.

The use of ICT in education adds value to teaching and learning, by enhancing the effectiveness of learning. It added a dimension to learning that was not previously available. After the inception of ICT in schools, students found learning in a technology-enhanced environment more stimulating and engaging than in a traditional classroom environment.

MyClassboard is yet another school communication tool that bridges the gap between teachers, parents, and students by using its school messenger module.

Parents and teachers can interact with each other using this module emphasizing on transparency between the duo. Become a partner with us and build the communication between your teachers and parents with effectiveness and ease.

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### Check your progress 1

1. Define ICT in Education?

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2. List out the uses of ICT in Education?

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## 1.6 EVOLUTION OF INFORMATION TECHNOLOGY

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### The Evolution of Technology: Past, Present and Future

Technology runs our lives these days. Smartphones, tablets and computers. we really can't seem to function without them. In a very short amount of time, technology has exploded in the market and now, many people cannot imagine a life without it.

To understand how we left the dark ages to where we are today, it is important to understand how technology evolves and why it matters.

### Purpose Drives Technology Forward

All technologies are born out of purpose. For example, search engines were created to sort through the massive amounts of data online. With each new upgrade technology compounds existing technologies to create something better than what was previously used before. And on and on it goes.

With the lightning speed of technological evolution, it is no wonder many people have struggled to keep up. To be fair, the scope of technology's expanse is so great, wrapping everything up into a single blog post is practically impossible.

Here is just a brief glimpse into how rapidly the Internet and technology as a whole have evolved in recent years.

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### **1940s – 1950s: UNIVAC Computer**

On June 30, 1945, John Von Neumann published the First Draft of a Report on the EDVAC. It was the first documented discussion of the stored program concept and the blueprint for computer architecture. Further, in this period, it was a direct-access architecture with no operating system or remote access and used for scientific computing. There were no software applications.

### **1960s- 1970s: Mainframe Computer**

In this era, it was a centralized architecture with operating system built-in within the hardware. Computers were mostly mainframes and minicomputers. Remote access was available from client terminals. Applications and data were centralized. Applications were designed to function as silos.

The role of Chief Information Officer (CIO) was as operational manager of a specialist function. IT roles included performing printer backups, conducting system upgrades via lengthy procedures, manually running user batch tasks, keeping terminals stocked with paper and swapping out blown tubes.

IT staff was working in separate rooms than other employees with system interconnectivity minimal at the time. People's desire to bridge the gaps led to the motivation behind ARPANET.

### **1980s – 1990s: Personal Computer**

This decade saw the introduction of the Personal Computer (PC) and had Client/Server architecture with operating system separated from hardware. Application and data were distributed with processing shared between clients and distributed servers. Applications were shared throughout the organisation.

This generation of IT worked in cubicles onsite, often sharing space alongside the users they supported. Most employees were using PCs with Windows operating system.

The role of CIO was an organizational designer or a technology advisor. The typical IT roles at that time consisted of installing and maintaining file and print servers to automate data storage, retrieval and printing. Other business roles included installing and upgrading DOS on PCs. IT support was engaged with network maintenance, PC email support, networking, Windows and Microsoft Office installations and adding memory or graphics cards.

Toward the end of the 1990s, Internet connectivity became the most requested computing resource among growing businesses. Employers worried about productivity and often limited Web access.

Connecting people in a vast and distributed network of computers not only increased the amount of data generated but also led to numerous new ways of getting value out of it using new enterprise

applications. Data mining helped in the analysis of data from different prospects and summarizing data into useful information.

IT staff believed in building their own IT infrastructures from components sold by focused, specialized IT vendors such as Intel in semiconductors, Microsoft in operating systems, Oracle in databases, Cisco in networking, Dell in PCs and EMC in storage.

### **2000s – present: Mobile**

This era is web services architecture with the virtual operating system. While computer networks took IT from the accounting department to all corners of the enterprise, the World Wide Web took IT to all corners of the globe, connecting millions of people.

World Wide Web led to the proliferation of new applications which were no longer limited to enterprise-related activities but digitized almost any activity in people's lives

. It greatly facilitated the creation and sharing of information by anyone with access to the Internet. This also increased the amount of data created, stored, moved, and consumed.

Today applications, data and services are distributed. Processing is shared and utilized intelligently within grid-computing or P2P application. Applications are shared between clients, suppliers and external partners.

Mobile and cloud computing is responsible for running the infrastructure. Cloud computing enables on-demand and convenient network access to a shared pool of computing devices such as applications, networks, servers, storage and services that can be established quickly and released with minimal management effort or service provider interactions.

Big data and its analysis are becoming an organisation's competitive edge. Big data is a collection of data from traditional and digital sources inside and outside of an organization that represents a source for ongoing discovery and analysis.

The role of CIO is business visionary and master outsourcer. Today's IT job roles include support of Bring Your Own Device(BYOD), introduction of social media for sales and marketing (and the blocking of its access at work for personal use), constant security patches and DevOps automation.

### **The Past: World, Meet The Internet**

Looking back to the 1990's, the Internet was a new commodity many, but not all, households and businesses began to gain access. For people living during that time, the sound of the painfully slow dial up signal connecting to the Internet is a not-so-fond memory Thankfully, as more people found value in the Internet, technology took off to

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eliminate having to use a phone line to go online and instead delivered faster connections to the World Wide Web.

### **Websites And Blogging Are Born**

Websites advanced along with the internet. Suddenly, everyone had a Geocities or Tripod website dedicated to themselves. Just in infancy, websites were basic in both function and design. This is also the time when the blogging craze started to set in on the consumer level with the introduction of “weblogs” (later condensed to “blogs”).

### **The Present: Snaps, Chats And Double Taps**

Since the days of dial-up, access to the Internet is available almost everywhere. It is rare these days for consumers to go into a coffee shop, library or any place of business and not be able to access a Wi-Fi signal. If there isn't a Wi-Fi signal in close range, most people still have access to the Internet via their cellular data connection on their smart phones and personal hotspots, no problem.

### **There's An App for That**

With this anywhere/anytime access to the Internet, businesses created web applications to answer common needs of consumers. These applications can do everything from tracking food portions to sending massive amounts of information in a click of a button.

### **The Evolution And Revolution of Communication**

How we communicate continued to evolve as well. Remember face-to-face conversations? Hand-written letters? Waiting by the phone the kind with the cord? Technology perpetually reshapes our communication.

Perhaps the most noticeable difference in the Internet today is the ability to be personable in such an impersonal setting.

Constant connection seems to be the name of the game. And along with connection, we see instant availability. Bluetooth connections, talk-to-text, every form of messaging apps – while you're driving, in meetings, at home. Connection. Everywhere.

### **Myspace, Yourspace, Bookface: The Social Media Awakening**

We've watched texting evolve from sending text-only messages (literally texting) to the addition of imagery, thanks to the viral spread of gifs, memes, emojis and bitmojis. In fact, with the spike in video-sharing, actual text is shrinking (meet SnapChat, Instagram Stories, Facebook Stories, Periscope, Vine, etc. and shorthand abbreviations). SMH.

Social networks continue to change the way people engage with one another. Ironically, the constant connection and way people interact with one another seems to morph to a more superficial setting online.



Although superficial at times, this form of communication helps people stay closer to each other when they would have otherwise lost contact.

### **Face To Face (Virtually, Speaking)**

Face-to-face conversations via technology are resurfacing, though, and even strengthening, thanks to higher-quality video and streaming capabilities (enter: Skype, Google Hangouts, Zoom, FaceTime, live streaming, etc.).

With more people engaging in web/video conferencing online, geographic barriers that once hindered communication were torn down.

Instead, companies can engage with consumers in a more human manner, people can talk to people face-to-face without the need for costly travel and reaching out to people all over the world is faster and easier.

### **Cutting The Cord: The Era of Video Streaming**

Remember when Netflix was a primarily a DVD delivery company, bringing your favorite movie via mail? Back when binge-watching wasn't a thing?

Today, people are cutting the cord when it comes to cable, opting for digital streaming and video services like Netflix, YouTube and Hulu. Big brands are trying to keep up and compete, doing their best to one-up each other with original content, availability and delivery channels (e.g. Apple TV, Amazon Fire TV, Google TV, etc.).

User-generated content is a force to acknowledge as well. Thanks to streaming options like Facebook Live, Instagram Live and Periscope, individuals and business are able to broadcast their own videos and content.

In a nutshell, videos are popping up everywhere and trending big time. And they thought talking pictures would never last...

### **Today's Tech Forecast: Icloudy Days Ahead**

More people and companies are using cloud-based services for their business and store everything online instead of on a single device. This change will continue to have an enormous impact on the way business is done, transforming our once-traditional office environments and how people interact with companies on a regular basis.

Flash drives are almost extinct with the prevalence of cloud storage, like iCloud, Google Drive, Dropbox and FTP sites.

With so many new technologies permeating the way people access information and access each other, the forward momentum looks promising for future technological developments.

### **The Future: Emerging Trends on The Horizon**

As more existing technologies are stacked onto each other and developed into something greater, consumers and businesses alike can

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expect to see more opportunity with future technology. Technology will be faster, have the ability to accomplish more and everything will become more streamlined to make getting work done, easier.

While we don't have the ability to predict the future, we can offer speculations on technology's evolution. We are constantly seeing emerging media and new trends in technology to follow. Here are a few trends to watch for in the coming years.

### Smart Devices

And by "smart" we mean the continued evolution of smart devices and rise of artificial intelligence (AI) technology.

Smart devices will continue to evolve to work better together. These machines will share data automatically limiting the need for human involvement. Of course, it's not just smartphones, watches, TVs or tablets anymore.

### The Internet of Things

We'll hear more and more about the "Internet of Things" (IoT) now and in the future. The deeper we dive into technology, the more it seems we try to blend the physical and virtual worlds together. Smart speakers, smart homes and even smart cars are the tech wave to ride in the future, but it's just the beginning.

Think of the Internet of Things as a network of physical devices – like handheld gadgets, vehicles, home appliances or any kind of electronic item with embedded software or technology connected together and able to exchange data.

Gartner, an analyst firm, speculates there will be more than 26 billion connected devices by 2020. Imagine a future where your car warns you of heavy traffic or your alarm clock notifies you about your coffee brewing itself in the kitchen. Imagine living in a smart home in a smart city.

In other words, the future happening is now. Or at least, it'll be here sooner than you may think.

The birth of computers and information technology goes back many centuries. The development of mathematics led to the development of tools to help in computation. Blaise Pascal, in 17th century France, was credited with building the first calculating machine. In the 19th century, the Englishman Charles Babbage, generally considered the father of computing, designed the first "analytical engine." This machine had a mechanical computing "mill" and, like the Jacquard loom of the early 19th century, used punch cards to store the numbers and processing requirements. Ada Lovelace worked on the design with him and developed the idea of a sequence of instructions—a program. The machine was not complete at Babbage's death in 1871.

Almost a century later, the ideas re-emerged with the development of electro-mechanical calculating machines. In 1890, Herman Hollerith used punch cards to help classify information for the United States Census Bureau. At the same time, the invention of the telegraph and telephone laid the groundwork for telecommunications and the development of the vacuum tube. This electronic device could be used to store information represented as binary patterns—on or off, one or zero.

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### 1.7 INFORMATION AND COMMUNICATION TECHNOLOGY IN SCHOOL

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#### EDUCATION

The Eleventh five year plan is mooted as ‘National Educational Plan by the Prime Minister with allocation of over 19% of the gross budgetary support for the sector. Secondary education will be the new thrust area in education in the Eleventh Plan with the government now flushing out its mid-term review suggestion to universalize secondary education on lines of the SarvaShikshaAbhiyan.

The government is looking at investing at least Rs 50,000 crore in the sector that has been traditionally neglected. In the XIth plan, the government has budgeted Rs.411 billion to set up ICT labs for computer-aided learning and Edusat centers for distance learning programs.

The government has also proposed Rs.310 billion for the National Skill Development Programme in the plan period, for training through virtual centers. The future ICT investments in schools will focus primarily on procurement of ICT infrastructure for schools and colleges, teacher training/capacity building and online admissions and school administration.

In the education sector ICT can provide a practical and enabling solution for improving the quality of education. The advents of highly responsive networks of information and knowledge and rapid development of new software, hardware and other channels of communication have presented real opportunities to creatively solve deficiencies within the educational system.

The education and training segment has witnessed a rise in the number of private players offering education technology, training and services. The market is open to competition with emergence of national and regional e-learning companies offering myriad technology solutions and training services as a package to educational institutions across the country.

There is lack of expertise in the government and educational institutes to implement the ICT projects, today partnerships are the new mode of quality education delivery using ICT in India with private

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companies, NGOs, International organizations and institutes. Implementation of such large scale hardware provision and connectivity is possible through networking with relevant institutions and agencies for expertise, and up scaling strengths.

### **SarvaShikshaAbhiyaan**

The Centre introduced IT in schools as a tool to achieve the mission of Education for All under the SarvaShikshaAbhiyaan (SSA).

The state government education departments and educational institutes have adopted the tendering process for procurement of hardware, software and other IT peripherals such as EDUSAT for implementing ICT projects and programmes under the Build-Own-Operate (BOO) and Build-Own-Operate and Transfer (BOOT) models as a public-private partnership venture.

The process of ICT installation in schools began with the CLASS project under SSA for elementary education and currently most of the ICT infrastructure in schools is through SSA funds.

Tenders under SSA invite companies to bid for IT hardware and software installation for computer-aided learning alongwith consumerables such furniture and stationary, teacher training and an instructor.

The maintenance and upkeep is included to be undertaken by the selected bidder for 3-5 years. The programme usually involved setting of computer labs in schools and imparting basic computer operations to students. Some schools installed EDUSAT for educational programmes.

### **ICT@Schools:**

success of SSA computer-aided programmes in elementary education resulted in scaling-up of ICT in schools through ICT@Schoolsprogramme launched by Ministry of Human Resource Development (MHRD) as an umbrella scheme designed for overall development of schools as smart schools installed with ICT peripherals including hardware, software and trained teacher faculty. The states government and educational institutions broadly focus on the following criteria in a tender:

- ICT Infrastructure: Hardware, Software, connectivity, furniture etc.
- Digital Content based on the school curriculum
- Faculty Staff and Teacher Training
- Maintenance and recurring costs
- Power Back-up

### **Madhya Pradesh ICT@SchoolsProgramme:**

The state announced its tender this year for Computer Education in schools for ICT Hardware, software and manpower for maintenance

and training to be installed in its government schools based on build-own-operate and transfer (BOOT) model for five years. The Request For Qualification (RFQ) details out the ICT infrastructure and faculty requirements to be met by the bidder. Some of the important criteria include:

**Connectivity:**

Minimum Internet Connectivity of 256kbps

**Hardware:**

Madhya Pradesh tender included A LCD monitor 17"; key board; one overhead DLP projector (2000 Lumen), one multifunction device [MFD] with a laser printer mouse; computer table and chair. It does not specify any hardware specifications.

**Power Back up:**

It may be a combination of UPS and solar panels or UPS and DG set etc. The cost of operating such equipments factored in while submitting the bids.

**Capacity Building:**

To provide two faculties (three in case of 50% extra seats) to each of the schools who will be responsible for the maintenance and upkeep of the facility and also teach the students and train the teachers in understanding technology. The faculty must have any one of the following qualifications include BE Computer Science/IT, BCA or higher O level certification of DOEACC, PGDCA

**Software and Content:**

Content to teach basics of office software and programming to the students teach subjects through computers [Computer Aided Learning].

**Multi Media Content:**

Develop rich multimedia content for students in Hindi and English, which present complex subjects in an easy to understand format. The content will be evaluated by a team of experts of the concerned subjects and will be accepted only after it has been approved by the team. The bidder may be required to quote Computer Aided Learning software as a separate item.

**Out-Of School Students**

The bidder would be entitled to levy charges from the out of school users of the facility before and after the School hours. However, during the School Hours the students will be using the facility without paying any charge.

**Assessment Criteria**

The tenders on ICT for schools are divided into two sections, firstly a technical bid that details out the ICT hardware, software and faculty benchmarks, this is followed by a financial bid quotation of the

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overall costs for the installation and implementation of ICT in each school under BOO and/or BOOT model. To be eligible for pre-qualification and short listing, an applicant usually has to fulfill the following criteria common to most of the state bids:

- **Past experience in executing projects:** The tender eligibility requires the company to have executed at least 1 – 5 projects of similar nature in preceding 5-10 years. The experience requirement ensures effective implementation of the project in prescribed time-frames. **Manpower Infrastructure:** The bid in few cases outlines number of professionals such as in Himachal Pradesh wherein the applicant company was asked to have a minimum of 50 professional in ICT based education on its role to be eligible to qualify.

- **Association with a major Hardware and Software manufacturer:** Some states build piecemeal partnerships with leading IT companies for hardware or software. The bidder hence has to incorporate the existing IT components. The Applicant Company must have association with one of the major Computer Hardware and Software Manufacturer to be eligible to qualify.

- **Financial Capacity and Turnover:** It is usually stated that the applicant shall have a minimum average net worth 10 – 20 crores in the past 5-10 years to be eligible to bid for the project or the applicant company should have a minimum average turnover of Rs. 10 crores from execution of education based projects in the preceding three years to be eligible to bid in the tender. This eliminates local players to participate in the bid; they have local advantage of knowledge and relevant content but lack the financial capacity to reach the scale of operations. Hence it results in only the big and leading ICT in education companies to apply and compete in the bidding process.

### **Online Admissions, SCERT, Pune, Maharashtra**

The state has proposed to make all teacher training courses online, the first step in this effort is announcement of online admission process for D.Ed course from 2008 by Maharashtra State Council of Educational Research (MSCERT).

In its tender it required companies to developed a centralised admission process for D.Ed examination, SCERT hence emphasised local software firms with experience and expertise on software and data entry of admission forms. MSCERT decision for local software firms within Pune provided them a cost and service advantage.

### **Curriculum and Syllabus**

Department of School Education, Haryana is doing progressive work in integrating ICT in Haryana schools. The state has initiated a Comprehensive Computer Education Project to integrate and leverage ICT for achieving education goals.

The state hence invited tenders for curriculum design agency to design ICT course for students on industry inputs. It also laid down the certification requirements and develop a effective course delivery mechanism along with capacity building of teachers, principals and officials connected with implementation of the programme. The tender is very comprehensive in its outline as it also enlists monitoring and feedback regarding programme implementation.

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### 1.8 LET US SUM UP

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In this unit, we have dealt with the impact of ICT on educational system and curriculum. ICT is the field of expertise that connects information technology (computer) and telecommunication network (the internet) to provide sophisticated applications. Digital electronic devices and circuits, communication theory and networks are used to design and develop ICT tools. We have discussed about impact of ICT on teaching and learning. We have concluded with the ICT as a tool for individualized learning.

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### 1.9 UNIT-END EXERCISES

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Analyse the need of ICT in educational system

Justify the use of ICT in your classroom

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### 1.10 ANSWERS TO CHECK YOUR PROGRESS

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#### Check your progress 1

1. In this technological era, ICT in education has compelled many schools to get accustomed to smart technology. This school communication software uses computers, the internet, and multimedia as the medium of communication.

Computer-based learning: Computer-based learning is one of the modules of school communication tool that helps students to enhance their learning skills through computer aided education.

2. Information and communication technology in schools can be used as a school communication tool to improve student learning and better teaching techniques. With the advancement of technology in education, schools adopt school communication software to transmit, store, share or exchange information.

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# UNIT-II ICT AND SCHOOLEDUCATION - II

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*ICT and school  
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## **STRUCTURES**

- 2.1 Introduction
- 2.2 Objectives
- 2.3 Impact of ICT on educational System
- 2.4 Impact of ICT on Curriculum
- 2.5 Impact of ICT on Teaching and Learning
- 2.6 ICT as a tool for individualized learning
- 2.7 Let us Sum up
- 2.8 Unit - end Activities
- 2.9 Points for discussion
- 2.10 Answers to check your progress
- 2.11 Suggested Reading /References

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### **2.1 INTRODUCTION**

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The Information and Technology revolution demolished the barriers in communication and created a new world without boundaries on online platforms. Since it is a global procedure, every sphere of life got connected with it. The young generation is also enjoying great advantages of ICT as they get everything under one roof to study and enhance their knowledge. The only point of concern here is the misuse of such beneficial system. It is the duty of the parents and teachers to educate our children to responsibly use the privilege given to them.

If we look at the present education methods, most of the classrooms make use of ICT for advanced teaching practices. Since our children are growing amidst technology, it would be easy for the teachers to get connected with the children and share the information in the most appropriate way that they are familiar with.

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### **2.2 OBJECTIVES**

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At the end of the unit, you will be able to:

- Describe the Impact of ICT on educational system
- Understand the impact of ICT on curriculum
- Realize the important of ICT on teaching and learning
- Discuss the ICT as a tool for Individualized learning

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## **2.3 IMPACT OF ICT ON EDUCATIONAL SYSTEM**

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Information and Communications Technology (ICT) can impact student learning when teachers are digitally literate and understand how to integrate it into curriculum.

Schools use a diverse set of ICT tools to communicate, create, disseminate, store, and manage information. In some contexts, ICT has also become integral to the teaching-learning interaction, through such approaches as replacing chalkboards with interactive digital whiteboards, using students' own smartphones or other devices for learning during class time, and the "flipped classroom" model where students watch lectures at home on the computer and use classroom time for more interactive exercises.

When teachers are digitally literate and trained to use ICT, these approaches can lead to higher order thinking skills, provide creative and individualized options for students to express their understandings, and leave students better prepared to deal with ongoing technological change in society and the workplace.

ICT issues planners must consider include: considering the total cost-benefit equation, supplying and maintaining the requisite infrastructure, and ensuring investments are matched with teacher support and other policies aimed at effective ICT use.

### **Issues and Discussion**

Digital culture and digital literacy: Computer technologies and other aspects of digital culture have changed the ways people live, work, play, and learn, impacting the construction and distribution of knowledge and power around the world.

Graduates who are less familiar with digital culture are increasingly at a disadvantage in the national and global economy. Digital literacy the skills of searching for, discerning, and producing information, as well as the critical use of new media for full participation in society has thus become an important consideration for curriculum frameworks.

In many countries, digital literacy is being built through the incorporation of information and communication technology (ICT) into schools. Some common educational applications of ICT include:

### **One laptop per child:**

Less expensive laptops have been designed for use in school on a 1:1 basis with features like lower power consumption, a low cost operating system, and special re-programming and mesh network functions. Despite efforts to reduce costs, however, providing one laptop per child may be too costly for some developing countries.

### **Tablets:**

Tablets are small personal computers with a touch screen, allowing input without a keyboard or mouse. Inexpensive learning software (“apps”) can be downloaded onto tablets, making them a versatile tool for learning. The most effective apps develop higher order thinking skills and provide creative and individualized options for students to express their understandings.

### **Interactive White Boards or Smart Boards:**

Interactive white boards allow projected computer images to be displayed, manipulated, dragged, clicked, or copied. Simultaneously, handwritten notes can be taken on the board and saved for later use. Interactive white boards are associated with whole-class instruction rather than student-centred activities. Student engagement is generally higher when ICT is available for student use throughout the classroom.

### **E-readers:**

E-readers are electronic devices that can hold hundreds of books in digital form, and they are increasingly utilized in the delivery of reading material. Students both skilled readers and reluctant readers have had positive responses to the use of e-readers for independent reading. Features of e-readers that can contribute to positive use include their portability and long battery life, response to text, and the ability to define unknown words. Additionally, many classic book titles are available for free in e-book form.

### **Flipped Classrooms:**

The flipped classroom model, involving lecture and practice at home via computer-guided instruction and interactive learning activities in class, can allow for an expanded curriculum. There is little investigation on the student learning outcomes of flipped classrooms. Student perceptions about flipped classrooms are mixed, but generally positive, as they prefer the cooperative learning activities in class over lecture.

### **ICT and Teacher Professional Development:**

Teachers need specific professional development opportunities in order to increase their ability to use ICT for formative learning assessments, individualized instruction, accessing online resources, and for fostering student interaction and collaboration. Such training in ICT should positively impact teachers’ general attitudes towards ICT in the classroom, but it should also provide specific guidance on ICT teaching and learning within each discipline.

Without this support, teachers tend to use ICT for skill-based applications, limiting student academic thinking. To support teachers as they change their teaching, it is also essential for education managers,

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supervisors, teacher educators, and decision makers to be trained in ICT use.

### **Ensuring benefits of ICT investments:**

To ensure the investments made in ICT benefit students, additional conditions must be met. School policies need to provide schools with the minimum acceptable infrastructure for ICT, including stable and affordable internet connectivity and security measures such as filters and site blockers.

Teacher policies need to target basic ICT literacy skills, ICT use in pedagogical settings, and discipline-specific uses. Successful implementation of ICT requires integration of ICT in the curriculum. Finally, digital content needs to be developed in local languages and reflect local culture. Ongoing technical, human, and organizational supports on all of these issues are needed to ensure access and effective use of ICT.

### **Resource Constrained Contexts:**

The total cost of ICT ownership is considerable: training of teachers and administrators, connectivity, technical support, and software, amongst others.(42) When bringing ICT into classrooms, policies should use an incremental pathway, establishing infrastructure and bringing in sustainable and easily upgradable ICT.

Schools in some countries have begun allowing students to bring their own mobile technology (such as laptop, tablet, or smartphone) into class rather than providing such tools to all students an approach called Bring Your Own Device. However, not all families can afford devices or service plans for their children. Schools must ensure all students have equitable access to ICT devices for learning.

### **Inclusiveness Considerations**

#### **Digital Divide:**

The digital divide refers to disparities of digital media and internet access both within and across countries, as well as the gap between people with and without the digital literacy and skills to utilize media and internet.

The digital divide both creates and reinforces socio-economic inequalities of the world's poorest people. Policies need to intentionally bridge this divide to bring media, internet, and digital literacy to all students, not just those who are easiest to reach.

Minority language groups: Students whose mother tongue is different from the official language of instruction are less likely to have computers and internet connections at home than students from the majority. There is also less material available to them online in their own language, putting them at a disadvantage in comparison to their

majority peers who gather information, prepare talks and papers, and communicate more using ICT.

Yet ICT tools can also help improve the skills of minority language students especially in learning the official language of instruction through features such as automatic speech recognition, the availability of authentic audio-visual materials, and chat functions.

### **Students with different styles of learning:**

ICT can provide diverse options for taking in and processing information, making sense of ideas, and expressing learning. Over 87% of students learn best through visual and tactile modalities, and ICT can help these students ‘experience’ the information instead of just reading and hearing it.

Mobile devices can also offer programmes (“apps”) that provide extra support to students with special needs, with features such as simplified screens and instructions, consistent placement of menus and control features, graphics combined with text, audio feedback, ability to set pace and level of difficulty, appropriate and unambiguous feedback, and easy error correction.

## **ICT AND EDUCATION**

Globalization and technological change processes that have accelerated in tandem over the past years have created a new global economy “powered by technology, fueled by information and driven by knowledge.” ii The emergence of this new global economy has serious implications for the nature and purpose of educational institutions. As the half-life of information continues to shrink and access to information continues to grow exponentially, educational institutions cannot remain mere venues for the transmission of a prescribed set of information from teacher to student over a fixed period of time. Rather, they must promote “learning to learn,”

i.e., the acquisition of knowledge and skills that make possible continuous learning over the lifetime.iii “The illiterate of the 21st century,” according to futurist Alvin Toffler, “will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn.”

### **e-learning**

Although most commonly associated with higher education and corporate training, e-learning encompasses learning at all levels, both formal and non-formal, that uses an information network the Internet, an intranet (LAN) or extranet (WAN) whether wholly or in part, for course delivery, interaction and/or facilitation. Some prefer the term online learning. Web-based learning is a subset of elearning and refers to learning using an Internet browser.

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### **Blended Learning**

Blended learning refers to learning models that combine traditional classroom practice with e-learning solutions. Students in a traditional class can be assigned both print-based and online materials, have online mentoring sessions with their teacher through chat, and are subscribed to a class email list. Or a Web-based training course can be enhanced by periodic face-to-face instruction.

ICT and Education recognition that not all learning is best achieved in an electronically-mediated environment, particularly one that dispenses with a live instructor altogether. Instead, consideration must be given to the subject matter, the learning objectives and outcomes, the characteristics of the learners, and the learning context in order to arrive at the optimum mix of instructional and delivery methods.

### **Open and Distance Learning**

Open and distance learning is defined by the Commonwealth of Learning as “away of providing learning opportunities that is characterized by the separation of teacher and learner in time or place, or both time and place; learning that is certified in some way by an institution or agency; the use of a variety of media, including print and electronic; two-way communications that allow learners and tutors to interact; the possibility of occasional face-to-face meetings; and a specialized division of labour in the production and delivery of courses.

### **Learner-centered Environment**

The National Research Council of the U.S. defines learner-centered environments as those that “pay careful attention to the knowledge, skills, attitudes, and beliefs that learners bring with them to the classroom. The impetus for learner centredness derives from a theory of learning called constructivism, which views learning as a process in which individuals “construct” meaning based on prior knowledge and experience. Experience enables individuals to build mental models or schemas, which in turn provide meaning and organization to subsequent experience.

Thus knowledge is not “out there”, independent of the learner and which the learner passively receives; rather, knowledge is created through an active process in which the learner transforms information, constructs hypothesis, and makes decisions using his/her mental models. A form of constructivism called social constructivism also emphasizes the role of the teacher, parents, peers and other community members in helping learners to master concepts that they would not be able to understand on their own. For social constructivists, learning must be active, contextual and social. It is best done in a group setting with the teacher as facilitator or guide.

## Uses of ICT in Education

ICT is being utilized in every part of life. Due to the increasing importance of the computer, students-the future citizens cannot afford to keep themselves aloof from this potential medium. In education, use of ICT has become imperative to improve the efficiency and effectiveness at all levels and in both formal and non-formal settings.

It can be used for the following purposes.

- To broadcast material, online facility or CD-ROM as sources of information

- To use the online resource like, email, chat, discussion forum to support

collaborative writing and sharing of information

- To facilitate video-conferencing or other form of Tele conferencing to involve

wide range of students from distant geographic areas

- To blend learning by combining conventional classroom learning with Elearning systems

- To process administrative and assessment data

- To exchange and share ideas among teachers for the professional growth

- To carry out internet based research to enhance, educational process

- To facilitate communication for pupils with special needs

- To use electronic toys by children to develop spatial awareness and psychomotor control

## Advantages of the Use of ICT in Education

In education, communication process takes place among teachers, students, management and administrative personnel which requires plenty of data to be stored for retrieval as and when required and to be disseminated or transmitted in the desired format. ICT techniques are used for processing such data. In this context, advantages of ICT in education can be listed as follows.

Quick access to information: Information can be accessed in seconds by connecting to the internet and surfing through Web pages.

- Easy availability of updated data: Sitting at home or at any comfortable place the desired information can be accessed easily. This helps the students to learn the updated content.
- Teachers too can keep themselves abreast of the latest teaching learning strategies and related technologies.
- Connecting Geographically dispersed regions: With the advancement of ICT, education does not remain restricted

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within four walls of the educational institutions. Students from different parts of the world can learn together by using online, offline resources. This would result in the enriching learning experience. Such collaborative learning can result in developing divergent thinking ability, global perspective, and respect for varied nature of human life and acculturation.

- Catering to the Individual differences: ICT can contribute in catering to individual needs of the students as per their capabilities and interest. Crowded class rooms have always been a challenge for the teacher to consider the needs of every student in the class.
- Widening the range of communication media in education: With the advent of ICT, different means of communication are being introduced in the teaching learning process. Offline learning, online learning, and blended learning can be used in educational institutions.
- Collaborative learning or individualized learning strategies can enhance the quality of group as well as individual learning.
- Wider learning opportunities for students: Application of latest ICT resources in education has provided many options to the learners. Many Online courses are available for them to select any as per their aptitude and interest. Students can evaluate their own progress through different quizzes, ready to use online tests. This can ensure fulfillment of the employment required in the job market thus minimizing the problem of unemployment. It can also provide more efficient and effective citizens to the society as per the changing needs.

### **Potential of ICT for Creating a Powerful Learning Environment**

Just as people differ in many respects, so as ways in which they learn. It is essential, therefore to give attention to the characteristics, abilities, and experiences of the learners - both as a group and as individuals. ICT can contribute in creating powerful learning environment in numerous ways. ICT provides opportunities to access information from multiple resources and to view it from multiple perspectives, thus fostering the authenticity of learning environments. ICT may also make complex processes easier to understand through simulations.

Thus, ICT may function as a facilitator of active learning and higher-order thinking. The use of ICT may foster co-operative learning and reflection about the content. Furthermore, ICT may serve as a tool to curriculum differentiation, providing opportunities for adapting the learning content and tasks to the needs and capabilities of each individual pupil and by providing tailored feedback.



## **Promise of ICTs in Education**

For developing countries ICTs have the potential for increasing access to and improving the relevance and quality of education. It represents a potentially equalizing strategy for developing countries. [ICTs] greatly facilitate the acquisition and absorption of knowledge, offering developing countries unprecedented opportunities to enhance educational systems, improve policy formulation and execution, and widen the range of opportunities for business and the poor. One of the greatest hardships endured by the poor, and by many others, who live in the poorest countries, is their sense of isolation.

The new communications technologies promise to reduce that sense of isolation, and to open access to knowledge in ways unimaginable not long ago. However, the reality of the Digital Divide the gap between those who have access to and control of technology and those who do not means that the introduction and integration of ICTs at different levels and in various types of education will be a challenging task . Failure to meet the challenge would mean a further widening of the knowledge gap and the deepening of existing economic and social inequalities.

### **ICTs can expand access to education**

ICTs are a potentially powerful tool for extending educational opportunities, to previously underserved constituencies scattered and rural populations, groups traditionally excluded from education due to cultural or social reasons such as ethnic minorities, girls and women, persons with disabilities, and the elderly, as well as all others who for reasons of cost or because of time constraints are unable to enroll on campus. But the emergence and application of ICT has changed the scenario.

Anytime, anywhere - One defining feature of ICTs is their ability to transcend time and space. ICTs make possible asynchronous learning, or learning characterized by absence of time lag between the delivery of instruction and its reception by learners.

Online course materials, can be accessed 24 hours a day, 7 days a week. ICT-based educational delivery (e.g., educational programming broadcast over radio or television) also dispenses with the need for all learners and the instructor to be in one physical location. Additionally, certain types of ICTs, such as teleconferencing technologies, enable instruction to be received simultaneously by multiple, geographically dispersed learners (i.e., synchronous learning).

Access to remote learning resources - Teachers and learners no longer have to rely solely on printed books and other materials in physical media housed in for their educational needs. With the Internet and the World Wide Web, a wealth of learning materials in almost

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every subject and in a variety of media can now be accessed from anywhere at any time of the day and by an unlimited number of people.

This is particularly significant for many schools in developing countries, and even some in developed countries, that have limited and outdated library resources. ICTs also facilitate access to resource persons mentors, experts, researchers, professionals, business leaders, and peers all over the world.

### **ICT prepares individuals for the workplace**

One of the most commonly cited reasons for using ICTs in the classroom has been to better prepare the current generation of students for a workplace where ICTs, particularly computers, the Internet and related technologies, are becoming more and more ubiquitous. Technological literacy, or the ability to use ICTs effectively and efficiently, is thus seen as representing a competitive edge in an increasingly globalizing job market. But technological literacy is not the only skill that is required for the global economy.

EnGauge of the North Central Regional Educational Laboratory (U.S.) has identified what it calls “21st Century Skills,” which includes digital age literacy (consisting of functional literacy, visual literacy, scientific literacy, technological literacy, information literacy, cultural literacy, and global awareness, inventive thinking, higher-order thinking and sound reasoning, effective communication, and high productivity. xi The potential of ICTs to promote the acquisition of these skills is tied to its use as a tool for raising educational quality, including promoting the shift to a learner-centered environment.

### **Equity of access to ICTs in education:**

Given the wide disparities in access to ICTs between rich and poor countries and between different groups within countries, there are serious concerns that the use of ICTs in education will widen existing divisions drawn along economic, social, cultural, geographic, and gender lines. Ideally, one wishes for equal opportunity to participate.

But access for different actors both as users and producers is weighted by their resources. Hence, initial differences are often reproduced, reinforced, and even magnified, formidable challenge, therefore, continues to face planners of international education: how to define the problem and provide assistance for development.

### **The educational effectiveness:**

The educational effectiveness of ICTs depends on how they are used and for what purpose. And like any other educational tool or mode of educational delivery, ICTs do not work for everyone, everywhere in the same way. Enhancing access - It is difficult to quantify the degree to which ICTs have helped expand access to basic education since most of the interventions for this purpose have been small-scale and under-

reported. Raising quality - The impact of ICT enabled teaching and learning process on education remains an under-researched area. But few researches suggest that the interventions are as effective as traditional classroom instruction. There are strong evidences to show the ICT's effectiveness in raising the quality of education as demonstrated by increased scores on standardized tests as well as improved attendance.

It is also proven that the ICT interactive classes reduced the dropout rates in many schools in developing countries. The use of computers as tutors, for drill and practice, and for instructional delivery, combined with traditional instruction, results in increases in learning in the traditional curriculum and basic skills areas.

Students also learn more quickly, demonstrate greater retention, and are better motivated to learn when they work with computers. Research also suggests that the use of computers, the Internet, and related technologies, given adequate teacher training and support, can indeed facilitate the transformation of the learning environment into a learner-centered one.

### **Active learning:**

ICT-enhanced learning provides tools and mechanisms for examination, calculation and analysis of information, and provides a platform for student inquiry, analysis and construction of new information.

Learners learn as they do and work on real-life problems in-depth, making learning less abstract and more relevant to the learner's life situation. In this way, and in contrast to memorization based learning, ICT-enhanced learning promotes increased learner engagement. ICT enhanced learning is also "just-in-time" learning in which learners can choose what to learn when they need to learn it.

### **Collaborative learning:**

ICT-supported learning encourages interaction and cooperation among students, teachers, and experts regardless of where they are. Apart from modeling real-world interactions, ICT-supported learning provides learners the opportunity to work with people from different cultures, thereby helping to enhance learners' teaming and communicative skills as well as their global awareness. It models learning done throughout the learner's lifetime by expanding the learning space to include not just peers but also mentors and experts from different fields.

### **Creative Learning:**

ICT-supported learning promotes the manipulation of existing information and the creation of real-world products rather from received information.

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### **Integrative learning:**

ICT-enhanced learning promotes a thematic, integrative approach to teaching and learning. This approach eliminates the artificial separation between the different disciplines and between theory and practice that characterizes the traditional classroom approach.

### **Evaluative learning:**

ICT-enhanced learning is student-directed and diagnostic. Unlike static, text- or print-based educational technologies, ICT-enhanced learning recognizes that there are many different learning pathways and many different articulations of knowledge. ICTs allow learners to explore and discover rather than merely listen and remember.

### **ICTs can enhance the quality of education in several ways:**

ICT Improves the quality of education Improving the quality of education and training is a critical issue, particularly at a time of educational expansion. by increasing learner motivation and engagement, by facilitating the acquisition of basic skills, and by enhancing teacher training.

ICTs are also transformational tools which, when used appropriately, can promote the shift to a learner-centered environment. Motivating to learn - ICTs such as videos, television and multimedia computer software that combine text, sound, and colorful moving images can be used to provide challenging and authentic content that will engage the student in the learning process.

Interactive radio likewise makes use of sound effects, songs, dramatizations, comic skits, and other performance conventions to compel the students to listen and become involved in the lessons being delivered. More so than any other type of ICT, networked computers with Internet connectivity can increase learner motivation as it combines the media richness and interactivity of other ICTs with the opportunity to connect with people and to participate in world events.

### **Facilitating the acquisition of basic skills**

The transmission of basic skills and concepts that are the foundation of higher order thinking skills and creativity can be facilitated by ICTs through drill and practice. Educational television programs use repetition and reinforcement to teach the alphabet, numbers, colors, shapes and other basic concepts.

Most of the early uses of computers were for computer-based learning (also called computer-assisted instruction) that focused on mastery of skills and content through repetition and reinforcement. Enhancing teacher training - ICTs have also been used to improve access to and the quality of teacher training. It provides latest

information and ideas to teachers to make their teaching more interesting.

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## **2.4 IMPACT OF ICT ON CURRICULUM**

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### **Curriculum planning and ICT**

Curriculum planning that is considered the warp of education system originally, is in mutual relationship with other domains of education, and today, globalization in addition to ICT have influenced curriculum, thereby, this process is experiencing a new transformational trend.

The system of curriculum planning should provide appropriate curricula with meticulous attention to these new formative changes implicitly with prognostication of those change that are supposed occurred.

In curriculum compile, formation and design, information and scientific findings which are resulted from fundamental studies on curricula are used and the more these information and findings are authentic and reliable, the more the curriculum would be scientifically valid and exact With its emergence, ICT has influenced the community in general and training activities and factors in particular, as well as curriculum as a process for compile and format the components and the elements of learning.

So this effect can be seen in each element of curriculum and if this effect is not being designed in a desirable scientific manner, it can unbalance the curriculum at hand.

Decision makers are those who can make special decisions regarding curriculum elements through their expertise. One of the patterns that can be appropriate in ICT-based curriculum, is a systemic conceptual pattern that has five main elements:

- Input,
- process,
- output,
- Environment
- Evaluation
- feed back.

In this pattern, input is introduced in three main parts as follows:

1. data origin that consists of all the environments such as education system as a whole, organizations, ministry of education and the environments from which necessary data are gathered.
2. Data resources that consist of (ICT centre, Institutions and organizations.)

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3. Human, financial, material and educational resources.
4. Fundamental and research data.
3. Structure and Establishments

ICT centre that consists of three parts including general substructure, hardware and software parts and networks that by means of this component, hardware and software in proportion to curriculum and its position can be provided.

And in professional substructure, the systems supporting management and its performance are discussed and expected, and in database section, the data are recorded from different resources or centres in two ways that are educative and non-educative and are used for curriculum planning.

Institutions and organization of this type that are included in this source included all data regarding institution and organizations subordinated to education such as brilliant and intelligent talents, intellectual training centres and exceptional organization of education.

### **Human, financial, material and educational resources:**

This source or this section has a great emphasis on those resources concerning human educative and non-educative resource, costs, expenditure and incomes and information regarding education and schooling.

This resource is recorded in different levels in two internal and external sections of the organization. The Internal section includes fundamental philosophy of education and some information about the researches, projects related to educational departments and research council.

In the external section the information about education in research and statistic centre is considered. Agents and decision makers: Individuals and different groups make use of inputs entered into educational system. And these people: in school level one teachers, managers, parents and counselors.

### **In education departments level are:**

Regional deputies.

### **In education organization level are:**

Principals (Head), deputy, and head masters of research council.

### **In ministry levels are:**

Minister, deputies, university experts.

And the ICT group including ICT experts, curricula planning experts, computer programmer, education technology specialists multimedia designers and etc, that are present in all phases of

specialized counselling, and detect and prepare the necessary progress and information and technology for using in curricula planning according to the necessary decisions for each level, and enter it into curricula planning system.

Centralization prevents the growth of planning ability and management of learning process, which are among the basic skills in the application of technology in education. Each conceptual model for decision making about curriculum planning in different levels of support system of administrators and during the implementation of decision support systems of function that are two main data processing, database and communications technology are active.

External data in this model includes activities and changes and developments that occurred in the processing stage on internal data and curriculum development system in three levels of curricula, comprehensive educational system, regional planning and fine curriculum system is introduced.

Today, information and communication technology (ICT) is of first rate in education systems, but the origin of these saying is based upon scientific finding particularly training sciences, developmental psychology, knowledge and education capability.

Under the aegis of IT, the inequities and hand can be reduced and educational systems can be promote knowledge and skill of the learners thereby encouraging and improving creativity, critical thinking and learning how to learn.

ICT has an important prominent role in knowledge due to its changeable ability and its capability to making relationship among students.

Change-oriented approach believes in change of ICT, has changed the tools and even the policies and educational goals basically and fundamentally. If an appropriate effort is accomplished in order to proper application of IT and making it a base in development programmed can be achieved, this can be considered one of the greatest resource of skillful and proficient human power in IT and can play on important scientific and economic role in the country and in world competitions as well as it provides the real opportunity for fundamental progress and development of the country.

If the curricula(or syllabus) is according to real need or real require of the learner, it increases their interest for incremental learning and IT, because of its verity and being benefited from a great deal of information has a property or characteristic to meet different needs of the learner and caused them interested in contents of the curricula.

This unit intends to investigate the effect or impact of this phenomenon curricula by stating the role of ICT in educational domain and to provide an integrating and blending programmed for teacher and

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student and to prepare a field in which the potential of individual capabilities of students and their own and personal experiences could be increased.

**Curriculum Development**

In any educational system, the level of available resources places a restriction on the degree to which any new subject can be introduced into the school curriculum, especially where only the most basic facilities have so far been provided (UNESCO/IFIP, 2000).

ICT is of such importance to the future industrial and commercial health of a country that invest in the equipment, teacher training and support services necessary for the effective delivery of an ICT-curriculum which is expected to rank high in any set of government priorities. The curriculum proposed by any country in African need to take account of these resource issues and specifies minimum requirement for effective delivery in different circumstances.

Redefining education has become a powerful descriptor that helps administrators and educators at every level (i.e., nursery school through university) to understand the changes required for ESD (Ehlers, 2007).

An appropriately reoriented basic education includes more principles, skills, perspectives, and values related to sustainability than are currently included in most education systems. Hence, it is not only a question of quantity of education, but also one of appropriateness and relevance. ESD encompasses a vision that integrates environment, economy, and society.

Reorienting education also requires teaching and learning, knowledge, skills, perspectives, and values that will guide and motivate people to pursue sustainable livelihoods, to participate in a democratic society, and to live in a sustainable manner. In reorienting education to address sustainability, program developers need to balance looking forward to a more sustainable society with looking back to traditional ecological knowledge.

Indigenous traditions often carry with them the values and practices that embody sustainable resource use. While returning to indigenous lifestyles is not an option for the millions of urban dwellers, the values and major tenets of indigenous traditions can be adapted to life in the 21<sup>st</sup> century.

Redefining curriculum supposes that the curriculum should be designed for both teachers and students to improve their knowledge and skill in ICT. The design according to (UNESCO/IFIP, 2000) supplies four curriculum areas tied with the four stages of teaching and learning:



### **ICT Literacy:**

This covers the use of ICT in daily life in a competent and intelligent way. Topics include: basic concepts of ICT, using computers and managing files, word processing, spreadsheets, databases, creating presentations, finding information and communicating with ICT, social and ethical issues, and jobs using ICT.

### **Application of ICT in Subject Areas:**

This covers the application of ICT-tools work within specific subject areas including languages, natural sciences, mathematics, social sciences, and art. The topics include: measurement, modelling and simulation, robots and feedback devices, statistics, creating graphics, spreadsheet design, and database design.

### **Integration of ICT across the Curriculum:**

This is described to demonstrate the use of ICT to combine subject areas to work on real-world projects and solve real problems. There are some examples to show how within one course ICT can help students to integrate several areas, such as math, science and art.

There are also examples to show larger projects that include several courses and several schools integrating ICT in community or global projects.

### **ICT Specialisation:**

Here the designed is for students who plan to go into professions that use ICT such as engineering, business, and computer science, or who plan to advance to higher education. These modules cover the use of advanced tools and techniques for ICT specialist.

Topics include:

Basic and advancing programming, planning information systems, designing

process control systems, and project management.

### **Education for Sustainable development**

Education is seen as key in the process of achieving sustainable development. However, in order for formal education to contribute to sustainability, traditional systems and methodologies need to be re-oriented and re-engineered (Tilbury et al., 2002; Huckle& Sterling, 1996; UNESCO, 2003).

Research (Aston, 2002; Roschelle et al., 2007; Paas& Creech, 2008) have shown that even in developed countries, where technological levels are high, the education system has not succeeded in influencing choices and behaviours that would support sustainable development.

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In 2005, UNESCO launched the “Decade for Education for Sustainable Development,” which aims to accelerate the implementation of a new vision in education. The Decade is a call for a collaborative process to re-orient educational policies, programs and practices so that education can better play its part in building the capacities of all members of society to work together to build a sustainable future (UNESCO, 2003).

UNESCO (2003:5) points out that “this vision of education emphasizes a holistic, interdisciplinary approach to developing the knowledge and skills needed for a sustainable future as well as changes in values, behaviour, and lifestyles.”

A research conducted by Paas (2004) finds that many changes called for in ESD could be supported through greater integration of ICTs in the learning environment. The next section briefly traces the history of technological advances and technology policy as drivers for using ICTs in education.s

- By increasing access to educational materials about sustainability (e.g., via distance learning, educational networks and databases); and
- By helping to promote new ways of interacting in order to facilitate the learning called for in ESD that emphasizes not just knowledge, but choices, values and actions.
- Explaining these two ways, Paas& Creech put forward that at their most basic level, ICTs enable the presentation of course content using multimedia (images, text and sound) and facilitate archiving of that content.
- But they also provide new means of interactivity and simulation, thereby offering opportunities to improve learning and making new ways of understanding possible.
- The use of new technologies, thus, can offer exciting new possibilities to promote the changes in education methodologies called for in ESD.

Furthermore, (Paas& Creech, 2008) indicates that current uses of ICTs in ESD fall into three broad categories:

1. Information resources, tools and portals for educators;
2. Supplements to classroom-based activities; and
3. Tools for distance/online learning.

Information resource tools and portals for educators Web provides extensive links to information on ICTs in education; platforms for educators to exchange knowledge, read and publish articles and lesson plans; and connections to support materials for ESD.

However, when looking specifically for research on the use of ICTs in Education for Sustainable Development, including educational

policies, pedagogical approaches and classroom uses of ICTs for ESD, there is not much available to date. This may be because ESD has grown from the tradition of environmental/outdoor education, which aimed at getting learners outside to experience and learn about the natural world.

Early proponents of the use of ICTs in education were from the civics fields promoting media awareness activities (researching TV shows, Internet resources, etc.) and cultural understanding activities that use collaborative Internet technologies.

Other examples are:

The field of geography where experts are increasingly using ICT tools as central to the curriculum, including Mapping and Graphics software, Geographic Information Systems (GIS) and Global Positioning Systems (GPS), World Summit on the Information Society's ICT for Development (ICT4D), UNESCO's Portal on Communication and Information Resources, etc.

ICTs as a supplement to classroom-based activities ICTs applications are being designed to promote collaboration, connectivity, "real-world," experience based learning, and systems thinking, which are emerging as key pedagogical methods conducive to education for sustainability. Examples provided are from primary as well as in universities.

These includes: collaboration and connectivity, real time real world learning, system thinking, etc.

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## **2.5 IMPACT OF ICT ON TEACHING AND LEARNING**

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All the aspects of our life have been impacted, including education. In an age determined to generate new paths to quality education, ICT brings forward countless of benefits, enabling children with the right skill and outlook to stay ahead in the increasingly aggressive rat race.

- ICT, or information and communication technology, makes many ordinary tasks uncomplicated and facilitates communications from virtually any part of the globe.
- Today, the emergence of such modern education technologies has altered how students approach learning and education. The failing conventional methods prompted the birth of new-age education models that provide and support innovative pedagogy.
- Information and Communications Technology (ICT) in education has been linked with the upward shift in the quality of people's lives by improving teaching and learning. This is why a number of schools are increasingly integrating ICT in their primary school education system. Through this unique teaching

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method, student gain an genuine learning experience, collaboratively constructing their own knowledge and applying their learning's in a real-world context.

- The use of ICT techniques in learning/teaching has a very positive influence on a student's learning capabilities as well. It is established that students reflect in a very positive manner towards work and education when they are using computers to complete tasks given to them, encouraging and motivating them to soak in the knowledge.
- Students who used technology to learn in school have an increased self-esteem and self-confidence.

Here are ways how children/students can benefit from this methodology in the times to come:

- The barrier this technology breaks are both linguistic and geographic as the information can be shared quickly and efficiently over the cloud thus, providing them access to quality education anytime and anywhere.
- The ICT methods are very effective in clearing the core concepts of the subject matter; this has been proven in enhancing the students level of understanding and retaining the knowledge.
- This method makes content more enjoyable thorough engaging narratives and high quality animation, making the whole session more interactive. This improves the retention capacity of the students, brings in more focus and makes the whole process enjoyable.
- The content can be tweaked to add value to the learning curve of the student depending on the shortcoming of a student.
- Active and independent learning are forte of this method which inculcates self-responsibility and maturity for learning
- The spatial reasoning capacity of a student gets sharpened over a period of time and the ability to solve complex geometric questions without relying on formulas get a formidable boost.
- The childs progress can be mapped in the form of a electronic journal which will help teachers and students to identify the strong and weak points.
- ICT based learning not just assumes an imperative part in a student's scholastic development yet perceives the youngster's subjective, social and enthusiastic advancement essentially.
- Through refined and present day systems, such as, video conferencing, virtual reality and 3D animation, it empowers students and teachers to work together in ways that mirror a comprehensively constructive way to deal with training. Also, it augments the student's quick.
- It is important to acknowledge that students are already interested and engaged in using technology, this creates many

amazing opportunities for schools and teachers to benefit from integrating some forms of technology in the classroom and to make teaching and learning more effective.

### **Improves engagement**

When technology is integrated into lessons, students are expected to be more interested in the subjects they are studying. Technology provides different opportunities to make learning more fun and enjoyable in terms of teaching same things in new ways.

For instance, delivering teaching through gamification, taking students on virtual field trips and using other online learning resources. What is more, technology can encourage a more active participation in the learning process which can be hard to achieve through a traditional lecture environment.

### **Improves knowledge retention**

Students who are engaged and interested in things they are studying, are expected to have a better knowledge retention.

As mentioned before, technology can help to encourage active participation in the classroom which also is a very important factor for increased knowledge retention.

Different forms of technology can be used to experiment with and decide what works best for students in terms of retaining their knowledge.

### **Encourages individual learning**

No one learns in the same way because of different learning styles and different abilities. Technology provides great opportunities for making learning more effective for everyone with different needs.

For example, students can learn at their own speed, review difficult concepts or skip ahead if they need to. What is more, technology can provide more opportunities for struggling or disabled students.

Access to the Internet gives students access to a broad range of resources to conduct research in different ways, which in turn can increase the engagement.

### **Encourages collaboration**

Students can practice collaboration skills by getting involved in different online activities. For instance, working on different projects by collaborating with others on forums or by sharing documents on their virtual learning environments.

Technology can encourage collaboration with students in the same classroom, same school and even with other classrooms around the world.

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### **Students can learn useful life skills through technology**

By using technology in the classroom, both teachers and students can develop skills essential for the 21st century. Students can gain the skills they will need to be successful in the future.

Modern learning is about collaborating with others, solving complex problems, critical thinking, developing different forms of communication and leadership skills, and improving motivation and productivity.

What is more, technology can help develop many practical skills, including creating presentations, learning to differentiate reliable from unreliable sources on the Internet, maintaining proper online etiquette, and writing emails. These are very important skills that can be developed in the classroom.

### **Benefits for teachers**

With countless online resources, technology can help improve teaching. Teachers can use different apps or trusted online resources to enhance the traditional ways of teaching and to keep students more engaged.

Virtual lesson plans, grading software and online assessments can help teachers save a lot of time. This valuable time can be used for working with students who are struggling. What is more, having virtual learning environments in schools enhances collaboration and knowledge sharing between teachers.

### **Usage of Internet**

Many of the Internet projects require students to communicate with students from different states or countries via electronic mail or mailing lists or other news groups. Furthermore, The Internet should be a part of an integrated teaching system.

It should be seen as a tool that supports and enhances learning and not as a means by itself. A poll result conducted by Global Strategy in April 1997 shows that this is the only way that the Internet adds value to the learning process.

Teaching using the Internet does not by itself lead to achieving curriculum objectives, because part from assisting in class preparation, a good knowledge of the Internet allows us to assist our students in their class activities involving the Internet.

Besides, Professional Development is a key to updating skills and for career advancement for teachers. Among others, we can use the Internet to join a discussion group, subscribe to a news group, take classes, and keep in touch with professional colleagues.

To successfully use the Internet for teaching, we must know how to access the various services available through the Internet.

Moreover, it has been reported that the majority of teachers who use the Internet in teaching are those who believe that the Internet is a new way for doing things. These teachers also use the Internet for shopping, banking, looking for mortgage rates, etc.

It is not the computer by itself but how they are used that makes the difference. They emphasize teacher training as a key to effective use of computer technology in the classroom. Every new technology brings with it positive and negative impact. Nobody has taken time to analyze the negative impact of exposing students to the Internet may have on their social development.

### **How the Internet Enhances the Teaching Process**

We can use the Internet to add value, manage our classroom or improve the planning. We want to teach using the Internet because we want to change, improve, add a new dimension to our teaching, or vary the types and increase the quality of activities assigned to students. In learning, the students need some motivation.

Allow them to use the Internet in their learning is a motivational push to who are bored by the traditional ways of information delivery, and thereby expedite the transfer of information from the short-term memory to the long-term memory. The Internet allows us to motivate some of the lost students in the class, and thereby accelerate the assimilation process.

According to an African proverb, a person who asks questions understands a new language faster. Using the Internet for educational activities provides a different avenue for discovery through questioning, and for critical evaluation of information.

It is also important that we answer students' questions properly and timely. This is why we must constantly retrain according to the needs of the time. For this information age, we must be vexed with the personal and educational uses of the Internet.

Generally, Communication is a way of using knowledge. It is a source for re-enforcement. The Internet promotes fast communication across geographical barriers, and therefore gives students an opportunity to communicate early in life with a broad range of people not imagined possible before. Also using knowledge in different settings give a better understanding of the different shades of meaning of the concepts involved in a giving learning situation.

Besides to manage the class room, you can post class lessons, homework problems, and practice exams on the Net for students to access from home, from the library, or from any place that has access to the Net. Parents can access the Web pages to confirm the homework problems their children are required to do.

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Moreover, the homework could be structured in such a way that the student can progress from simpler to more challenging activities by means of hyperlinks. In addition to posting class lessons and homework, we can have a class bulletin board on web site.

In this way, students can get involved in class discussions in a manner not possible in the classroom. This medium can also be used to resolve problems between class periods.

In conclusion, the Internet allows you to add content to your lessons and to disseminate useful information to students and parents without waste of valuable class time and those give many advantages for students in learning.

### **Advantages of Students Using ICT for Learning**

As was pointed out previously, the Internet provides students with the tools they need to discover and own knowledge. And give students the hooks and templates they need to fasten information to the long-term memory. There are some advantages of student using ICT for learning :

#### **Motivating Factor.**

The Internet can act as a motivating tool for many students. Young people are very captivated with technology. Educators must capitalize on this interest, excitement, and enthusiasm about the Internet for the purpose of enhancing learning.

For already enthusiastic learners, the Internet allows you to provide them with additional learning activities not readily available in the classroom.

#### **Fast Communication**

The Internet promotes fast communication across geographical barriers. Your students can join collaborative projects that involve students from different states, countries or continents. This type of learning experience was not possible before the Internet.

This is a unique learning experience very essential for each of our students, as the world is becoming one big community.

#### **Cooperative Learning**

The Internet facilitates cooperative learning, encourages dialogue, and creates a more engaging classroom. For example, a LISTSER V for our class will allow your students to get involved in class discussions through e-mails in a way not possible within the four walls of the classroom.

#### **Locating Research Materials**

Apart from communication, research is what takes many people to the Internet. There are many more resources on the Internet than the



school library can provide. We can encourage students to take advantage of this wealth of resources on the Internet for their research.

### **Acquiring Varied Writing Skills**

If students are required to publish their work on the Internet, they have to develop hypertext skills. These skills help students gain experience in non-sequential writings. Moreover, and since the Internet is open to all with access, students publishing their work on the Internet are forced to be mindful of their language and to write to non-expert audience.

### **Disadvantages of Using ICT for Education**

The use of the Internet for education is not without problems. Therefore, one should expect the problems to be encountered in using the Internet in teaching to be evolving as well. There are some disadvantage of using ICT for teaching and learning :

#### **Plagiarism**

Apart from Web sites that claim to help students write term papers, there are numerous cases of students downloading information from the Net and turning them in for grades. We can minimize this problem by requiring students to cite research sources.

There is an online service, Plagiarism.org at <http://www.plagiarism.org/>, which can assist us in minimizing cases of plagiarism in the class. This service claims to prevent plagiarism by determining if a term paper has been copied from the Internet or not.

#### **Student Privacy**

Criminals, marketers, and other persons can easily get information from students when they are online. These could pose danger to students' lives or may even lead to litigation against the school. To avoid this problem, students should be educated on the dangers of giving information to people online. Parents and teachers need to supervise students' online activities.

#### **Low Income Groups**

According to the US Department of Education, over 50% of public schools with a high minority enrollment had a lower rate of Internet access than public schools with a low minority enrollment in 1997.

The same was true of instructional rooms in those schools. In addition, students from low-income families may not have computers at home or may have computers at home with no access to the Internet.

Consequently, students in low-income communities may be disadvantaged. To reduce the effect that social or economic status may have, we should give Internet assignments that students can easily complete while in school. If necessary, schools may need to keep

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computer labs open for longer and/or odd hours. The use of computers at public libraries should also be encouraged.

**Preparation Time**

It takes a lot of preparation time to effectively use the Net for education. In addition to designing Internet based lesson plans, we may have to surf the Internet to download lesson plans and adapt them to support the curriculum objectives or visit sites to select those appropriate for classes. We have no choice but prepare in order to help your students become responsible user of the Internet.

**New Administrative Responsibilities**

Teaching using the Internet brings to bear a new set of administrative demands on the teacher and the school administration. These include development and implementation of acceptable use policy, training, developing new evaluation criteria as needed, and addressing parents' concerns.

In sum, not all lessons can be incorporated into the Internet. Through the net, the student can communicate or collaborate with other students or experts in the field across geographically boundaries. Moreover, they can join a news group on a particular topic of interest. What is most interesting about the Net, as far as communication is concerned, is that it is race, age, national origin, and gender blind.

**Check your progress 1**

1. Discuss impact of ICT on teaching and learning?  
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2. What are the advantages of students using ict for learning?  
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**2.6 ICT AS A TOOL FOR INDIVIDUALIZED LEARNING**

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Technology-assisted individualized learning solutions in the classroom

In today's environment of growing class sizes—with an average of 25 students in elementary classrooms and 150 students a day in high school classes—it's difficult for teachers to provide one-to-one instruction. In addition, teachers are required to ensure that every student is being taught at his or her appropriate instructional level, and that all of the instruction meets grade level state standards.

One of the main challenges in education today is providing every student with individualized instruction, including remediation on grade-level work or enrichment, which is necessary.

How technology helps individualize learning

Both students and teachers are finding that online technology helps individualize the learning process and makes better use of learning time. Although the teacher can by no means be replaced in the classroom, hardware devices and adaptive learning technologies are a great ‘assistant’ to improve students’ educational experiences.

Sometimes, the method of learning needs to be ‘flipped’, with teachers using class time for review and practice while learning is done independently.

Adaptive learning technology and how it individualizes learning

Providing truly differentiated and individualized instruction has been a goal of educators for decades, but new technologies available today are empowering schools to implement this form of education in a way never before possible.

Adaptive learning, and intelligent adaptive learning technology in particular which tailors learning to the individual student provides many benefits for students and educators: Seamlessly integrates instruction with assessment. Adapts within and between lessons in real-time.

Deeply personalized, engaging individualized learning experience for every type of student the right next lesson at the right level of difficulty at the right time. Supports and empowers teachers with current student progress data to set and meet goals and state standards. Complements all learning models.

Read about adaptive learning and intelligent adaptive learning. Current reporting helps individualize learning in alignment with standards.

Schools across the U.S. and Canada faced with growing class size and fewer resources have come to rely on an individualized learning model supported by technology. For example, elementary math students are proven to move further and faster with adaptive online instruction, in alignment with new state and Canadian standards.

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## **2.7 LET US SUM UP**

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In this unit we have started with impact of ICT on educational system and curriculum. We have realized importance of ICT in teaching learning. In teaching using the ICT, we have to convince that using the Net adds something new, some real value to our teaching. But also, students should be trained to use the available technology efficiently. We should collaborate with other teachers in the school and in the system, because cooperation and mutual understanding is very important especially when the school has few Internet accounts. finally ,the discussion for ICT as a tool for Individual learning.

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## **2.8 UNIT - END ACTIVITIES**

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Bring out a impact on ICT on educational system.

Write about impact of ICT on curriculum.

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## **2.9 POINTS FOR DISCUSSION**

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Discuss about the ICT as a tool for individual learning.

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## **2.10 ANSWERS TO CHECK YOUR PROGRESS**

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1. We can use the Internet to add value, manage our classroom or improve the planning. We want to teach using the Internet because we want to change, improve, add a new dimension to our teaching, or vary the types and increase the quality of activities assigned to students. In learning, the students need some motivation.

Allow them to use the Internet in their learning is a motivational push to who are bored by the traditional ways of information delivery, and thereby expedite the transfer of information from the short-term memory to the long-term memory. The Internet allows us to motivate some of the lost students in the class, and thereby accelerate the assimilation process.

### **2. Motivating Factor.**

The Internet can act as a motivating tool for many students. Young people are very captivated with technology. Educators must capitalize on this interest, excitement, and enthusiasm about the Internet for the purpose of enhancing learning.

For already enthusiastic learners, the Internet allows you to provide them with additional learning activities not readily available in the classroom.

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## Locating Research Materials

Apart from communication, research is what takes many people to the Internet. There are many more resources on the Internet than the school library can provide. We can encourage students to take advantage of this wealth of resources on the Internet for their research.

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# UNIT-III COMMUNICATION AND NETWORK

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## STRUCTURES

- 3.1 Introduction
- 3.2 Objectives
- 3.3 Communication
  - 3.3.1 Meaning
  - 3.3.2 Definition
- 3.4 Elements of communication
- 3.5 Barriers of communication
- 3.6 Effective communication
- 3.7 Types of communication
- 3.8 Media of communication
- 3.9 Computer network concept
  - 3.9.1 Definition
  - 3.9.2 Types
- 3.10 History of Internet
- 3.11 Use of search engine
- 3.12 Social Network
  - 3.12.1 Concept
  - 3.12.2 Definition
- 3.13 Educational use of social network
  - 3.13.1 Face book
  - 3.13.2 Blog
  - 3.13.3 Whatsapp
- 3.14 Let us Sum up
- 3.15 Unit - end Activities
- 3.16 Points for discussion
- 3.17 Answers to check your progress
- 3.18 Suggested Reading /References

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## 3.1 INTRODUCTION

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Communications refers to the use of signals to transfer voice, data, image, and/or video information between locations, the main applications of which are in communications science, engineering, and technology. From the bonfires and smoke signals to early modern optical telegraphs, humankind has attempted to move communication beyond the realm of earshot. Among the first practical uses of electrical engineering, early communication devices included the telegraph, first conceived in the 1700s and realized in 1837 by Charles Wheatstone and William Cooke and by Samuel Morse. Through the next century, advancements in the telephone, radio, television and today's Internet, completely changed the way people communicate and interact with one another.

In the early days of computing, computers were seen as devices for making calculations, storing data, and automating business

processes. However, as the devices evolved, it became apparent that many of the functions of telecommunications could be integrated into the computer. During the 1980s, many organizations began combining their once-separate telecommunications and information-systems departments into an information technology, or IT, department. This ability for computers to communicate with one another and, maybe more importantly, to facilitate communication between individuals and groups, has been an important factor in the growth of computing over the past several decades.

Computer networking really began in the 1960s with the birth of the Internet, as we'll see below. However, while the Internet and web were evolving, corporate networking was also taking shape in the form of local area networks and client-server computing. In the 1990s, when the Internet came of age, Internet technologies began to pervade all areas of the organization. Now, with the Internet a global phenomenon, it would be unthinkable to have a computer that did not include communications capabilities. This chapter will review the different technologies that have been put in place to enable this communications revolution.

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## **3.2 OBJECTIVES**

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At the end of the unit, you will be able to:

- Explain the concept, elements and Barriers of communication.
- Describe the effective communication
- Realize computer network and its types.
- Analyse the history of internet.
- Define the use of search engine
- Discuss the concept of social network and its educational usage

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## **3.3 COMMUNICATION**

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The word communication is derived from a Latin word meaning “to share.” Communication can be defined as “purposefully and actively exchanging information between two or more people to convey or receive the intended meanings through a shared system of signs and (symbols)” (“Communication,” 2015, para. 1).

### **3.3.1 MEANING**

Communication is the act of sending information or ideas via speech, visuals, writing or any other such method. The Communication model has a sender who is sending the message and the receiver who is receiving the message. In between, the speech or ideas need to be simple enough to be decoded and understood by the receiver. If the ideas are not presented properly, then decoding is improper and the receiver does not understand.

Communication is simply the act of transferring information from one place, person or group to another. Every communication

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involves one sender, a message and a recipient. This may sound simple, but communication is actually a very complex subject. The transmission of the message from sender to recipient can be affected by a huge range of things. These include our emotions, the cultural situation, the medium used to communicate, and even our location. The complexity is why good communication skills are considered so desirable by employers around the world: accurate, effective and unambiguous communication is actually extremely hard.

**3.3.2 DEFINITION**

Two-way process of reaching mutual understanding, in which participants not only exchange (encode-decode) information, news, ideas and feelings but also create and share meaning. In general, communication is a means of connecting people or places. In business, it is a key function of management--an organization cannot operate without communication between levels, departments and employees. See also communications.

communication, The imparting or exchanging of information by speaking, writing, or using some other medium. The successful conveying or sharing of ideas and feelings.

**Oxford English Dictionary**

As this definition makes clear, communication is more than simply the transmission of information. The term requires an element of success in transmitting or imparting a message, whether information, ideas, or emotions.

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**3.4 ELEMENTS OF COMMUNICATION**

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The communication process includes the steps we take in order to ensure we have succeeded in communicating. The communication process comprises essential and interconnected elements detailed in Fig. 3.4.1. We will continue to reflect on the story of your friend in the coffee shop to explore each element in detail.

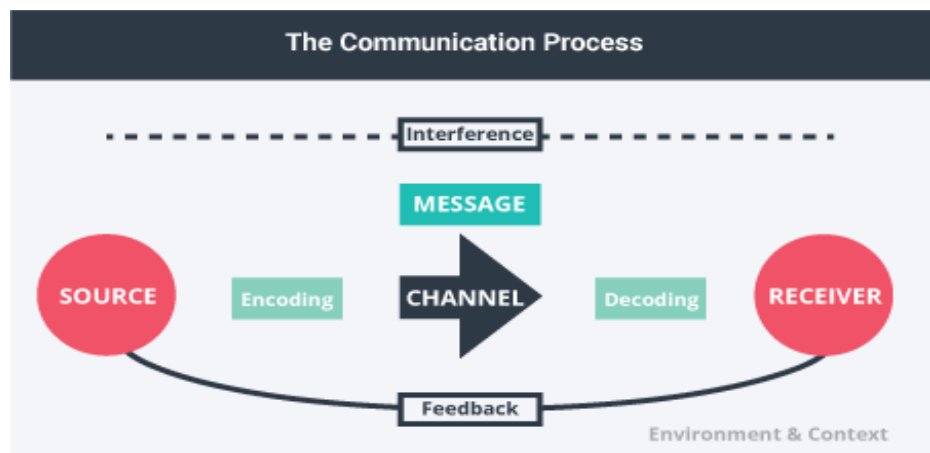


Fig. 3.4.1 The communication process by Laura Underwood



**Source:**

The source comes up with an idea and sends a message in order to share information with others. The source could be one other person or a group of people. In our example above, your friend is trying to share the events leading up to their first hockey goal and, likely, the feelings they had at the time as well.

**Message:**

The message is the information or subject matter the source is intending to share. The information may be an opinion, feelings, instructions, requests, or suggestions. In our example above, your friend identified information worth sharing, maybe the size of one of the defense players on the other team, in order to help you visualize the situation.

**Channels:**

The source may encode information in the form of words, images, sounds, body language, and more. There are many definitions and categories of communication channels to describe their role in the communication process, including verbal, non-verbal, written, and digital.

In our example above, your friends might make sounds or use body language in addition to their words to emphasize specific bits of information. For example, when describing a large defense player on the other team, they may extend their arms to explain the height of the other team's defense player.

**Receiver:**

The receiver is the person for whom the message is intended. This person is charged with decoding the message in an attempt to understand the intentions of the source. In our example above, you as the receiver may understand the overall concept of your friend scoring a goal in hockey and can envision the techniques your friend used.

However, there may also be some information you do not understand such as a certain term perhaps your friend describes some events in a confusing order. One thing the receiver might try is to provide some kind of feedback to communicate back to the source that the communication did not achieve full understanding and that the source should try again.

**Environment:**

The environment is the physical and psychological space in which the communication is happening (Mclean, 2005). It might also describe if the space is formal or informal. In our example above, it is the coffee shop you and your friend are visiting in.

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**Context:**

The context is the setting, scene, and psychological and psychosocial expectations of the source and the receiver(s) (McLean, 2005). This is strongly linked to expectations of those who are sending the message and those who are receiving the message.

In our example above, you might expect natural pauses in your friend’s storytelling that will allow you to confirm your understanding or ask a question.

**Interference:**

There are many kinds of interference (also called “noise”) that inhibit effective communication. Interference may include poor audio quality or too much sound, poor image quality, too much or too little light, attention, etc.

In our working example, the coffee shop might be quite busy and thus very loud. You would have trouble hearing your friend clearly, which in turn might cause you to miss a critical word or phrase important to the story.

Those involved in the communication process move fluidly between each of these eight elements until the process ends.

**Check your progress 1**

1 .What is communication?

-----

2. Describe the elements of communication?

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**3.5 BARRIERS OF COMMUNICATION**

There are many reasons why interpersonal communications may fail. In many communications, the message (what is said) may not be received exactly the way the sender intended. It is, therefore, important that the communicator seeks feedback to check that their message is clearly understood.

The skills of Active Listening, Clarification and Reflection may help but the skilled communicator also needs to be aware of the barriers to effective communication and how to avoid or overcome them.

There are many barriers to communication and these may occur at any stage in the communication process. Barriers may lead to your message becoming distorted and you therefore risk wasting both time and/or money by causing confusion and misunderstanding.

Effective communication involves overcoming these barriers and conveying a clear and concise message.

## **Common Barriers to Effective Communication:**

- The use of jargon. Over-complicated, unfamiliar and/or technical terms.
- Emotional barriers and taboos. Some people may find it difficult to express their emotions and some topics may be completely 'off-limits' or taboo. Taboo or difficult topics may include, but are not limited to, politics, religion, disabilities (mental and physical), sexuality and sex, racism and any opinion that may be seen as unpopular.
- Lack of attention, interest, distractions, or irrelevance to the receiver. (See our page Barriers to Effective Listening for more information).
- Differences in perception and viewpoint.
- Physical disabilities such as hearing problems or speech difficulties.
- Physical barriers to non-verbal communication. Not being able to see the non-verbal cues, gestures, posture and general body language can make communication less effective. Phone calls, text messages and other communication methods that rely on technology are often less effective than face-to-face communication.
- Language differences and the difficulty in understanding unfamiliar accents.
- Expectations and prejudices which may lead to false assumptions or stereotyping. People often hear what they expect to hear rather than what is actually said and jump to incorrect conclusions. Our page The Ladder of Inference explains this in more detail.
- Cultural differences. The norms of social interaction vary greatly in different cultures, as do the way in which emotions are expressed. For example, the concept of personal space varies between cultures and between different social settings. See our page on Intercultural Awareness for more information.
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- A skilled communicator must be aware of these barriers and try to reduce their impact by continually checking understanding and by offering appropriate feedback.
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- A skilled communicator must be aware of these barriers and try to reduce their impact by continually checking understanding and by offering appropriate feedback.

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### **A Categorisation of Barriers to Communication**

#### **Language Barriers**

Language and linguistic ability may act as a barrier to communication. However, even when communicating in the same language, the terminology used in a message may act as a barrier if it is not fully understood by the receiver(s). For example, a message that includes a lot of specialist jargon and abbreviations will not be understood by a receiver who is not familiar with the terminology used.

Regional colloquialisms and expressions may be misinterpreted or even considered offensive. See our page: Effective Speaking for more information.

#### **Psychological Barriers**

The psychological state of the communicators will influence how the message is sent, received and perceived.

For example:

If someone is stressed they may be preoccupied by personal concerns and not as receptive to the message as if they were not stressed.

Stress management is an important personal skill that affects our interpersonal relationships. See our pages Stress: Symptoms and Triggers and Avoiding Stress for more information.

Anger is another example of a psychological barrier to communication. When we are angry it is easy to say things that we may later regret, and also to misinterpret what others are saying.

#### **Physiological Barriers**

Physiological barriers to communication may result from the receiver's physical state. For example, a receiver with reduced hearing may not fully grasp the content of a spoken conversation especially if there is significant background noise.

#### **Physical Barriers**

An example of a physical barrier to communication is geographic distance between the sender and receiver(s).

Communication is generally easier over shorter distances as more communication channels are available and less technology is required. The ideal communication is face-to-face.

Although modern technology often helps to reduce the impact of physical barriers, the advantages and disadvantages of each communication channel should be understood so that an appropriate channel can be used to overcome the physical barriers.

## **Systematic Barriers**

Systematic barriers to communication may exist in structures and organisations where there are inefficient or inappropriate information systems and communication channels, or where there is a lack of understanding of the roles and responsibilities for communication. In such organisations, people may be unclear of their role in the communication process and therefore not know what is expected of them.

## **Attitudinal Barriers**

Attitudinal barriers are behaviours or perceptions that prevent people from communicating effectively.

Attitudinal barriers to communication may result from personality conflicts, poor management, resistance to change or a lack of motivation. To be an effective receiver of messages you should attempt to overcome your own attitudinal barriers to help ensure more effective communication.

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## **3.6 EFFECTIVE COMMUNICATION**

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Effective communication skills are fundamental to success in many aspects of life. Many jobs require strong communication skills. People with good communication skills also usually enjoy better interpersonal relationships with friends and family.

Effective communication is therefore a key interpersonal skill and learning how to improve your communication has many benefits. However, many people find it difficult to know where to start. This page sets out the most common ‘problem areas’ and suggests where you might focus your attention.

### **A Identifying Problems**

Many people appreciate that they have a problem with communication skills, but struggle to know where to start to improve. There are a number of ways that you can identify particular problem areas, including:

Ask your friends, family and colleagues to advise you. Most people will be happy to help you with your journey towards self-improvement. They may even have been waiting for just this opportunity for some time.

Use a self-assessment tool like our Interpersonal Skills Self-Assessment. This will help you to identify the most important areas for improvement.

You could instead simply work to improve the most common problem areas and see what happens.

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### Four Key Areas for Improvement

There are generally four main areas of communication skills that most of us would do well to improve. These are listening, non-verbal communication, emotional awareness and management, and questioning.

#### 1. Learn to Listen

One of the most common areas to need improvement is listening. We all have a tendency to forget that communication is a two-way process. We fall into the trap of 'broadcasting', where we just issue a message, and fail to listen to the response.

Quite a lot of the time, we are not really listening to others in conversation, but thinking about what we plan to say next.

Improving your listening skills is likely to pay off in improvements in your relationships both at work and at home.

- Listening is not the same as hearing. Learning to listen means not only paying attention to the words being spoken but also how they are being spoken and the non-verbal messages sent with them. It means giving your full attention to the person speaking, and genuinely concentrating on what they are saying—and what they are not saying.
- Good listeners use the techniques of clarification and reflection to confirm what the other person has said and avoid any confusion. These techniques also demonstrate very clearly that you are listening, just like active listening.

#### 2. Studying and Understanding Non-Verbal Communication

Much of any message is communicated non-verbally. Some estimates suggest that this may be as much as 80% of communication.

- It is therefore important to consider and understand non-verbal communication particularly when it is absent or reduced, such as when you are communicating in writing or by telephone.
- Non-verbal communication is often thought of as body language, but it actually covers far more. It includes, for example, tone and pitch of the voice, body movement, eye contact, posture, facial expression, and even physiological changes such as sweating.
- 
- You can therefore understand other people better by paying close attention to their non-verbal communication. You can also ensure that your message is conveyed more clearly by ensuring that your words and body language are consistent.

#### 3. Emotional Awareness and Management

The third under sung area of communication is awareness of our own and other people's emotions, and an ability to manage those

emotions. At work it is easy to fall into the trap of thinking that everything should be logical, and that emotion has no place.

- However, we are human and therefore messy and emotional. None of us can leave our emotions at home and nor should we try to do so. That is not to say that we should ‘let it all hang out’. However, an awareness of emotions, both positive and negative, can definitely improve communication.
- This understanding of our own and others’ emotion is known as Emotional Intelligence.
- There is considerable evidence that it is far more important to success in life than what we might call ‘intellectual intelligence’.
- Emotional intelligence covers a wide range of skills, usually divided into personal skills and social skills. The personal skills include self-awareness, self-regulation and motivation. The social skills include empathy and social skills. Each one of these is broken down into more skills.

For example:

- Self-awareness consists of emotional awareness, accurate self-assessment and self-confidence.
- Empathy is the ability to ‘feel with’ others: to share their emotions and understanding them. It includes understanding others, developing them, having a service orientation, valuing and leveraging diversity, and political awareness.

Fundamentally, the principle behind the different skills that make up emotional intelligence is that you have to be aware of and understand your own emotions, and be able to master them, in order to understand and work well with others.

#### **4. Questioning Skills**

The fourth area where many people struggle is questioning. Questioning is a crucial skill to ensure that you have understood someone’s message correctly. It is also a very good way of obtaining more information about a particular topic, or simply starting a conversation and keeping it going.

Those with good questioning skills are often also seen as very good listeners, because they tend to spend far more time drawing information out from others than broadcasting their own opinions.

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### **3.7 TYPES OF COMMUNICATION**

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As you can see, there are at least 6 distinct types of communication: non-verbal, verbal-oral-face-to-face, verbal-oral-distance, verbal-written, formal and informal types of communication. Add to this the boundless opportunities the internet superhighway

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offers, and you have an absolute goldmine of communication possibilities!

In successive sections of this post, we highlight the finer nuances of these distinct expressions so your communication is conscious, focused and mighty effective.

### **Formal Types of Communication Skills**

This types of communication is also referred to as “official communication” and covers the gamut of verbal expressions that address a formal need.

It is:

- Conducted through a pre-determined channel. For instance, a large number of your interactions within your profession, financial communication (from and to your bank, creditors, debtors, etc.) and legal expressions are examples of formal communication.
- More time-consuming than non-formal communication, as it follows a particular communication protocol.
- Even in cases of oral expressions (in meetings, seminars, etc.), it is often backed by written communication that can provide documentation evidence of the oral conversation. (This written communication could be as simple as a minutes-of-meeting, to as complex as a detailed recording.)
- Considered a reliable source of information. (So when you receive a legal notice from your bank, you better take notice of it!)
- Formal communication forms the core of our professional lives (though not all professional communication is formal). Hence becoming an expert in this type of communication is central to professional advancement and success. Below, we provide you simple tips to excel in your expression and profession.
- Begin by clarifying the purpose of your communication.
- Whether you use an oral or written expression, always follow a well-defined structure that can be easily understood by your audience.
- Keep your tone open, professional and friendly.
- End by re-iterating what you expect to cause through this communication: clarification on your stance, answers to questions, a call to action, etc. Also clarify any constraints that apply to this communication (like confidentiality, time-limit for response, etc.)
- Finally, thank your audience for their listening. (This works well for written communication too.)



## **Informal Communication**

Informal communication is surprisingly popular, and also referred to as “the (unofficial) grapevine”. This is often by word-of-mouth information. In fact, it is this type of communication that opens you up to unofficial yet provocative information.

- Spontaneous and free-flowing, without any formal protocol or structure. Hence this type of information is also less reliable or accurate.
- A communication channel that spreads like wildfire, as there are no formal rules to follow.
- Mostly oral, with no documentation evidence. Due to this, many undermine the value of informal communication, terming it mere “gossip”.
- Despite its drawbacks, informal communication is considered “user-friendly” and hence offers huge advantages when used wisely. For instance, consider this example where a company is served by 3 different caterers. Employees may become aware of the timings of service, rules and regulations through a formal communication sent out by company management.
- But they will become aware of the preferred caterer of the day through informal communication from friends and colleagues. This type of communication hence serves well when you want to control or encourage positive opinions, ideas and expressions, without making them seem like they’ve been “thrust upon” by senior management.
- Note: In modern times, social networks from “unofficial” sources (like your personal Facebook and Twitter feeds, LinkedIn, etc.) are powerful sources of informal communication and are often used to shape public opinion.
- Oral Communication (Face-to-face)
- Face-to-face oral communication is the most recognized type of communication. Here, what you express comes directly from what you speak. Again, this can be formal or informal: with your friends and family, in a formal meeting or seminar, at work with your colleagues and boss, within your community, during professional presentations, etc.

This types of communication

- Gets better with practice. The more you practice with awareness, the more control you will have on your oral expressions.
- Is vibrantly a-live! This means that despite all past rehearsals, oral communication offers you a present-moment opportunity to tune, revise, revoke and fix what you express. It is hence the most powerful type of communication and can work for or against you with every expression.

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- Engages your audience more than other types of communication. The listener (or an audience) often expects to speak-back to you with oral communication, enabling two-way communication more than any other channel.

### **For superior face-to-face communication**

- Always meet the eyes of your audience with confidence, conviction and openness.
- Practice before a mirror to perfect your tone and expressions, so they suit the message you want to convey. They two facets often convey more than your words do.
- Practice using role-play. This means that even when you rehearse before a mirror, candidly ask yourself, “Am I ready to receive this message with this tone and expression?” If you aren’t convinced, your audience won’t be either. So practice again until you get it right.
- Consciously engage your audience’s participation. This is the strength of this type of communication, so never let your oral expression be a one-way rant to yourself. You can do this by asking questions, getting their opinion and encouraging expression of new ideas.
- Finally, become an active listener. An effective oral communicator not only speaks, but also actively listens to his audience.

### **Oral Communication (Distance)**

Distance (oral) communication has made the world a smaller and more accessible place. Mobile phones, VOIP, video-conferencing, 2-way webinars, etc. are all modern expansions of distance communication, taking its expression to the next subtle level. And in this type of communication, your tone of voice and pace of delivery take priority over other expressions.

For effective oral communication over distance,

- Give higher priority to your listening. When you fail to listen, you will find that multiple people attempt to speak at the same time, undermining the value of this form of communication.
- Speak slightly slower than you would in face-to-face communication. This will make sure that you remain aware of the subtle nuances of your tone, and the receiver has time to grasp what you convey.
- Always re-iterate what you understand when you listen. This type of communication misses the non-verbal signals that you would receive in face-to-face communication (that can indicate subtle expressions like anger, friendliness, receptivity, sarcasm, etc.) So paraphrase what understand and confirm that this is indeed what the other party also meant to convey.

- Where appropriate, wear your friendly face with a smile on your lips and eyes. Feel this friendly face. Your tone will automatically convey your openness and receptivity to the other person. (This may not be appropriate if you expect to convey a warning on the phone, so ensure that your face suits your message.)
- Finally, back this up with written communication where possible. The intent is to confirm the take-away from the communication so all parties are on the same page. This makes sense even for an informal call with your friend – perhaps you can send a quick text message to re-iterate how pleasurable it was to speak to him, and then confirm the final call-for-action.

### **Written Communication**

A few decades ago, written communication depended on the trusty old mailman as we wrote to people who were far away. On rare occasions, this also included the formal note or legal notice from the bank, landlord, business client, etc. What a surprise then that this type of communication has now taken over every aspect of our world!

Think about it, if you club the total written communication you engage within a day – the text messages you send over your fancy mobile, your Facebook and Twitter updates, personal and professional emails, heck, even the blogs you write – it would far surpass any other verbal communication you enjoy. Correct? It makes sense then to be an absolute pro at this type of communication. Listed below are 3 rules that can help you get there.

- Follow a clear structure so your communication is not all over the place. This can include a brief introduction, agenda, message body and conclusion. The cleverness and effectiveness of your communication lies in how you're able to capture this structure in your mode of communication (email, text message, quick status update on social media, etc.).
- Clarify the context of your communication where possible. This might seem like overkill for a harmless text message. But you'd be amazed at the amount of seemingly-harmless (written) communication that reaches the wrong eyes and ears. So take care to ensure that your context is reasonably clear, no matter who the recipient.
- Always err on the right side of caution. There are very few instances when written communication is purely formal (addressed to professional peers and seniors or third-parties), or purely informal (addressed only to your immediate friend/family circle). More often, it falls between these two modes.

Hence, play safe by adapting a semi-formal tone, keeping your communication clean (in language and expression) and open (without offending any group). Believe us when we say that it's far better to

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have your friends think of you as a “stiff” communicator, rather than have your boss view as an “offensive” communicator!

### **Non-verbal Types of Communication**

This type of communication is more subtle, yet far more powerful. It includes the entire gamut of physical postures and gestures, tone and pace of voice, and the attitude with which you communicate.

In the past few decades, body language experts have revealed how the posture you adopt, the hand gestures you endorse and other facets of your physical personality affect your communication. It is worthwhile to spend a few hours coming up to speed on basic body-language gestures, so you don't inadvertently send mixed messages with your gestures and speech. You can also use this to support your message, making it more impactful.

But despite what these experts tell you, there will be times when the body language you are meant to adapt is in complete contrast with how you feel (like using a “friendly” posture when you internally feel threatened or intimidated). Hence, non-verbal communication is most effective when these 3 facets are consistent in your communication.

1. What you say with your words.
2. What you share with your postures and gestures. (However, these can be learnt to express the right message).
3. What you feel inside you, and hence impacts the subtle message you feel compelled to share outside you.

As you can see, (1) and (2) can be learnt with a little bit of practice. But (3) has to be consciously built so you constantly align yourself to what you want to express.

For instance,

- When you want your peers to think of you as a friendly person, it is because you genuinely like and care for people.
- When you want your team to think of you as a strong Leader, it is because you genuinely take responsibility for yourself and the team.
- When you want your peers, seniors and others to listen to you, it is because they are convinced that you will genuinely listen to them and factor their thoughts and opinions.

We leave you with this powerful quote from Enlightened Master Paramahansa Nithyananda, revealing a tip so potent that it shows its power in any type of communication (formal, informal, verbal, non-verbal, etc.).

***“Communication begins with Listening!”***

So the next time you find yourself in the middle of a frustrating conversation, focus on your listening. This will help you grasp what

your audience wants to hear from you, so you find a way to tailor your communication for your audience to become receptive to it too. When you listen and your audience too listens, you are engaged in the best form of communication!

### 3.8 MEDIA OF COMMUNICATION

#### Media (Channels) of Communication

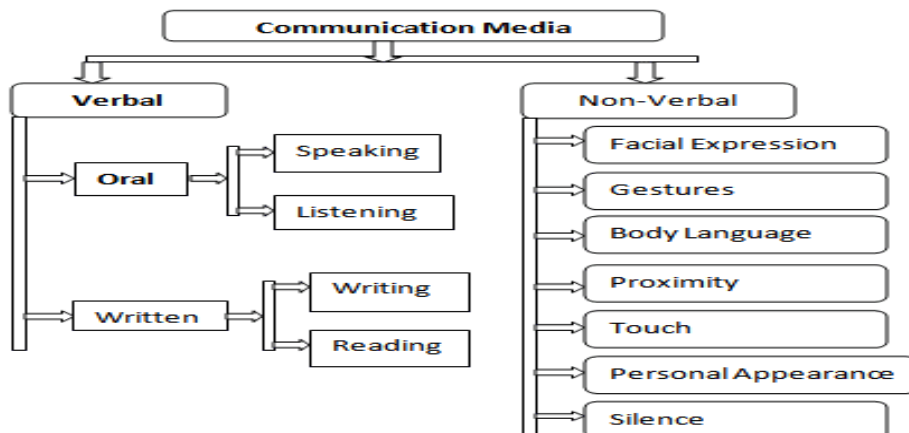
Media or channel is the means or ways of transmitting the messages from sender to the receiver. The media of oral communication are face to face conversation, telephone or mobile, conference, meetings etc. The media of written communication are newspaper, letter, report, memo, mail etc.

According to Bartol and Martin, “The communication is the method used to convey the message to the intended receiver.”

According to Defleur and Dennis, “A medium is a device for moving information through time or space.”

So, Media or channel of communications is the means or ways that are used to transitioning the messages or information from the sender to the receiver.

#### TYPES OF MEDIA COMMUNICATION



#### Verbal communication

Verbal communication is the expression or exchanged of information or messages through written or oral words. Forms of verbal communication are as follows:

1. Oral communication: Oral communication is the process of communication in which messages or information is exchanged or communicated within sender and receiver through the word of mouth. It can be divided into two ways: a. Speaking b. Listening.
2. Written communication: Written communication is the process of communication in which messages or information is exchanged or

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communicated within sender and receiver through written form. It can be divided into two ways: a. Writing b. Reading.

### **Nonverbal Communication**

Nonverbal communication is the expression or exchange of information or messages through without using any spoken or written word. Some of the forms of non-verbal communications are as follows:

1. Facial expression
2. Gestures
3. Body language
4. Proximity
5. Touch
6. Appearance
7. Silence
8. Paralinguistic
9. Eye Gaze or eye contact etc.

Techopedia explains Communication Media

Different media are employed for transmitting data from one computer terminal to the central computer or to other computer systems inside some kind of network.

There are two forms of communication media:

Analog: Includes conventional radio, telephonic and television transmissions  
Digital: Computer-mediated communication, computer networking and telegraphy

The most commonly used data communication media include:

- Wire pairs
- Coaxial cable
- Microwave transmission
- Communication satellites
- Fiber optics

However, many of the most common issues actually lie in receiving rather than sending messages.

**A Two-Way Process**

Communication is a two-way process. It involves both how we send and receive messages. Receiving includes both how we take in the message (reading or listening, for example), and the 'decoding' of the message.

Improving communication may therefore also involve either or both elements. However, many of the most common issues actually lie in receiving rather than sending messages.

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### **3.9 COMPUTER NETWORK CONCEPT**

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A computer network is a set of computers connected together for the purpose of sharing resources. The most common resource shared today is connection to the Internet. Other shared resources can include a printer or a file server. The Internet itself can be considered a computer network.

Computer networks can be defined as the exchange of network packets between computing machines across the world with the help of data lines like wire cables, optical fibers, etc.

#### **3.9.1 DEFINITION**

A computer network is a group of computer systems and other computing hardware devices that are linked together through communication channels to facilitate communication and resource-sharing among a wide range of users. Networks are commonly categorized based on their characteristics.

In the world of computers, networking is the practice of linking two or more computing devices together for the purpose of sharing data. Networks are built with a combination of computer hardware and computer software.

Some explanations of networking found in books and tutorials are highly technical, designed for students and professionals, while others are geared more to home and business uses of computer networks.

#### **Wireless , Computer- Networking**

In the world of computers, networking is the practice of linking two or more computing devices together for the purpose of sharing data. Networks are built with a mix of computer hardware and computer software.

#### **Area Networks**

Networks can be categorized in several different ways. One approach defines the type of network according to the geographic area it spans. Local area networks (LANs), for example, typically reach across a single home, whereas wide area networks (WANs), reach across cities, states, or even across the world. The Internet is the world's largest public WAN

A computer network is a set of connected computers. Computers on a network are called nodes. The connection between computers can be done via cabling, most commonly the Ethernet cable, or wirelessly through radio waves.

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Connected computers can share resources, like access to the Internet, printers, file servers, and others. A network is a multipurpose connection, which allows a single computer to do more.

### 3.9.2 COMPUTER NETWORK TYPES

A computer network is a group of computers linked to each other that enables the computer to communicate with another computer and share their resources, data, and applications.

A computer network can be categorized by their size. A computer network is mainly of four types:

LAN(Local Area Network)

PAN(Personal Area Network)

MAN(Metropolitan Area Network)

WAN(Wide Area Network)

PAN(Personal Area Network)

- Personal Area Network is a network arranged within an individual person, typically within a range of 10 meters.
- Personal Area Network is used for connecting the computer devices of personal use is known as Personal Area Network.
- Thomas Zimmerman was the first research scientist to bring the idea of the Personal Area Network.
- Personal Area Network covers an area of 30 feet.
- Personal computer devices that are used to develop the personal area network are the laptop, mobile phones, media player and play stations.

#### Computer Network Types

There are two types of Personal Area Network:

- Wired Personal Area Network
- Wireless Personal Area Network

Wireless Personal Area Network: Wireless Personal Area Network is developed by simply using wireless technologies such as WiFi, Bluetooth. It is a low range network. Wired Personal Area Network: Wired Personal Area Network is created by using the USB.

Examples of Personal Area Network:

Body Area Network: Body Area Network is a network that moves with a person. For example, a mobile network moves with a person. Suppose a person establishes a network connection and then creates a connection with another device to share the information.

Offline Network: An offline network can be created inside the home, so it is also known as a home network. A home network is



designed to integrate the devices such as printers, computer, television but they are not connected to the internet.

### **MAN(Metropolitan Area Network)**

- A metropolitan area network is a network that covers a larger geographic area by interconnecting a different LAN to form a larger network.
- Government agencies use MAN to connect to the citizens and private industries.
- In MAN, various LANs are connected to each other through a telephone exchange line.
- The most widely used protocols in MAN are RS-232, Frame Relay, ATM, ISDN, OC-3, ADSL, etc.
- It has a higher range than Local Area Network(LAN).

### **Uses of Metropolitan Area Network:**

- MAN is used in communication between the banks in a city.
- It can be used in an Airline Reservation.
- It can be used in a college within a city.
- It can also be used for communication in the military.

### **Local Area Network (LAN)**

It is also called LAN and designed for small physical areas such as an office, group of buildings or a factory. LANs are used widely as it is easy to design and to troubleshoot. Personal computers and workstations are connected to each other through LANs. We can use different types of topologies through LAN, these are Star, Ring, Bus, Tree etc.

LAN can be a simple network like connecting two computers, to share files and network among each other while it can also be as complex as interconnecting an entire building. LAN networks are also widely used to share resources like printers, shared hard-drive etc.

### **Characteristics of LAN**

- LAN's are private networks, not subject to tariffs or other regulatory controls.
- LAN's operate at relatively high speed when compared to the typical WAN.
- There are different types of Media Access Control methods in a LAN, the prominent ones are Ethernet, Token ring.
- It connects computers in a single building, block or campus, i.e. they work in a restricted geographical area.

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### Applications of LAN

- One of the computer in a network can become a server serving all the remaining computers called clients. Software can be stored on the server and it can be used by the remaining clients.
- Connecting Locally all the workstations in a building to let them communicate with each other locally without any internet access.
- Sharing common resources like printers etc are some common applications of LAN.

### Advantages of LAN

- **Resource Sharing:** Computer resources like printers, modems, DVD-ROM drives and hard disks can be shared with the help of local area networks. This reduces cost and hardware purchases.
- **Software Applications Sharing:** It is cheaper to use same software over network instead of purchasing separate licensed software for each client a network.
- **Easy and Cheap Communication:** Data and messages can easily be transferred over networked computers.
- **Centralized Data:** The data of all network users can be saved on hard disk of the server computer. This will help users to use any workstation in a network to access their data. Because data is not stored on workstations locally.
- **Data Security:** Since, data is stored on server computer centrally, it will be easy to manage data at only one place and the data will be more secure too.
- **Internet Sharing:** Local Area Network provides the facility to share a single internet connection among all the LAN users. In Net Cafes, single internet connection sharing system keeps the internet expenses cheaper.

### Disadvantages of LAN

- **High Setup Cost:** Although the LAN will save cost over time due to shared computer resources, but the initial setup costs of installing Local Area Networks is high.
- **Privacy Violations:** The LAN administrator has the rights to check personal data files of each and every LAN user. Moreover he can check the internet history and computer use history of the LAN user.
- **Data Security Threat:** Unauthorised users can access important data of an organization if centralized data repository is not secured properly by the LAN administrator.
- **LAN Maintenance Job:** Local Area Network requires a LAN Administrator because, there are problems of software installations or

hardware failures or cable disturbances in Local Area Network. A LAN Administrator is needed at this full time job.

- Covers Limited Area: Local Area Network covers a small area like one office, one building or a group of nearby buildings.

### **Wide Area Network (WAN)**

It is also called WAN. WAN can be private or it can be public leased network. It is used for the network that covers large distance such as cover states of a country. It is not easy to design and maintain. Communication medium used by WAN are PSTN or Satellite links. WAN operates on low data rates.

#### **Characteristics of WAN**

- It generally covers large distances(states, countries, continents).
- Communication medium used are satellite, public telephone networks which are connected by routers.

#### **Advantages of WAN**

- Covers a large geographical area so long distance business can connect on the one network.
- Shares software and resources with connecting workstations.
- Messages can be sent very quickly to anyone else on the network. These messages can have picture, sounds or data included with them(called attachments).
- Expensive things(such as printers or phone lines to the internet) can be shared by all the computers on the network without having to buy a different peripheral for each computer.
- Everyone on the network can use the same data. This avoids problems where some users may have older information than others.

#### **Disadvantages of WAN**

- Need a good firewall to restrict outsiders from entering and disrupting the network.
- Setting up a network can be an expensive, slow and complicated. The bigger the network the more expensive it is.
- Once set up, maintaining a network is a full-time job which requires network supervisors and technicians to be employed.

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## **3.10 HISTORY OF INTERNET**

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### **Origins of the Internet**

The first recorded description of the social interactions that could be enabled through networking was a series of memos written by J.C.R. Licklider of MIT in August 1962 discussing his “Galactic Network” concept. He envisioned a globally interconnected set of

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computers through which everyone could quickly access data and programs from any site. In spirit, the concept was very much like the Internet of today. Licklider was the first head of the computer research program at DARPA,<sup>4</sup> starting in October 1962. While at DARPA he convinced his successors at DARPA, Ivan Sutherland, Bob Taylor, and MIT researcher Lawrence G. Roberts, of the importance of this networking concept.

Leonard Kleinrock at MIT published the first paper on packet switching theory in July 1961 and the first book on the subject in 1964. Kleinrock convinced Roberts of the theoretical feasibility of communications using packets rather than circuits, which was a major step along the path towards computer networking. The other key step was to make the computers talk together. To explore this, in 1965 working with Thomas Merrill, Roberts connected the TX-2 computer in Mass. to the Q-32 in California with a low speed dial-up telephone line creating the first (however small) wide-area computer network ever built.

The result of this experiment was the realization that the time-shared computers could work well together, running programs and retrieving data as necessary on the remote machine, but that the circuit switched telephone system was totally inadequate for the job. Kleinrock's conviction of the need for packet switching was confirmed.

In late 1966 Roberts went to DARPA to develop the computer network concept and quickly put together his plan for the "ARPANET", publishing it in 1967. At the conference where he presented the paper, there was also a paper on a packet network concept from the UK by Donald Davies and Roger Scantlebury of NPL. Scantlebury told Roberts about the NPL work as well as that of Paul Baran and others at RAND. The RAND group had written a paper on packet switching networks for secure voice in the military in 1964.

It happened that the work at MIT (1961-1967), at RAND (1962-1965), and at NPL (1964-1967) had all proceeded in parallel without any of the researchers knowing about the other work. The word "packet" was adopted from the work at NPL and the proposed line speed to be used in the ARPANET design was upgraded from 2.4 kbps to 50 kbps. <sup>5</sup>

In August 1968, after Roberts and the DARPA funded community had refined the overall structure and specifications for the ARPANET, an RFQ was released by DARPA for the development of one of the key components, the packet switches called Interface Message Processors (IMP's). The RFQ was won in December 1968 by a group headed by Frank Heart at Bolt Beranek and Newman (BBN).

As the BBN team worked on the IMP's with Bob Kahn playing a major role in the overall ARPANET architectural design, the network topology and economics were designed and optimized by Roberts

working with Howard Frank and his team at Network Analysis Corporation, and the network measurement system was prepared by Kleinrock's team at UCLA.

Due to Kleinrock's early development of packet switching theory and his focus on analysis, design and measurement, his Network Measurement Center at UCLA was selected to be the first node on the ARPANET. All this came together in September 1969 when BBN installed the first IMP at UCLA and the first host computer was connected.

Doug Engelbart's project on "Augmentation of Human Intellect" (which included NLS, an early hypertext system) at Stanford Research Institute (SRI) provided a second node. SRI supported the Network Information Center, led by Elizabeth (Jake) Feinler and including functions such as maintaining tables of host name to address mapping as well as a directory of the RFC's.

One month later, when SRI was connected to the ARPANET, the first host-to-host message was sent from Kleinrock's laboratory to SRI. Two more nodes were added at UC Santa Barbara and University of Utah. These last two nodes incorporated application visualization projects, with Glen Culler and Burton Fried at UCSB investigating methods for display of mathematical functions using storage displays to deal with the problem of refresh over the net, and Robert Taylor and Ivan Sutherland at Utah investigating methods of 3-D representations over the net.

Thus, by the end of 1969, four host computers were connected together into the initial ARPANET, and the budding Internet was off the ground. Even at this early stage, it should be noted that the networking research incorporated both work on the underlying network and work on how to utilize the network. This tradition continues to this day.

Computers were added quickly to the ARPANET during the following years, and work proceeded on completing a functionally complete Host-to-Host protocol and other network software. In December 1970 the Network Working Group (NWG) working under S. Crocker finished the initial ARPANET Host-to-Host protocol, called the Network Control Protocol (NCP). As the ARPANET sites completed implementing NCP during the period 1971-1972, the network users finally could begin to develop applications.

In October 1972, Kahn organized a large, very successful demonstration of the ARPANET at the International Computer Communication Conference (ICCC). This was the first public demonstration of this new network technology to the public. It was also in 1972 that the initial "hot" application, electronic mail, was introduced. In March Ray Tomlinson at BBN wrote the basic email

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message send and read software, motivated by the need of the ARPANET developers for an easy coordination mechanism.

In July, Roberts expanded its utility by writing the first email utility program to list, selectively read, file, forward, and respond to messages. From there email took off as the largest network application for over a decade. This was a harbinger of the kind of activity we see on the World Wide Web today, namely, the enormous growth of all kinds of “people-to-people” traffic.

### **The Initial Internetting Concepts**

The original ARPANET grew into the Internet. Internet was based on the idea that there would be multiple independent networks of rather arbitrary design, beginning with the ARPANET as the pioneering packet switching network, but soon to include packet satellite networks, ground-based packet radio networks and other networks.

The Internet as we now know it embodies a key underlying technical idea, namely that of open architecture networking. In this approach, the choice of any individual network technology was not dictated by a particular network architecture but rather could be selected freely by a provider and made to interwork with the other networks through a meta-level “Internetworking Architecture”.

Up until that time there was only one general method for federating networks. This was the traditional circuit switching method where networks would interconnect at the circuit level, passing individual bits on a synchronous basis along a portion of an end-to-end circuit between a pair of end locations. Recall that Kleinrock had shown in 1961 that packet switching was a more efficient switching method. Along with packet switching, special purpose interconnection arrangements between networks were another possibility

. While there were other limited ways to interconnect different networks, they required that one be used as a component of the other, rather than acting as a peer of the other in offering end-to-end service.

In an open-architecture network, the individual networks may be separately designed and developed and each may have its own unique interface which it may offer to users and/or other providers. including other Internet providers. Each network can be designed in accordance with the specific environment and user requirements of that network.

There are generally no constraints on the types of network that can be included or on their geographic scope, although certain pragmatic considerations will dictate what makes sense to offer.

The idea of open-architecture networking was first introduced by Kahn shortly after having arrived at DARPA in 1972. This work

was originally part of the packet radio program, but subsequently became a separate program in its own right. At the time, the program was called “Internetting”. Key to making the packet radio system work was a reliable end-end protocol that could maintain effective communication in the face of jamming and other radio interference, or withstand intermittent blackout such as caused by being in a tunnel or blocked by the local terrain.

Kahn first contemplated developing a protocol local only to the packet radio network, since that would avoid having to deal with the multitude of different operating systems, and continuing to use NCP.

However, NCP did not have the ability to address networks (and machines) further downstream than a destination IMP on the ARPANET and thus some change to NCP would also be required. (The assumption was that the ARPANET was not changeable in this regard). NCP relied on ARPANET to provide end-to-end reliability.

If any packets were lost, the protocol (and presumably any applications it supported) would come to a grinding halt. In this model NCP had no end-end host error control, since the ARPANET was to be the only network in existence and it would be so reliable that no error control would be required on the part of the hosts.

Thus, Kahn decided to develop a new version of the protocol which could meet the needs of an open-architecture network environment. This protocol would eventually be called the Transmission Control Protocol/Internet Protocol (TCP/IP). While NCP tended to act like a device driver, the new protocol would be more like a communications protocol.

Four ground rules were critical to Kahn’s early thinking:

Each distinct network would have to stand on its own and no internal changes could be required to any such network to connect it to the Internet.

Communications would be on a best effort basis. If a packet didn’t make it to the final destination, it would shortly be retransmitted from the source.

Black boxes would be used to connect the networks; these would later be called gateways and routers. There would be no information retained by the gateways about the individual flows of packets passing through them, thereby keeping them simple and avoiding complicated adaptation and recovery from various failure modes.

Kahn began work on a communications-oriented set of operating system principles while at BBN and documented some of his early thoughts in an internal BBN memorandum entitled “Communications Principles for Operating Systems“. At this point he

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realized it would be necessary to learn the implementation details of each operating system to have a chance to embed any new protocols in an efficient way.

Thus, in the spring of 1973, after starting the internetting effort, he asked Vint Cerf (then at Stanford) to work with him on the detailed design of the protocol. Cerf had been intimately involved in the original NCP design and development and already had the knowledge about interfacing to existing operating systems. So armed with Kahn's architectural approach to the communications side and with Cerf's NCP experience, they teamed up to spell out the details of what became TCP/IP.

The give and take was highly productive and the first written version of the resulting approach was distributed at a special meeting of the International Network Working Group (INWG) which had been set up at a conference at Sussex University in September 1973. Cerf had been invited to chair this group and used the occasion to hold a meeting of INWG members who were heavily represented at the Sussex Conference.

Some basic approaches emerged from this collaboration between Kahn and Cerf:

Communication between two processes would logically consist of a very long stream of bytes (they called them octets). The position of any octet in the stream would be used to identify it.

Flow control would be done by using sliding windows and acknowledgments (acks). The destination could select when to acknowledge and each ack returned would be cumulative for all packets received to that point.

It was left open as to exactly how the source and destination would agree on the parameters of the windowing to be used. Defaults were used initially.

Although Ethernet was under development at Xerox PARC at that time, the proliferation of LANs were not envisioned at the time, much less PCs and workstations. The original model was national level networks like ARPANET of which only a relatively small number were expected to exist.

Thus a 32 bit IP address was used of which the first 8 bits signified the network and the remaining 24 bits designated the host on that network. This assumption, that 256 networks would be sufficient for the foreseeable future, was clearly in need of reconsideration when LANs began to appear in the late 1970s.

The original Cerf/Kahn paper on the Internet described one protocol, called TCP, which provided all the transport and forwarding services in the Internet. Kahn had intended that the TCP protocol



support a range of transport services, from the totally reliable sequenced delivery of data (virtual circuit model) to a datagram service in which the application made direct use of the underlying network service, which might imply occasional lost, corrupted or reordered packets.

However, the initial effort to implement TCP resulted in a version that only allowed for virtual circuits. This model worked fine for file transfer and remote login applications, but some of the early work on advanced network applications, in particular packet voice in the 1970s, made clear that in some cases packet losses should not be corrected by TCP, but should be left to the application to deal with.

This led to a reorganization of the original TCP into two protocols, the simple IP which provided only for addressing and forwarding of individual packets, and the separate TCP, which was concerned with service features such as flow control and recovery from lost packets. For those applications that did not want the services of TCP, an alternative called the User Datagram Protocol (UDP) was added in order to provide direct access to the basic service of IP.

A major initial motivation for both the ARPANET and the Internet was resource sharing – for example allowing users on the packet radio networks to access the time sharing systems attached to the ARPANET. Connecting the two together was far more economical than duplicating these very expensive computers.

However, while file transfer and remote login (Telnet) were very important applications, electronic mail has probably had the most significant impact of the innovations from that era. Email provided a new model of how people could communicate with each other, and changed the nature of collaboration, first in the building of the Internet itself (as is discussed below) and later for much of society.

There were other applications proposed in the early days of the Internet, including packet based voice communication (the precursor of Internet telephony), various models of file and disk sharing, and early “worm” programs that showed the concept of agents (and, of course, viruses).

A key concept of the Internet is that it was not designed for just one application, but as a general infrastructure on which new applications could be conceived, as illustrated later by the emergence of the World Wide Web. It is the general purpose nature of the service provided by TCP and IP that makes this possible.

## **HISTORY OF THE INTERNET**

### **Definition**

By definition the Internet is a worldwide, publicly accessible series of interconnected computer networks that transmit data by packet

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switching using the standard Internet Protocol. How did this technology come to be so popular and so widely used around the world? Was it always so large and extensive, filled with information about just about anything you can possibly imagine and accessible from almost anywhere, anytime? The answer is no and it is important to understand where it came from to understand how to utilize it to its fullest potential now.

### **Creation**

The Internet's origin have their roots in a military project, the Semi-Automatic Ground Environment (SAGE) program, which networked country-wide radar systems together for the first time. This was created around 1958 as part of an attempt to regain the lead in technology from the Soviet Union which had recently launched Sputnik.

J.C.R. Licklider was selected to head the committee which controlled the SAGE project. He envisioned universal networking as a unifying human revolution. Licklider recruited Lawrence Roberts to head a project which implemented a network.

Roberts had worked with the U.S. Air Force on a packet switching system as opposed to a circuit switching system. On October 29, 1969, Licklider and Roberts interconnected the first two nodes between UCLA and SRI International at Menlo Park, California.

This was the beginning of the Advanced Research Projects Agency Network (ARPANET) which was one of the key networks which our Internet today was based off of. Soon after the first international packet-switched network service was created between U.S. and U.K.

Vint Cerf and Bob Kahn developed the first description of TCP (covered more deeply in the Introduction to Networking lesson) in 1973. The term "Internet" was first used in 1974 to describe a single global TCP/IP network detailed in the first full specification of TCP written by Cerf and his colleagues. The first TCP/IP-wide area network was created on January 1, 1983 when all hosts on the ARPANET were switched over from the older protocols to TCP/IP.

In 1984, the National Science Foundation (NSF) commissioned the construction of a 1.5 megabit/second network which became known as NSFNET. In 1989 the US Federal Networking Council approved the interconnection of the NSFNET to the commercial MCI Mail system.

Soon after, other commercial e-mail services were connected such as OnTyme, Telemail, and CompuServe. Three Internet Service Providers (ISPs) were also created: UUNET, PSINET, and CERFNET. More and more separate networks were created that eventually interconnected with this large, growing network of networks.

The ability of TCP/IP to work over virtually any pre-existing communication networks allowed for a great ease of growth, although the rapid growth of the Internet was due primarily to the availability of commercial routers from companies such as Cisco Systems, Proteon and Juniper, the availability of commercial Ethernet equipment for local-area networking and the widespread implementation of TCP/IP on the UNIX operating system.

## **Growth**

Although the basic applications and guidelines that make the Internet possible had existed for almost a decade, the network did not gain public face until the 1990s. On August 6, 1991, the European Organization for Nuclear Research, (CERN), which straddles the border between France and Switzerland, publicized the new World Wide Web project. The web was invented by English scientist Tim Berners-Lee in 1989.

## **WWW Logo**

An early popular web browser was ViolaWWW. It was eventually replaced in popularity by the Mosaic web browser. By 1996 usage of the word “Internet” had become commonplace, and consequently, so had its use as a reference to the World Wide Web.

Over the course of the decade, the Internet successfully accommodated the majority of previously existing public computer networks (although some networks have remained separate).

## **Today’s Internet**

Aside from the complex physical connections that make up its infrastructure, the Internet is facilitated by bi- or multi-lateral commercial contracts and technical specifications or protocols that describe how to exchange data over the network. Indeed, the Internet has severely matured since its birth many years ago. Today almost 1.5 billion people use the Internet. That’s almost a quarter of the entire world (a lot of people).

The Internet Corporation for Assigned Names and Numbers (ICANN) is the authority that coordinates the assignment of unique identifiers on the Internet, including domain names, Internet Protocol (IP) addresses, and protocol port and parameter numbers.

A globally unified namespace is essential for the Internet to function. Because the Internet is a distributed network comprising many voluntarily interconnected networks, the Internet, as such, has no governing body.

## **ICANN Headquarters**

One of the most common uses people have for the Internet is the World Wide Web. Whenever you say you are “on the Internet” you are using the World Wide Web. When you are surfing the Internet

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through different pages you are moving through the World Wide Web. However, that is not the only use for the Internet.

E-mail is another very popular use for the Internet. Internet e-mail may travel and be stored unencrypted on many other networks and machines out of both the sender's and the recipient's control. Remote access is another very common use for the Internet.

The Internet allows computer users to connect to other computers and information stores easily, wherever they may be across the world. File sharing is also popular. It allows people to send files through e-mail, FTP, peer-to-peer networks, etc.

### **A BRIEF HISTORY OF THE INTERNET**

#### **Sharing Resources**

The Internet started in the 1960s as a way for government researchers to share information. Computers in the '60s were large and immobile and in order to make use of information stored in any one computer, one had to either travel to the site of the computer or have magnetic computer tapes sent through the conventional postal system.

Another catalyst in the formation of the Internet was the heating up of the Cold War. The Soviet Union's launch of the Sputnik satellite spurred the U.S. Defense Department to consider ways information could still be disseminated even after a nuclear attack. This eventually led to the formation of the ARPANET (Advanced Research Projects Agency Network), the network that ultimately evolved into what we now know as the Internet.

ARPANET was a great success but membership was limited to certain academic and research organizations who had contracts with the Defense Department. In response to this, other networks were created to provide information sharing.

January 1, 1983 is considered the official birthday of the Internet. Prior to this, the various computer networks did not have a standard way to communicate with each other. A new communications protocol was established called Transfer Control Protocol/Internetwork Protocol (TCP/IP).

This allowed different kinds of computers on different networks to "talk" to each other. ARPANET and the Defense Data Network officially changed to the TCP/IP standard on January 1, 1983, hence the birth of the Internet. All networks could now be connected by a universal language.

#### **Model of Univac I computer, c. 1954**

The image above is a scale model of the UNIVAC I (the name stood for Universal Automatic Computer) which was delivered to the Census Bureau in 1951. It weighed some 16,000 pounds, used 5,000 vacuum tubes, and could perform about 1,000 calculations per second. It was

the first American commercial computer, as well as the first computer designed for business use. (Business computers like the UNIVAC processed data more slowly than the IAS-type machines, but were designed for fast input and output.)

The first few sales were to government agencies, the A.C. Nielsen Company, and the Prudential Insurance Company. The first UNIVAC for business applications was installed at the General Electric Appliance Division, to do payroll, in 1954. By 1957 Remington-Rand (which had purchased the Eckert-Mauchly Computer Corporation in 1950) had sold forty-six machines.

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### **3.11 USE OF SEARCH ENGINE**

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#### **InfoSeek**

InfoSeek is one of the best search engines for finding information. In addition to searching the Web, InfoSeek provides guides to popular subjects which contain links to recommended sites. Each main topic in the guide is broken down further into subtopics, which contain links to more websites. Each topic will bring up a list of popular websites for that topic, which can be useful in getting you to a related site for your subject area very quickly. If you run a search on InfoSeek that relates to an InfoSeek guide you will notice that it pulls up a "Best Bets" feature that contains different categories related to your search. As mentioned above, these guides can get you to a website quickly without having to try out results from your search. The guides can also be accessed directly from the homepage of InfoSeek -- where it says "tune into our channels."

When running a search on InfoSeek there are a couple things you can do to enhance your results. First, you can search within the given results to further limit the information returned by the search. Simply enter an additional keyword or keywords and click on the "search within these results" box. InfoSeek also groups all of your results that occur in the same website. You will notice when this happens, because it will say under the website description "grouped results from" and the domain name of that website. You can click on the group results link to find more related pages on that particular website or you can click on "ungroup these results" to show every single page that matches your results, regardless of whether they occur in the same website. Ungrouping results can be useful if a particular website has many, many pages on your subject and you are looking for information that may be found on only a single page within that website. Searches can be further limited by using the advanced search, reachable by following the advanced search link on InfoSeek.

Searching for news stories is also available on InfoSeek. You can search through recent Reuters, PR Newswire and Businesswire releases or through news stories from major newspapers. InfoSeek will

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also search through company profiles, newsgroups, email addresses, phone numbers and stocks. In addition to searching, you can also reference information such as maps, Roget's thesaurus and Webster's dictionary. These additional tools can be found on the menu bar located at the top of InfoSeek.

### **Excite/Webcrawler**

Excite provides a search engine that will crunch through webpages, and also provides searches of recent news stories, site reviews, a shopping guide and more. In a similar way to InfoSeek, if you are looking for well-developed and established sites for a particular subject you may want to visit the reviewed sites first. Site reviews on Excite can also be found on Webcrawler, but in a different layout. If you are only interested in the reviews you might find Webcrawler's set-up more convenient.

If you are looking for something very specific, then search the Web through Excite's search engine. Excite also provides searching of recent news stories. For later reference you can store your search keywords on Excite so you can re-run the same search another time. Be sure click on the "search tips" link to get additional search ideas and to find out additional ways to search Excite. Excite's "Power Search" will allow you to further limit your search. It allows you to select words that your search must NOT contain in addition to the words the search MUST contain. It also allows you to search only through websites that Excite recommends, to bring up only titles in your results (and not the description) and to show the results by the website's main URL. Excite also allows you to personalize Excite, under the "My Excite" section, which allows you to store your favorite websites, different kinds of news information, weather and other content for quick access.

### **Lycos**

Lycos is another major search engine that is also becoming more of a media site, similar to Excite, Yahoo and InfoSeek. The main web search on Lycos uses a technology called WiseWire which brings up particular pages that pertain to your query and allows users to rate these pages at the same time. These "community guides" will often include some useful sites that you may not have found elsewhere. With Lycos you can also add more options to your search. By clicking on search features or by going to [www.lycos.com/search/](http://www.lycos.com/search/) you will also find the option of searching within a specific website. For instance, you could search only within the USA Today website by entering [www.usatoday.com](http://www.usatoday.com) and then entering your keyword(s).

Lycos also has an advanced search option, dubbed "Lycos Pro." In addition to the options mentioned above, Lycos Pro allows you to rank the importance of different criteria pertaining to your search results including: how close together your keywords should be, how much the results need to match all of your keywords, how important is

it for the keywords be part of the title of the webpage and whether the keywords need to appear in the exact order as you entered them in the search box. For each criteria you can select a low, medium or high measure of importance.

The help section on Lycos is detailed and includes screenshots that help you understand what each type of search can do. Lycos will also search for images, sounds and products and search through Usenet postings, message boards, and personal homepages. Lycos also provides web reviews, through its "Top 5% of the Web" service.

### **Look Smart**

Look Smart is not a search engine in that it does not physically search through websites. Instead, Look Smart reviews a great number of websites and this database of website reviews is searchable on Look Smart. If you are looking for a website on a general subject, you should consider a search Look Smart first. In addition to searching the reviews, you can also click on the main topics (located on the left bar on Look Smart's homepage) which will dig you deeper into that topic and bring up more options. Clicking on these options will allow you to refine your search into more specific categories. Look Smart provides a quick and effective way to find websites quickly. However, if you are searching for a very specific topic, you might start with one of the search engines instead.

### **Yahoo**

Yahoo is fast becoming a major media leader. As a search site it functions as a huge directory, which when searched will pull up links to some major and some minor sites related to your search. Searching Yahoo can be either useful or invaluable, depending on your subject field. If Yahoo cannot pull up the information you need, the keyword(s) you entered are run on AltaVista's search engine. One drawback to searching on Yahoo is it will often bring up insignificant webpages related to your topic, such as personal homepages or outdated websites in addition to the more serious or commercial website(s) on your topic. By clicking on the options link next to Yahoo!'s search box you will get to an additional search page where you can limit your search to only the most recent additions to Yahoo -- as recent as within the last day or week. You can also browse through the listings in Yahoo by category from Yahoo's front page.

Yahoo also provides searchable news stories culled from various major sources. News comes to Yahoo from Reuters, E! Online, Variety, The Sporting News, ZDNet and others. Yahoo also provides product searches for online shopping, web reviews, stocks, maps, phone numbers and email addresses. If you are looking for news of new websites, Yahoo provides daily picks and an internet magazine called Yahoo Internet Life. Yahoo also provides online diversions in the way

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of message boards, chat, email addresses and instant messaging (Yahoo pager).

### **AltaVista**

AltaVista is a great search engine if you are trying to pull up a large number of webpages relating to your search. AltaVista is also used by Yahoo when Yahoo's database is unable to match your search. AltaVista is most effective when you are involved in a very specific search or when when you are searching for recently added or updated webpages. You can search for new pages on your subject by changing the date on the search box to a recent date. Simply change the date from the date which reads 21/Mar/86 (the default date) to a more recent date and AltaVista will only search webpages posted since the date you select.

AltaVista can also perform a variety of search options you will not be aware of unless you click through to AltaVista's help menu. These additional options include: search only the text found in a hyperlink, find pages that contain a particular applet class, search pages with a particular domain name suffix (such as .com, .edu or .de), search pages on a specific website (i.e. usatoday.com), find images, find pages that link to a particular website, search through the text found only on the title of webpages and search for text on webpages but do not include the text in found in a link, image or title of the page. AltaVista also includes a number of specialty options for use when searching newsgroups, which are also explained on the help menu.

AltaVista works best when you want a large number of results, have a very specific topic or you want to search only recently posted webpages. It is not as useful if you are seeking a website on a general subject because AltaVista will bring up more results than you will want, including many inappropriate listings.

### **HotBot**

HotBot is also an excellent search engine when you are interested in a large number of results and you are searching a specific subject. HotBot also provides browsing by subject through website reviews and has licensed reviews from Look Smart for this option. HotBot has an excellent search tool, entitled SuperSearch that will allow you to restrict your web search by the date, by the domain suffix (i.e. .com, .net), by continent and by media type such as audio or video. You can also restrict your search to a particular domain which can be useful if you are looking for information within a particular website.

HotBot also provides searching through recent news stories with its news search service entitled Newsbot. HotBot also contains searches for businesses, people, newsgroups, domain names, discussion groups and shareware.



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## 3.12 SOCIAL NETWORK

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Social networking provides robust marketing opportunities for companies but can also put them at risk for PR disasters.

- The most popular social network as of early 2019 is Facebook.
- Marketers use social networking for increasing brand recognition and encouraging brand loyalty.
- Social networking is constantly evolving, so keeping up with changes can be challenging.

Social networking is the practice of expanding the number of one's business and/or social contacts by making connections through individuals, often through social media sites such as Facebook, Twitter, Linked in and Google+.

Social networking is the practice of expanding the number of one's business and/or social contacts by making connections through individuals, often Based on the six degrees of separation concept (the idea that any two people on the planet could make contact through a chain of no more than five intermediaries), social networking establishes interconnected online communities (sometimes known as social graphs) that help people make contacts that would be good for them to know, but that they would be unlikely to have met otherwise.

Depending on the social media platform, members may be able to contact any other member. In other cases, members can contact anyone they have a connection to, and subsequently anyone that contact has a connection to, and so on. Some services require members to have a preexisting connection to contact other members.

While social networking has gone on almost as long as societies themselves have existed, the unparalleled potential of the Web to facilitate such connections has led to an exponential and ongoing expansion of that phenomenon.

In addition to social media platforms, the capacity for social interaction and collaboration is increasingly built into business applications.rough social media sites such as Facebook, Twitter, LinkedIn and Google+.

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### 3.12.1 CONCEPT

Social networking is the use of Internet-based social media sites to stay connected with friends, family, colleagues, customers, or clients. Social networking can have a social purpose, a business purpose, or both, through sites such as Facebook, Twitter, LinkedIn, and Instagram, among others. Social networking has become a significant base for marketers seeking to engage customers.

Alternatively referred to as a virtual community or profile site, a social network is a website that brings people together to talk, share ideas and interests, or make new friends. This type of collaboration and sharing is known as social media. Unlike traditional media that is created by no more than ten people, social media sites contain content created by hundreds or even millions of different people. Below is a small list of some of the biggest social networks used today.

### 3.12.2 DEFINITION

The definition of online social networking encompasses networking for business, pleasure, and all points in between. Networks themselves have different purposes, and their online counterparts work in various ways. Loosely speaking, a social network allows people to communicate with friends and acquaintances both old and new.

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## 3.13 EDUCATIONAL USE OF SOCIAL NETWORK

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Social media has gained credibility over the years as a trusted source of information and platform where organisations can interact with audiences.

We are seeing education institutions adapting these developments into their systems and relying on group resources and mechanisms to improve the student life. The use of social media in education provides students with the ability to get more useful information, to connect with learning groups and other educational systems that make education convenient.

Social network tools afford students and institutions with multiple opportunities to improve learning methods. Through these networks, you can incorporate social media plugins that enable sharing and interaction. Students can benefit from online tutorials and resources that are shared through social networks and LMS's.

There is valuable knowledge to be gained through social media such as analytics and insights on various topics or issues for study purposes. Social media is also a medium where students can establish beneficial connections for their careers. As an educational institution, it is crucial to be active in many social platforms possible, this helps create better student training strategies and shapes student culture.

### **Institutions communicate with students via YouTube and Facebook**

Learning colleges have the ability to connect with students through social media networks such as Facebook, Google Plus groups, and YouTube. These channels can be used to communicate campus news, make announcements and provide students with useful information. This builds engagement between the College and students which help tackle many student issues through the group interactions.

Institutions can share supportive and positive posts that reach all students that are connected to the networks and pages. You can initiate hashtags on social media to engage students and online discussions that are helpful. Video is a prominent tool in social media trends that are effective and you can use it to share useful videos that inspire students and help them in their course subjects.

Through social mediums such as YouTube, Facebook or Instagram live video the engagements between students and the institution can be sustained. It is advisable to be selective about which social platforms to use for the best practice.

### **It helps in Research process**

Social media offers audience and subject monitoring tools that are useful and it is one of the best platforms to extract data. You can find out how the majority people feel about a particular topic or how experts perceive and advice on specific issues.

This can help students compile and produce useful content for research. Whether students are working on an assignment, working on a project or trying to gain more insight on a subject, some of the best information and results can be extracted from social media.

### **Enhanced Learning management systems**

Learning management systems is a networking software that delivers educational programs and gives institutions other administrative activities. Social media learning in LMS can include instant chat functions, video, forums to share info and other lesson resources to help students.

Most LMS's come with built in social media integration and this drives instant interaction between the users and the system. The system strengthens student participation and makes team projects easy to collaborate.

The system exists to tackle student and learning related issues to improve education schemes. It is beneficial for institutions to use popular Learning management systems with social media integration to have the best reach and effect through the system. Other social learning benefits are live conferencing systems, webinar capability, share group reviews, blogs and much more.

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### Distance learning opportunities

Modern educators look for new approaches of attracting students to distance learning and integration of social media is one of them. According to MOOCs early data learning programs with integrated social media platforms are better visited and less often dropped out than other ones. There is even a recommendation for colleges and universities to make use of this positive phenomenon as soon it will be impossible to ignore that significant influence.

#### 3.13.1 FACE BOOK

Now almost three years later, educators are still finding great ideas for putting Facebook to work on our list. But at the same time, Facebook has changed so much, and the site has even more to offer for the classroom.

So we've compiled a fresh batch of ways to make Facebook work in your classroom, some tried and true, and others that have evolved with Facebook. Read on, and you'll find a wealth of resources, assignments, and amazing uses for Facebook in any type of classroom.

#### Face Book

Back in 2009, we wrote a popular post, 100 Ways You Should Be Using Facebook in Your Classroom. Now almost three years later, educators are still finding great ideas for putting Facebook to work on our list. But at the same time, Facebook has changed so much, and the site has even more to offer for the classroom.

So we've compiled a fresh batch of ways to make Facebook work in your classroom, some tried and true, and others that have evolved with Facebook. Read on, and you'll find a wealth of resources, assignments, and amazing uses for Facebook in any type of classroom.

#### RESOURCES ON FACEBOOK

**Ask for information:** Instead of trusting Wikipedia, ask the crowd on Facebook. One kindergarten teacher asked parents to research seeds and got great information about the largest seed in the world according to the *Guinness Book of World Records*.

**Attend remote lectures:** Using Facebook, you can tune into remote lectures and presentations from around the world.

**Museums and more:** Help your students follow along with local and international museums, art galleries, exhibits, and more for enriched learning on Facebook.

**Firsthand research:** Students can connect with family members for genealogy assignments, discuss issues with local celebrities and more through Facebook.

**Follow politicians:** If your class is studying the current election, use Facebook to follow politicians on the local, state, and national scale. You can even ask students to interact with the candidates, posting questions and getting feedback.

**Learning games:** Plenty of games are on Facebook, and many of them are actually educational. Adopt Facebook crosswords, math games, and more as a reward in your classroom.

**Public polling:** Students can research and poll friends and family members by simply asking questions on Facebook.

**Applications:** Flashcards, Courses, and more offer easy ways to adopt and create learning tools in your classroom.

### **Projects & Assignments**

Facebook is an interesting platform for learning, and these ideas offer great ways to make the site a part of projects and assignments in your classroom.

**Rise to meet a challenge:** As a class, you can participate in challenges posted by educational outlets, companies, and more.

**Book reviews:** Ask students to head to Facebook to review and report on books that you've assigned in class, sharing what they've learned with the rest of the class.

**Get support:** If your school is being forced to cut a service due to budget constraints, or your classroom needs help getting connected with a resource, head to Facebook and ask for help.

**Offer extra credit:** Post extra-credit assignments on Facebook that students can quickly take advantage of.

**News gathering:** Your classroom can follow journalists and media outlets on social networks, gathering past and current news clips relevant to your latest classroom discussions.

**Documenting growth:** Whether it's a potted plant or a caterpillar, students can document the growth of classroom projects through Facebook.

**Teaching 21st century skills:** Use Facebook to create a lesson on using social media tools for collaboration, news, networking, and more.

## NOTES

**Build a Facebook application:** Computer science students can learn valuable skills for the future by taking on a project to create an app that can be used on Facebook.

**Ask students to create content:** Have students try their hand as content creators by sharing resources, sparking discussions, taking polls, and more.

**Take on a classroom cause:** Using the Causes application on Facebook, students can take on projects that benefit the greater good.

**Brainstorm:** Ask students to collaborate and brainstorm on your classroom's Facebook page.

**Journal entries:** Students can post regular journal entries to share with the class via a classroom Page or Group.

**Scavenger hunt:** Put together a scavenger hunt kids can participate in, sharing clues and hints on Facebook.

**Facebook book club:** Host a regular book club gathering with your students on Facebook.

**A lesson in social media etiquette:** Use Facebook in the classroom as an opportunity to teach students how to be safe, polite, and effective when using Facebook and other social media tools.

**Resource curation:** Students can gather news links, photos, videos, and more to share on the classroom Facebook page, curating valuable resources for the class.

**Exam practice:** Keep students on their toes and prepared for exams by posting exam practice activities on Facebook.

**Create fake profiles:** Students often love filling out their own profiles, so creating fake ones offers great appeal. Ask students to create fake profiles for historical figures, fictional characters, and more.

**Reading summaries:** After each reading assignment, ask students to post a summary of what they've just covered.

**Broadcast school news:** Ask students to be the source, taking on a classroom journalism project to report on sports results, campus news, events, and more.

### Sharing

Give students, parents, and your community something of value by sharing knowledge and resources through the power of Facebook.

**Import your class blog to Facebook:** If your class maintains a blog, be sure to have it shared on Facebook.

**Ask parents to get involved:** Parents can follow along as kids post their projects, and even highlight any insightful resources they may know about.

**Pet day can get a little less scary:** Students with pets that are not quite appropriate for school (like huge pythons or newborn kittens) can still participate, sharing photos of their beloved friend at home.

**Archived videos:** Important lectures, slides, and more can be shared and saved on Facebook.

**Document class trips:** Headed to the zoo? Have your class share the tasks of taking photos, notes, and more to share in a Facebook report on the activity.

**Highlighting vocabulary:** An easy and quick way to fit vocabulary review into study time is posting words and definitions on Facebook.

**Make graphs out of parent data:** Ask parents about household habits, favorite animals, and more, creating graphs in your classroom that you can share on Facebook.

**Explore Questions:** Facebook offers a Questions app, which is clearly useful for the classroom and allows teachers to ask questions about photos, topics, and more with responses from students.

**Archive discussions:** Facebook is a great place to link to and archive classroom slides, discussions, and more that students can reference if they missed class or need to review.

**Posting educational content:** Teachers can post educational videos and links for concepts that are currently being discussed in class.

### **Collaboration & Discussion**

Students, educational professionals, and even parents can get together for collaboration and discussion through Facebook.

**Ask for feedback on assignments and activities:** If you're not sure of a new assignment or activity that you'd like to introduce in your classroom, ask students what they think on Facebook.

**Writing workshops:** Facebook's collaborative nature makes it easy for students to participate in writing workshops with peer review and instructor oversight.

**Set up a Facebook backchannel:** For courses that are simply too large to allow every student to participate in the discussion, encourage students to communicate through a Facebook discussion wall that operates during class time.

**Practice foreign language with native speakers:** Use Facebook to connect your classroom with speakers around the world, and get a chance to improve their foreign language skills.

**Encourage online participation:** Bring quiet students out of their shell by asking them to participate in Facebook discussions.

**Create study groups:** Allow study groups and group projects to easily connect with each other within their own Facebook groups.

## NOTES

**Take classroom polls:** Need to gather classroom opinions on snack time, movie Friday, or the next book to read? Take a poll on Facebook!

**Get connected with guest speakers:** Use Facebook to track down old students or professionals that would make for great guest speakers in your classroom.

**Students can discuss work through Notes:** On Facebook Notes, students can publish their work, tag classmates, and get feedback on what they've written.

**Connect with classes around the world:** Whether it's a class in your school, or a class on another continent, Facebook offers a great way to get connected with other students.

**Discuss classroom ideas with other teachers:** Facebook is great for connecting not just classes, but teachers with helpful ideas.

**Homework help:** It may be awkward for some students to call up a classmate and ask for help on a homework problem, but posting on a class Facebook wall is less intrusive, and teachers can get involved as well.

**Stay in touch with old students:** Keep in touch with old students and find out what's been valuable to them years down the road.

### **Classroom Management & Organization**

These ideas offer great ways to enrich your classroom with personal connection, reminders, and tools for organization.

**Post events:** Get your classroom event on your students' calendars by creating a Facebook event. This can be used for everything from exam dates to after-school mixers.

**Organize different classes into groups:** If you teach any number of different courses, keep things organized by asking students to join appropriate groups for their class.

**Celebrate birthdays:** Use Facebook as a tool for remembering and pointing out birthdays within your classroom community.

**Familiarize yourself with students:** In large classes, it can sometimes be hard to remember each and every student. Facebook makes it a little easier to connect faces and personalities with names.

**Get a record that students read what you're writing:** Emails get ignored, but you can ask students to "Like" important updates so that you'll know they got the message.

**Share positive updates:** When a certain class or group does particularly well, be sure to point it out with a Facebook status message.



**Save paper:** Instead of handing out permission slips and flyers, post them to Facebook and allow parents to download and print them at home.

**Continue discussions on Facebook:** If you're finding that an interesting discussion is taking up too much classroom time, ask students to simply continue the discussion on Facebook and move on.

**Share last minute updates:** Let students know if school is closed due to snow, if you'll be absent, and more on Facebook.

**Investigate "dog ate my homework" claims:** One professor busted a student who had lied to her about losing Internet access (and was thus unable to work on her paper), pointing out that she was somehow able to connect because she made several Facebook updates during that same time.

**Maintain a classroom map:** Share a geography lesson and increase participation at the same time by asking students to share their heritage, travels, and favorite countries.

**Parents can learn about what kids are doing:** Gone are the days when parents have to pry information out of their kids with power tools. Now, parents can get in on the classroom through Facebook, and spark conversations about projects they've actually seen already.

**Ask for feedback on exams:** Gauge how students think they did on exams by asking about them on Facebook, and appropriately plan how much time you'll need to grade them.

**Get updates on progress:** Make sure students are staying on top of their assignments by using Facebook to ask how things are coming along.

**Improve classroom participation:** Keep students engaged by giving them something productive to do on Facebook, rather than allowing them to zone out on the social site during lectures.

**Use Facebook for career guidance:** Get students connected with recruiting professionals, mentors, and more through Facebook.

**School fundraising:** Use Facebook to promote any fundraising activities you have in your classroom.

**Create a Facebook page for parents:** Many teachers have found that parents aren't happy with their existing method of communication, whether it's an online parent portal, or just pinning notes to backpacks. Creating a Facebook page for your class offers an excellent opportunity for parents to get involved and stay informed.

**Find out what students are into:** Learn about their hobbies and interests, and you just might discover a way to bring what they love into the classroom.

## NOTES

**Host fun contests:** Host contests on Facebook that require students to participate or attend to win, keeping kids involved in studies.

**Remind students to come to class:** Facebook is a great tool for reminding frequently tardy or absent students to make it on time to class.

**Finding future lessons:** Paying attention to discussions on your Facebook classroom page can help you discover great ideas for future lessons and assignments.

**Stay up to date on assignments:** Remind students of assignments they need to be working on, upcoming due dates, and more with Facebook.

**Tag books:** Tag books for students to read easily and conveniently right on Facebook, and even create resources to go along with the readings.

**Clarify directions:** If it's clear some students are having trouble understanding an assignment, use Facebook to post clarified directions.

**Celebrate student work:** Teachers can highlight some of the best work students have done in any period of time on Facebook walls.

### Apps & Groups

These Facebook resources can help you when it comes to sharing documents, college resources, books, and more.

**Courses:** This app will make managing your courses on Facebook and beyond an easier job to do.

**CiteMe:** Ask students to use the CiteMe app on Facebook so that they can create properly formatted citations.

**Booktag:** Share books and ask students to comment on them with the Booktag Facebook app.

**Acceptly:** Help guide students in getting accepted to college by using the Acceptly Facebook app in class.

**Calendar:** Make sure everyone is on the same page by sharing your class calendar through this app.

**Knighthood:** Promote reading skills with this game app on Facebook.

**Mathematical Formulas:** Math teachers can take advantage of this app, sharing formulas and solutions with students on Facebook.

**Used Text Books:** Students can get connected with a Facebook marketplace for books through the Used Text Books group.

**Webinairia:** Use Facebook to create and host screencasts for your classroom and beyond.

**JSTOR Search:** Your classroom can use the JSTOR Search app on Facebook to find useful scholarly articles and research.

**Homework Help:** If students are stuck on a problem, they can find assistance in the Homework Help Facebook group.

**Word of the Day:** Use apps like Word of the Day, This Day in History, and more to create small but fun nuggets of learning on a regular basis.

**Zoho Online Office:** Make Facebook a source for documents with Zoho, which allows you to share and even collaborate on documents within Facebook.

**Notely:** Get all of your classroom documents and notes organized with the help of this Facebook app for education and beyond.

**Language Exchange:** Help your students get connected with foreign language practice through the Language Exchange app.

**Typing Test:** Help students build their typing skills right inside Facebook using the Typing Test app.

**Quiz Monster:** Host online quizzes through Facebook with the Quiz Monster app.

**Study Groups:** This app was made to create the perfect environment for study groups to connect and collaborate on Facebook.

### **3.13.2 BLOG**

A blog is a kind of social media tool that allows one to share ideas with authentic audiences and to engage those audiences in conversation. Most blogs look something like journals, with a series of “posts” appearing on the blog in reverse chronological order (newest posts at the top, older posts below).

Blogs can address any number of topics, from travel to food to parenting to politics, and they can be written by single authors or by groups of writers. Typically, blogging software is very easy to use, but also flexible enough to allow for customization in both style and structure.

#### **Teach with Blog**

Although people often think of social media as a space for non-academic interactions, blogs can be helpful tools for instructors interested in enhancing their students’ communication skills and increasing their students’ investment in learning.

Blogs can be spaces for informal or formal writing by students, and the capacity of blogs to support multiple forms of media (images, videos, links, and so on) can help students bring creativity to their communication.

Most blogs includes tools for commenting and discussion, enabling students to engage their ideas in conversation with others, either within their local learning communities or on the open Web.

**NOTES**

Student writing is often seen by just one person on the planet (their instructor), which can make writing assignments feel like “busy work.” The dynamic interaction between writer and audience that blogs facilitate can help students see real value in their academic writing and take that writing more seriously.

Moreover, the public, persistent nature of blogs can help students practice more integrative learning, finding connections among their personal, professional, and academic experiences.

When writing for blogs, students can experiment and interact digitally in a relaxed and low-risk environment. Blogs can be an excellent balance between the rigor and structure of a formal written assignment and the freedom to experiment with ideas and arguments.

**3.13.3 WHATSAPP**

The underlying purpose of WhatsApp is to facilitate communication, and at its most basic level, education is nothing but communication. WhatsApp can provide a channel through which teachers can achieve faster and more seamless communication with their students. It can also increase the level of communication between students and create another venue for learning.

**EDUCATION STRATEGIES FOR WHATSAPP**

Here are some basic strategies that educators can utilize to take advantage of the core abilities of WhatsApp:

1. Use the Group Chats feature to create learning and study groups
2. Create audio lessons that can be sent directly to students
3. Stay in contact with students outside the classroom
4. Send out problems or assignments to students even when they are not in class
5. Stay in contact with parents
6. Send videos to students
7. Send graphics such as pictures or charts directly to students
8. Send report cards directly to the parents’ phones
9. Facilitate real-time communication between students and teachers.
10. Facilitate real-time communication between teachers and parents.
11. Teachers can also maintain communication with students .

### ***Some Reasons Why Educators Should Use WhatsApp in the Classroom and Beyond:***

- It allows free unlimited messaging
- It can be used directly over the Internet via WhatsApp Web.
- WhatsApp can be used on Wi-Fi without a data plan.
- Unlike some messaging solutions, WhatsApp can be used to send videos, audio messages, and pictures.
- WhatsApp is a cross platform solution.
- WhatsApp can be used to reach students via the technology they are most familiar with: their phones
- WhatsApp can be used to reach students and parents that do not utilize other communication methods, such as landline telephones and email
- WhatsApp is very cost effective

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### **3.14 LET US SUM UP**

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In this unit we have started with concept, elements and Barriers of communication. Communication is a powerful activity that comes to us as naturally as breathing. With a little bit of awareness, our communication can be flawless so the other person not only receives our message, but is also open to it. The communication media acts as a channel for linking various computing devices so that they may interact with each other. Contemporary communication media facilitate communication and data exchange among a large number of individuals across long distances via email, teleconferencing, internet forums and many other forms of communication. We have seen about effective and types of communication. In the second case, we have dealt with about computer network, types and history of internet. Finally, we have discussed the use of search engine and social network.

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### **3.15 UNIT - END ACTIVITIES**

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Describe the role of social network in education

Analyse the history of internet

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### **3.16 POINTS FOR DISCUSSION**

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Discuss about the effective communication

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### **3.17 ANSWERS TO CHECK YOUR PROGRESS**

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1. Communication is the act of sending information or ideas via speech, visuals, writing or any other such method. The Communication model has a sender who is sending the message and the receiver who is receiving the message. In between, the speech or ideas need to be

**NOTES**

simple enough to be decoded and understood by the receiver. If the ideas are not presented properly, then decoding is improper and the receiver does not understand.

Communication is simply the act of transferring information from one place, person or group to another. Every communication involves one sender, a message and a recipient. This may sound simple, but communication is actually a very complex subject. The transmission of the message from sender to recipient can be affected by a huge range of things. These include our emotions, the cultural situation, the medium used to communicate, and even our location. The complexity is why good communication skills are considered so desirable by employers around the world: accurate, effective and unambiguous communication is actually extremely hard.

The communication process includes the steps we take in order to ensure we have succeeded in communicating. The communication process comprises essential and interconnected elements detailed in Fig. 3.4.1. We will continue to reflect on the story of your friend in the coffee shop to explore each element in detail.

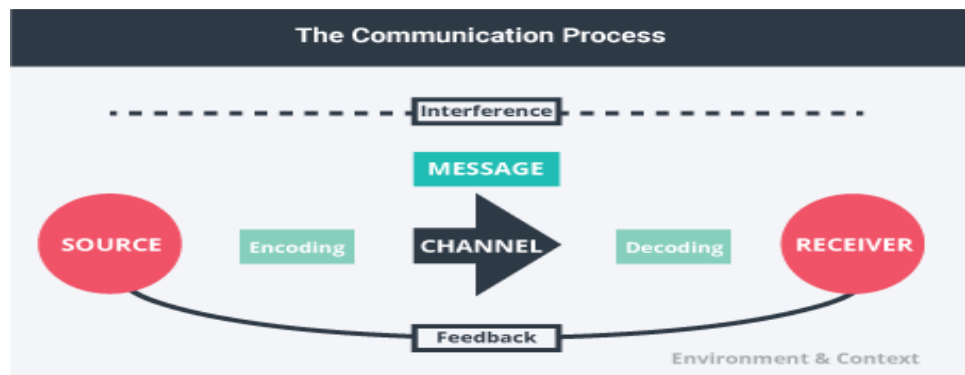


Fig. 3.4.1 The communication process by Laura Underwood

**Source:**

The source comes up with an idea and sends a message in order to share information with others. The source could be one other person or a group of people. In our example above, your friend is trying to share the events leading up to their first hockey goal and, likely, the feelings they had at the time as well.

**Message:**

The message is the information or subject matter the source is intending to share. The information may be an opinion, feelings, instructions, requests, or suggestions. In our example above, your friend identified information worth sharing, maybe the size of one of the defence players on the other team, in order to help you visualize the situation.

### **Channels:**

The source may encode information in the form of words, images, sounds, body language, and more. There are many definitions and categories of communication channels to describe their role in the communication process, including verbal, non-verbal, written, and digital.

In our example above, your friends might make sounds or use body language in addition to their words to emphasize specific bits of information. For example, when describing a large defense player on the other team, they may extend their arms to explain the height of the other team's defense player.

### **Receiver:**

The receiver is the person for whom the message is intended. This person is charged with decoding the message in an attempt to understand the intentions of the source. In our example above, you as the receiver may understand the overall concept of your friend scoring a goal in hockey and can envision the techniques your friend used.

However, there may also be some information you do not understand such as a certain term perhaps your friend describes some events in a confusing order. One thing the receiver might try is to provide some kind of feedback to communicate back to the source that the communication did not achieve full understanding and that the source should try again.

### **Environment:**

The environment is the physical and psychological space in which the communication is happening (McLean, 2005). It might also describe if the space is formal or informal. In our example above, it is the coffee shop you and your friend are visiting in.

### **Context:**

The context is the setting, scene, and psychological and psychosocial expectations of the source and the receiver(s) (McLean, 2005). This is strongly linked to expectations of those who are sending the message and those who are receiving the message.

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## **3.18 SUGGESTED READING /REFERENCES**

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# UNIT -IV COMPUTER AND LEARNING

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*Computer and Learning*

## **STRUCTURES**

- 4.1 Introduction
- 4.2 Objectives
- 4.3 Computer as a Tutor
- 4.5 The Computer as Tutee
- 4.6 Computer as a Teaching Resource
- 4.7 Different Forms of Learning through Computer: Computer Assisted Instruction(CAI)
  - 4.7.1 Typical CAI provides
  - 4.7.2 Types of Computer Assisted Instruction
  - 4.7.3 Affordances and sample use
- 4.8 Modes of CAI
  - 4.8.1 Types and Characteristics of CAI Modes of Delivery and Interaction
- 4.9 Computer Assisted Instruction (CAI) and Drill and Practice
  - 4.9.1 Five Instructional Software Functions
  - 4.9.2 Types of Integration Strategies for Each Instructional Software Function Strategy
  - 4.9.3 Principles of the Electronic Media Design
- 4.10 Computer Simulations
  - 4.10.1 Types of Computer Simulations
  - 4.10.2 Simulation theory
  - 4.10.3 How do simulations work?
- 4.11 Advantages of Computer-Assisted Instruction (CAI)
- 4.12 Computer Managed Instruction (CMI)
  - 4.12.1 The general characteristics of a CMI program
  - 4.12.2 Purposes/Values of CMI

## **NOTES**

#### 4.13 The Computer as Tool

##### 4.13.1 Computer as a Tool for students

##### 4.13.2 Computer as a tool for teacher

#### 4.14 Let us Sum Up

#### 4.15 Unit –End Activity

#### 4.16 Answers to Check your Progress

#### 4.17 Suggested Reading /References

### NOTES

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## 4.1 INTRODUCTION

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The computer is a multitool for teaching learning. It is a machine that can help with many different teaching and learning tasks. Rather than having separate tools for common tasks such as writing, drawing, filling, and developing multimedia, in the computer you have one tool that can do them all. Just by changing the software, like changing the attachment on a multitool, the computer can do many different things. In popular terms, the word computer refers to a machine that processes information according to a set of instructions. A personal computer, also known as a PC or microcomputer, is intended for use by an individual, and since PCs proliferated in the 1970s and 1980s, they have become the focus of most of the computing industry. We emphasize the personal computer because it is such a useful tool for teaching and learning. When most people picture a computer, they envision elements such as a keyboard, a box with a disk drive, and a display screen. This is actually a computer system, a collection of components that includes the computer and all of the devices used with the computer to realize or extend its capabilities. The hardware components of the computer system perform the basic functions that make everything work. Software is also an essential component of any computer system. Software, within the limitations set by the capabilities of the hardware, determines what the computer can do. When your computer operates, it carries out a complex set of actions that involves interplay among the various components of the system and you. Suppose that you wish to use your word processing software to compose a lesson plan. What role that computer will act in teaching and learning?

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## 4.2 OBJECTIVES

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At the end of this unit, you will be able to

- Pursue advanced education, research and development, and other creative efforts in science and technology.
- Know the need and importance of computer based learning.
- Understand the educational objectives.

- Develop the skills of teaching through computer in their class rooms.
- Realize that computer teaching is an effective teaching tool.
- Improve the knowledge of CAI

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### **4.3 COMPUTER AS A TUTOR**

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Computing in education depends upon seeing all computer use in such application as in one of three modes. In the first, the computer functions as a tutor. In the second, the computer functions as a tool. In the third, the computer functions as paychecks a tutee or student.

To function as a tutor in some subject, the computer must be programmed by “experts” in programming and in that subject. The student is then tutored by the computer executing the program(s). The computer presents some subject material, the student responds, the computer evaluates the response, and, from the results of the evaluation, determines what to present next. At its best, the computer tutor keeps complete records on each student being tutored; it has at its disposal a wide range of subject detail it can present; and it has an extensive and flexible way to test and then lead the student through the material. With appropriately well-designed software, the computer tutor can easily and swiftly tailor its presentation to accommodate a wide range of student differences.

Tutor mode typically requires many hours of expert work to produce one hour of good tutoring, for any or all of several reasons.

(a) As intuitive beings, humans are much more flexible than any machine, even a computer.

(b) Creating a lesson to be delivered by a human tutor requires less time because it omits much of the detail, relying upon the spontaneous improvisation and performance of the instructor to fill in both strategy and substance at the time of delivery.

(c) Computers are still relatively crude devices and the only means we have of programming them are awkward and time-consuming.

(d) Human instruction rarely aims to accommodate individual differences because the normal classroom situation prohibits such accommodation; hence lesson preparation and design are simpler and swifter. Because such accommodation is possible with the computer as tutor, the substantive and strategic details needed to individualize the lesson tend to get included, thus often greatly lengthening lesson design and preparation time.

- Serves as a sounding board for your ideas (interactive programs, chat rooms, emails and instant messaging)

## NOTES

- Challenges your assumptions (expert advice, research data)
- Expands your horizons by exposing you to new concepts and information (virtual tours, simulations, research data)
- Forces you to think critically (examine and analyze multiple points of view, participate in online debates)
- Motivates you to participate (visual medium, multi-media, interactive programs that can work at your pace but challenge you to get to the next level)
- Helps you to produce (simplifies complex operations, magnifies your effort by converting numbers to charts, spell and grammar checking, automating presentations)
- Helps you to learn (improves retention through engagement)
- To round out the definition of computer as teaching assistant, we need to add an important, often overlooked, feature:
- Non-Judgmental

### Examples of the Tutor Mode

Historically, this mode has its roots in programmed instruction. However, when properly deployed it is far more flexible than any book- or material- based programmed instruction. For one thing, in tutor mode, the material can be presented interactively, and dynamic graphics and other sophisticated teaching aids can be integrally used. For another thing (as pointed out earlier), in tutor mode the performance history of one or more pupils can be collected and stored, then subsequently used for evaluating the material and as a basis for routing a particular pupil through the material. At the same time, this mode can be designed to move the student at a wide range of speeds and to be interruptible more or less at the student's convenience. Though the label has been applied to broader applications than just this one of using the computer as a tutor, this mode has often been called CAI (Computer-Assisted Instruction), probably because the ancillary tasks it performs are similar to those that could be performed by ideally competent teaching assistants.

This mode has had both its advocates and its critics. Criticism from those who are deeply involved in computing and education is usually directed at those making extreme claims about the positive benefits to be derived from tutor mode computing. Good criticism of this kind is exemplified by Luehrmann's "Should the Computer Teach the Student or Vice-Versa?" Neither he nor any other pioneer, however, would argue that tutor mode computing should not have a significant place in education.

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#### **4.5 THE COMPUTER AS TUTEE**

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To use the computer as tutee is to tutor the computer; for that, the student or teacher doing the tutoring must learn to program, to talk to the computer in a language it understands. The benefits are several. First, because you can't teach what you don't understand, the human tutor will learn what he or she is trying to teach the computer. Second, by trying to realize broad teaching goals through software constructed from the narrow capabilities of computer logic, the human tutor of the computer will learn something both about how computers work and how his or her own thinking works. Third, because no expensive predesigned tutor software is necessary, no time is lost searching for such software and no money spent acquiring it.

The computer makes a good "tutee" because of its dumbness, its patience, its rigidity, and its capacity for being initialized and started over from scratch. Students "teach" it how to tutor and how to be a tool. For example, they have taught it to tutor younger students in arithmetic operations, to drill students on French verb endings, to play monopoly, to calculate loan interest, to "speak" another computer language, to draw maps, to generate animated pictures, and to invert melodies.

Learners gain new insights into their own thinking through learning to program, and teachers have their understanding of education enriched and broadened as they see how their students can benefit from treating the computer as a tutee. As a result, extended use of the computer as tutee can shift the focus of education in the classroom from end product to process, from acquiring facts to manipulating and understanding them.

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#### **4.6 COMPUTER AS A TEACHING RESOURCE**

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According to a study, students who use computer for learning at home, achieved higher scores than other children, is because lessons at the computer completes teacher explanations with multimedia elements and virtual experiments. In this case students understand and retain easier difficult topics from books. The role of computer in teaching activities is becoming more important because world is in a continuous and rapid modernization. The computer plays an important role in teaching and learning process. We live in a world where changes are made with high steps, and we must keep up with them. The computer can be used in teaching-learning of play form, drawing the children. Computer use in school has and will have a great role in the presentations of lessons, and for communication and information.

Computer training is the way in which the interaction of teaching and learning, between teacher and students, is the means of this computer. Integrating computers in teaching refers to how information and tasks contained in software work is articulated with

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other sequences of training and responding to objectives pursued by the teacher. Proper handling of the computer itself can be done by teachers or by students, depending on the task of learning content and specific situation in which the learning.

If we know how to weave the traditional with the modern lesson, if we managed to make students to participate in their training, if they educate students who will know how to find certain truths, proves that the methods used by us in the educational process were most suitable, we chose the best way.

Using the computer as a tool in teaching school subjects lead to the development of critical thinking, allowing students to demonstrate spontaneous. Satisfaction of the highlights is the "Talent" to make their own creation (composition, drawing, poster).

Computers and related electronic resources have come to play a central role in education. Whatever your feelings about what some have called the digital revolution, you must accept that many, perhaps most, of your students are fully immersed in it. At the very simplest level, you will rarely receive a paper or other assignment from a student that has not been written with the help of a computer. Most of your students will have considerable experience with the Internet and will, whether you like it or not, make use of it for much of their academic work. Many of them will be accustomed to using e-mail as a normal form of communication. But it is not just students who find electronic resources valuable. Teachers can benefit from these resources as well, by employing a series of useful tools.

We stress the word "useful" because electronic resources complement, but seldom replace, more conventional teaching techniques. Electronic tools can make classes more efficient; lectures more compelling, informative, and varied; reading assignments more extensive, interesting, and accessible; discussions more free ranging and challenging; and students' papers more original and well researched. Only you, however, can judge if these techniques advance your own teaching goals.

### **1. To replace writing on the chalkboard/white board/overhead:**

- Instead of writing on the board, instructor or a student takes notes on the computer and projects this onto the screen so the whole class can see this. Purposes:
  - Enables the students to read what has been written more easily than instructor's handwriting.
  - This can then be saved as a record of class (summary of class discussion or group work) then e-mailed to the whole class or posted on the course web page.

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- Students can work in small groups and use laptop computers to take notes on their group's discussions (replacing the use of poster paper or handwritten overhead transparencies). When they share their group's findings with the whole class, they copy their work to disk and bring it up to the front of the class to project using the instructor's computer.

**2. PowerPoint - to replace slides, pre-prepared overhead transparencies, and even video:**

- Creating own presentations for class.
- Creating own presentations for class and uploading these two course web page.
- Using presentations that come on CD with textbook.
- Having students create PowerPoint presentations to give presentations in class and for presenting assignments
- Creating presentations but printing them out and creating overhead transparencies of the slides (where faculty member does not have access to a computer in the classroom or does not feel comfortable with giving PowerPoint presentation).

**3. Course web pages:**

(Either using TopClass course management system or faculty member creating own site using PageMill or other web-authoring software).

- Having a collection of pages for each course (a course site) that includes some or all of the following: syllabus, class schedule, assignments, links to readings, on-line class discussion, posting of student work, on-line testing.

**4. Internet:**

- Outside of class:
  - Required readings (having students read specific web pages as assignments). Especially useful: on-line journals (e.g. ISTE).
  - Student research (for sites on specific topics)
- In-class use:
  - Instructor integrating web sites into teaching of lesson (projecting sites on to the screen)
  - Having students use specific sites during class, either working in groups, using their laptops, or in computer lab, with one or two students per computer.

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- Having students integrate web sites into class presentations (so that as students present to the class, they project the web site onto the screen and use this as part of their presentations)

### **5. Online discussion forums:**

Using TopClass, Web Crossing, or Tom Bacig's board.

- Students to continue class discussions outside of class
- Outside "speakers" can join in class discussions online.
- Using folders within the discussion forum, students can "meet" online to do group projects.
- Distance education classes can meet online.

### **6. Student created web pages:**

- students creating on-line portfolios of their work
- class developed "clearinghouse" on particular tasks or topics
- as a means of students sharing their work with peers (for group assignments) or with the instructor.

### **7. Class e-mail alias:**

- For instructor to provide updates and reminders to students.
- To e-mail students copies of work developed in class (e.g. instead of writing on the board, instructor or a student takes notes summarizing class discussion or group work, and then this is e-mailed to the whole class).

### **8. Administration:**

The routine administration of courses (advertising a class, providing copies of the syllabus, assigning discussion sections, and getting out course news) can be more efficiently handled with a course home page, electronic discussion groups, and e-mail lists. These tools can also dramatically improve the continuity and the community aspects of courses, helping students to engage with and learn from each other and even from people outside the course.

### **9. Readings/sources:**

The Web and CD-ROMs provide a wider variety of secondary and primary sources (including visual and audio sources) than has previously been available. With your guidance, your students can now gain access to materials that were once accessible only to experts



because they were too cumbersome to reproduce for classroom use or too expensive for students to purchase. By taking their own paths through these sources, students can bring their own evidence and arguments into lectures and discussion sections, as well as write on a wider range of research topics.

### **10.Papers/presentations:**

Rather than performing assignments and taking exams from the teacher alone, students can perform more independent exercises in publishing, exhibit building, or assembling and presenting teaching units and other materials for their peers. A web archive of several terms' work can make the course itself an ongoing and collaborative intellectual construction.

### **11.Lectures:**

A computer with presentation software can provide a single tool for augmenting lectures with outlines, slides, statistical charts and tables, images, music, and even video clips. In addition to printing them as handouts, you can save in-class presentations in a web-compatible format for later review and discussion.

### **12.Discussion:**

Electronic discussion tools such as e-mail, conferencing software, and on-line chat services can seed discussion questions before the class meets, draw out your shy students, and follow up on discussions or questions on the reading between classes. For courses without face-to-face discussion sections, these tools can bring the course to life over great distances and help overcome scheduling difficulties.

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## **4.7 DIFFERENT FORMS OF LEARNING THROUGH COMPUTER: COMPUTER ASSISTED INSTRUCTION(CAI)**

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### **What is computer-assisted instruction?**

"Computer-assisted instruction" (CAI) refers to instruction or remediation presented on a computer. Many educational computer programs are available online and from computer stores and textbook companies. They enhance teacher instruction in several ways.

Computer programs are interactive and can illustrate a concept through attractive animation, sound, and demonstration. They allow students to progress at their own pace and work individually or problem solve in a group. Computers provide immediate feedback, letting students know whether their answer is correct. If the answer is not correct, the program shows students how to correctly answer the

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question. Computers offer a different type of activity and a change of pace from teacher-led or group instruction.

Computer-assisted instruction improves instruction for students with disabilities because students receive immediate feedback and do not continue to practice the wrong skills. Computers capture the students' attention because the programs are interactive and engage the students' spirit of competitiveness to increase their scores. Also, computer-assisted instruction moves at the students' pace and usually does not move ahead until they have mastered the skill. Programs provide differentiated lessons to challenge students who are at risk, average, or gifted.

Computer-Assisted Instruction (CAI), is the instructional use of a computer to present training methods including simulations, games and tutorials. CAI offers an interactive presentation of materials through the use of graphics, text, video and audio enhancements. Often used as a tool to facilitate the training experience, it can enhance the user experience and increase engagement.

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 refers to the use of the computer as a tool to facilitate and improve instruction.

CAI programs tutorials, drill and practice, simulation, and problem solving approaches to present topics, and they test the student's understanding.

### 4.7.1 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.

### 4.7.2 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.

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**4.7.3 AFFORDANCES AND SAMPLE USE**

The following table elicits the relationship between the affordances of CAI programs and our understanding of how people learn.

<b>Affordances of CAI programs</b>	<b>Five elements of Engaging activities</b>	<b>Benefits</b>	<b>Examples</b>
Presents content through rich multimedia, such as text, videos, demonstrations and interactive animations	Orientation, Elicitation	<ul style="list-style-type: none"> <li>· Increases student motivation</li> <li>· Presents information in more than one way to suit different learning styles</li> </ul>	<ul style="list-style-type: none"> <li>· Tutorial software programs</li> <li>· Educational computer games</li> <li>· When used in class, a CAI program frees teacher time from some classroom tasks so that a teacher can devote more time to individual students</li> </ul>
Embedding hypertext links	Elicitation, Restructuring of Ideas	Provide supplementary resources with relevant information to enhance the content of the CAI	<ul style="list-style-type: none"> <li>· Online tutorial software programs</li> <li>· Online educational games</li> </ul>
Ability to generate questions depending on learner's performance	Restructuring of Ideas, Application	<ul style="list-style-type: none"> <li>· Students applied what they learned from tutorial notes to questions</li> <li>· Questions asked</li> </ul>	"Drill-and-practice" tutorial programs or games, assessment programs (ex. Rosetta Stone)

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on previous questions		have a greater chance of meeting each learner's <u>zone of proximal development</u>	
Provide immediate response to students' answers	Restructuring of Ideas, Review	Immediate feedback	Programs that provide chances to review (link to previous notes/ information on the web)
Presenting thinking problems in the form of <u>games</u>	Application	<ul style="list-style-type: none"> <li>· Improves learners' higher order thinking and problem solving skills</li> <li>· Increases student motivation as games provide context for fantasy</li> </ul>	Educational computer games

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**4.8 MODES OF CAI**

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The modes of delivery and interaction are intrinsic to the structural components of CAI. The concept of CAI can be viewed from two perspectives of utilization in the CAI teaching-learning process: as an instructional medium and as a learning tool.

**Modes of Delivery**

The use of computers as instructional media is the perspective from the standpoint of the teacher. Software selected by the teacher for use by the student with the computer is classified by modes of delivery; i.e., the ways in which the student will obtain, review, and/or apply knowledge which has been delivered by the computer.

**Modes of Interaction**

The use of the computer as a tool in CAI is a far more flexible concept (Anderson, 1982). From the standpoint of the computer as a tool to assist learning, the student will obtain, review, apply, and even create knowledge by interacting with the computer in a hierarchy of modes of interaction.

**4.8.1 TYPES AND CHARACTERISTICS OF CAI MODES OF DELIVERY AND INTERACTION**

The term modes of delivery and interaction refers to the ways in which students will obtain, review, apply, and/or create knowledge by

communicating actively with the computer in the CAI teaching-learning process.

## **General, Characteristics**

### **Delineation of Modes**

Presently, as just noted, there are six modes of delivery and interaction: drill and practice, tutorial, educational gaming, simulation, problem-solving, and word processing. Each mode has a different purpose and, hence, use. Instructionally, educational software differs in design and purpose, as well as in quality. Course-ware can be classified according to modes, depending on design, instructional purpose, and cognitive level.

### **Hierarchy of Modes**

The six modes of delivery and interaction a hierarchical in levels of cognitive functioning, task objectives, and degree of learner interaction. On a scale from one to six, learning tasks in CAI range sequentially and cognitively from simple to complex, from concrete to abstract. Task objectives range from skill mastery and knowledge acquisition in the drill and practice and tutorial modes to synthesis and evaluation in the problem-solving and word processing modes. Degrees of student interaction in CAI range from relative passivity, for the more simple type of response required in drill and practice activities, to almost total action on the part of the student in the higher-level problem solving and word-processing modes.

### **Programming**

With the exception of the problem-solving mode, none of the modes requires self-programming of the computer. In other words, students need not know how to program for most CAI modes. In this sense, the microcomputer in CAI is "user-friendly."

### **Specific Characteristics**

The six CAI modes of delivery and interaction are presented in sequential hierarchical order from simple to complex for the consideration of implementers.

### **Drill and Practice**

Drill and practice programs are intended to supplement classroom instruction already received. They are designed to assist students to review, reinforce, and overlearn a skill; they can help maintain, improve, and automatize basic skills. The drill and practice mode has been the most widely researched, is the most frequently used, and is the least sophisticated CAI mode. It emphasizes basic knowledge. Recently, with the new emphasis on expanding the creative potential of students, drill and practice programs have been criticized, but wrongly so. The drill and practice mode has a specific purpose, which does not and should not emphasize creativity.

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**Tutorial Mode**

In the tutorial mode, CAI assumes the place of the teacher and provides independent instruction on a one-to-one basis. A tutorial program presents the concepts and rules of the subject matter, evaluates the student's comprehension, and provides practice through branching in the specific skills and concepts taught. Cognitive objectives of the tutorial mode are knowledge acquisition and comprehension

**Educational Gaming**

Utilizing a highly motivational format, this mode provides the student with an opportunity to use previously acquired skills. Gaming often requires the student to use and/or develop problem-solving skills, since winning is dependent on demonstrating mastery of specific skills and concepts with a high rate of accuracy and efficiency. Educational gaming involves the application cognitive level.

**Simulation CAI**

Simulation programs imitate a real situation and/or they model the underlying characteristics of a real phenomenon. Students must interact with and become part of the simulated reality. While simulations may incorporate many features of games, their real power comes from their "capacity to teach about problem-solving" (Harrod and Ruggles, 1983, p. 5). They are effective in helping students learn such diverse concepts as driving a car, trading on the stock market, or the effects of stress on the heart. In essence, simulations provide "highly accessible laboratories" (Appel and Hurley, 1984, p. 3). Simulations should be used when and/or after basic principles and concepts are learned so as "to integrate them into the context of a meaningful problem" (Cohen, 1983, p. 11). Cognitively, simulations involve both the application and analysis levels.

**Problem-Solving**

In this CAI mode, synthetic-level thinking is involved; the student "teaches the computer" (Microcomputer Notebook, 1982, p. 166). Using a programming language, the student becomes a "generative problem developer and a problem solver" (Budoff and Hutten, 1982, p. 126). In the problem-solving mode, the student combines previously learned rules into a new, yet higher rule that will, in turn, solve a problem. Students can write a computer program to test possible solutions to a variety of real problems. While most microcomputers are programmed in BASIC, programming languages such as LOGO are simple enough to be used by pre-school aged children. Currently, the problem-solving mode tends to be used with competent problem-solving children. But researchers are discovering that systems such as LOGO can also assist handicapped learners, such as the learning disabled, who often manifest a disorganized approach to

problem-solving (Chiang, Thorpe, and Lubke, 1984; MIT LOGO Studies, cited in Grossman, 1983, p. 59)

### **Word Processing**

New CAI Mode. Word processing programs have been considered as general-purpose programs having unlimited applications. In addition to these continuing applications, word processing should also be considered as a CAI mode of delivery and interaction. Word processing as a mode signifies computer-assisted writing. And writing is an important aspect of learning.

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### **Rationale**

The process of writing involves many functions on the part of the learner: handwriting; the mechanics of correct spelling, punctuation, and capitalization; appropriate grammar-usage and sentence structure; and, at its most complex level, the mental manipulation of language expressed graphically in coherent concepts and ideas. Writing, when considered as the mental manipulation of language to be expressed graphically, is "a task in higher level thinking" (Hade, 1982, p. 10); it is an analytical, synthetic, and evaluative exercise, and is "always a creative act" (Schwartz, 1983, p. 35). As such, writing constitutes an even higher-level cognitive task than programming a computer.

### **Logistics**

In the word-processing mode, the computer delivers a "blank" program which will permit electronic editing of input. Interaction occurs when the student types text in his or her own language on the computer keyboard. Corrections, revisions, and language manipulations are performed electronically by the computer- but only as directed by the student after self-error analysis.

### **Learning Tool**

For many students, some of the most difficult objectives to achieve are those of written language skills. Organizing, re-organizing, and especially rewriting can be tedious tasks for learners. Word processing makes it easy for the student to manipulate language, make corrections, erase, and rewrite. "As a tool for saving time and energy (word processing) will allow the student to focus his or her energy on composition and expression" (Hägen, cited in Appel and Hurley, 1984, p. 5). The computer and its word-processing capabilities can facilitate development of written-expression skills.

**NOTES**

**Check your progress-I**

**Notes:** a) Write your answer in the space given below:

b) Compare your answer with the one given at the end of the unit.

1) How computer is used in our school?

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2) Write down computer as a teaching –Resource.

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**4.9 COMPUTER ASSISTED INSTRUCTIONAL (CAI) AND DRILL AND PRACTICE**

In the early days—when instructional software was used primarily to tutor students—it was called computer assisted instruction (CAI). The term is still in common use, but some kinds of instructional software are designed with more constructivist purposes in mind; they support, rather than deliver, instruction. Therefore, many people consider the term CAI outdated and misleading. Teachers may hear instructional software referred to as computer based instruction (CBI), computer-based learning (CBL), or computer-assisted learning (CAL), or in more generic terms such as software learning tools. Instructional Roles for Software: Past and Present It used to be easy to designate a software package by the type of teaching function it served. It was a drill-and-practice, tutorial, simulation, instructional game, or problem solving program. These terms originated because each package had clearly different characteristics and served a different instructional purpose. In contrast, much of today’s software defies easy classification because many software packages contain several different activities, each of which may perform a different function. For example, language-learning software may have a number of straight drill activities along with activities that fulfill problem solving and game functions. Also, developers use the terms interchangeably; there seems to be no consensus among developers about the terms used to describe various types of programs. Some developers refer to a drill program that gives extensive feedback as a tutorial. Others refer to simulations or problem-solving functions as games. Software still reflects the same five functions, but in light of current trends toward multiple-function software.

The CAI can be divided into several categories. Based on the principle of education theory, there are five elements as follows:

1. Tutorial,



2. Drill and Practice,
3. Simulation,
4. Instructional game,
5. Test.

**NOTES**

The basic of CAI with drill and practice is used after learning and teaching. This CAI is available for use by students in almost all subjects, to practice the knowledge they have learned. It combines a tutor in the format of the test. The content will focus on knowledge and exercises. So the media's being used with other activities, such as normal teaching, remedial and enrichment instruction, etc. when the students completed the exercises, lessons will show feedback. If students make correct answer, they can continue next exercise. But if they make the wrong answer, it has a key to provide student study and edit .Thus, these mediums are appropriate for use in the regular classroom to review the knowledge and understanding of past content.

**4.9.1 FIVE INSTRUCTIONAL SOFTWARE FUNCTIONS**

<b>Function/Examples</b>	<b>Description</b>
<b>Drill and Practice</b> ( <a href="http://www.transparent.com">http://www.transparent.com</a> )	Allows learners to work problems or answer questions and get feedback on correctness.
<b>Tutorial</b>	Acts like a human tutor by providing all the information and instructional activities a learner need to master a topic: information summaries, explanation, practice routines, feedback, and assessment.
<b>Simulation</b> <a href="http://www.digitalfrog.com">http://www.digitalfrog.com</a>	Models real or Imaginary systems to show how those systems or similar ones work or to demonstrate underlying concepts.
<b>Instructional Game</b>	Increases motivation by adding game rules to drills or simulations.
<b>Problem Solving</b>	(a) Teachers directly (through explanation and/or practice) the steps involved in solving problems or(b) helps learners acquire problem-solving skills by giving them opportunities to solve problems.

## 4.9.2 TYPES OF INTEGRATION STRATEGIES FOR EACH INSTRUCTIONAL SOFTWARE FUNCTION STRATEGY

### Software Instructional

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Function	Uses	Directed	Constructivist
<b>Drill and practice</b>	Skill practice	X	
<b>Tutorial Information</b>	delivery	X	
<b>Simulation</b>	Demonstration	X	
	Exploration		X
<b>Instructional game</b>	Skill practice	X	
	Exploration		X
<b>Problem solving</b>	Skill practice	X	
	Exploration		X

### 4.9.3 PRINCIPLES OF THE ELECTRONIC MEDIA DESIGN

Principles of the electronic media design have nine elements as follows:

**1) Gain Attention:** Early in the learning process, it is essential that the learners are motivated. Lessons should be designed and developed using multimedia such as characters, text, and graphics.

**2) Define Objectives:** This phase is learning objectives; students will know in advance about the key issues of the content and content layout, then the teacher will tell the learners the learning objective.

**3) Activate Prior Knowledge:** Ask for recall of existing relevant knowledge, and then the design of electronic media must find a way to evaluate new knowledge, and prepare students to be ready to accept the new knowledge, to determine the basic knowledge of the learner. If a lesson is sequential learning, the review of knowledge may be in the form of encouraging the students to think about previous learning.

**4) Present Information:** It is presenting a stimulus that is related to the subject matter, the contents are must so clear indication of features such

as underlining, bold print, highlighting, and pointing to emphasize major themes is helpful.

**5) Guide Learning:** The teacher has to provide learning guidance or advice, until the students are able to find the answers themselves.

**6) Elicit Responses:** Learners respond to demonstrate knowledge and understanding of the course. This provides learners with opportunities to apply knowledge and practice skills through a real-life application activity.

**7) Provide Feedback:** Give informative feedback on the learner's performance.

**8) Assess Performance:** To monitor the student's progress and has students self-assess in their progress. Performance and student's knowledge may be measured using quizzes or other post-tests. Tests should be ordered based on the learning objectives. If there are many lessons, the instructors could be split into sections of the test.

**9) Promote Retention and Transfer:** To enhance retention and transfer of information by helping them see the information learned in practice, such as conclusion of contents and other suggestion, etc., to provide students the opportunity to review and question before the lesson finishes.

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### Check your Progress-II

**Notes:** a) Write your answer in the space given below:

b) Compare your answer with the one given at the end of the unit.

3. What is Computer-Assisted Instruction?

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4. What is Computer-Managed Instruction (CMI)?

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## 4.10 COMPUTER SIMULATIONS

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The origins of computer simulations date back to the analog computers of the 1940s of the previous century. In the 1970s analog computers were replaced by digital computers. Simulations allow us to study amongst other things the waveforms, dynamic behaviour and the steady state of systems and components. Modelling and computer

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simulation play an important role in the analysis, the design and the study of systems of electronic power control. Almost all commercially available programs operate in the time domain.

To describe physical systems it is usually possible to create a system of differential equations (DE) and algebraic relationships.

The solution of a differential equation can usually be determined by one of the following methods:

### **1.Solution by human operator (mathematician, engineer...).**

This is a possibility but would you choose to drive in a nail with your fist ?No ! People use tools that are available for the job. The tool available is a computer!

### **2.Solution with a digital computer.**

Numerical methods are used.

In education we can consider computer simulations as an additional teaching tool. Simulations in industry allows us to dramatically shorten the development phase. An additional benefit is that if we simulate we cannot “blow up” any components. It is safer to study the behaviour of an IGBT and the new circuit in a simulation first. In the case of power electronics computer simulation is, in contrast to analogue electronic circuits at signal level, complimentary with the creation of prototypes in the lab. The simulation does not replace the prototype.

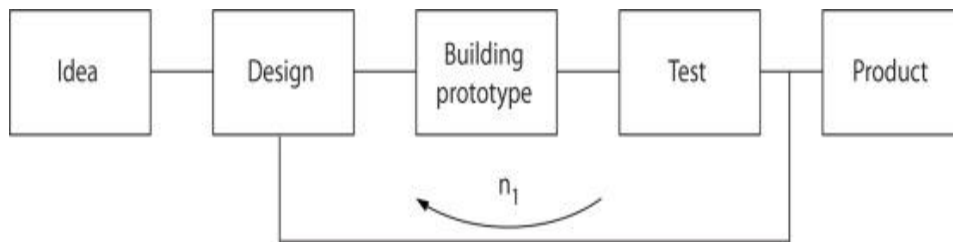
In the following figures we see the advantage obtained by implementing a simulation in the development process.

The loop indicated by  $n_1$  is repeated several times during the development-build-test phase. The most important delay in the loop is caused by building and adjusting the prototype. The time of loop  $n_1$  can vary from a few hours to a few weeks or months.

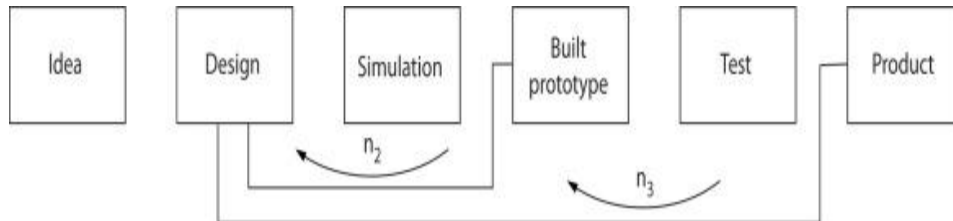
The introduction of model forming simulation in the development process has the goal of shortening the circulation time  $t_1$  of loop  $n_1$ . In figure 6-2 the development process is shown in the case where model forming and simulation is applied.

There are now two loops in the development process. Loop  $n_2$  occurs during simulation. The circulation time  $t_2$  of loop  $n_2$  is short in comparison to the circulation time  $t_1$  of loop  $n_1$  from fig. 6-1. In fig. 6-2 loop  $n_1$  is replaced by loop  $n_3$ . The number of iterations in the development process can be the same:  $n_1 = n_2 + n_3$ . The difference occurs in the fact that the largest amount of iterations in the development process occur in the simulation, indicated by loop  $n_2$  with the shorter circulation time  $t_2$ .

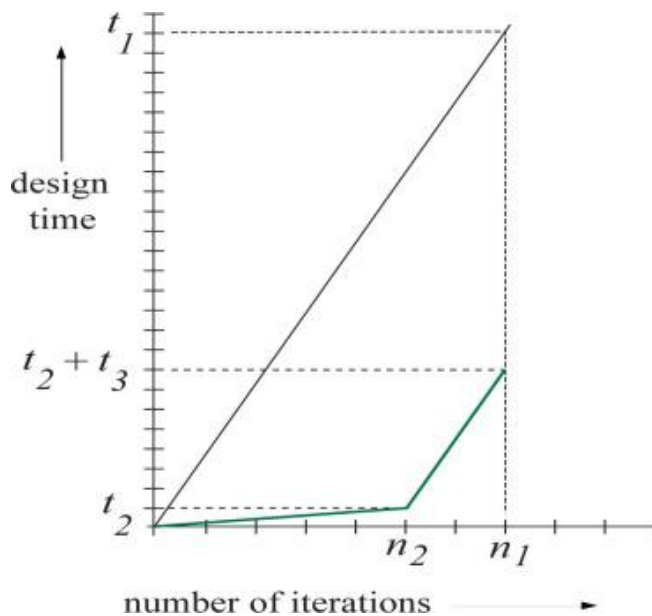
## Traditional development process



## Design process using simulation



The total time  $t_2 + t_3$  consisting of the circulation time of the simulation ( $t_2$ ) and building and testing ( $t_3$ ) is shorter than the circulation time  $t_1$  which is required for building the circuit. This is indicated in fig. The most important reason for this is that with the assistance of the simulation the new design can be tested quicker. A test with eventual adjustment is much quicker in a simulation than will be in the case of building a prototype. Optimisation can also be carried out in the simulation, included in this is the component choice and the configuration parameters of the system. In the first instance a number of different components can be compared with each other. In the second instance for the selected system the configuration parameters can be chosen.



Reduction of development time through the use of simulation

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An optimization criterion, for example the smallest error or the quickest response, can be added to the model. On the basis of the optimization criteria calculated in the simulation the design can be adjusted.

Computer simulations, the use of a computer to represent the dynamic of one system by the behaviour of another systems modeled after it. A simulation uses a mathematical description, or model, of a real system in the form of a computer program. This model is composed of equations that duplicate the functional relationship within the real system. When the program is run, the resulting mathematical dynamics form an analog of the behaviour of the real system, with the results presented in the form of data. A simulation can also take the form of a computer-graphics image that represents dynamic processes in an animated sequence.

Computer simulations are used to study the dynamic behaviour of objects or systems in response to conditions that cannot be easily or safely applied in real life. For example, a nuclear blast can be described by a mathematical model that incorporated such variables as heat, velocity, and radioactive emissions. Additional mathematical equations can then be used to adjust the model to changes in certain variables, such as the amount of fissionable material that produced the blast. Simulations are especially useful in enabling observers to measure and predict how the functioning of an entire system may be affected by altering individual components within that system.

The simpler simulations performed by personal computers consist mainly of business models and geometric models. The former includes spreadsheet, financial, and statistical software programs that are used in business analysis and planning. Geometrics models are used for numerous applications that require simple mathematical modeling of objects, such as buildings, industrial parts, and the molecular structures of chemicals. More advanced simulations, such as those that emulate weather patterns or the behaviour of macroeconomic systems, are usually performed on powerful workstations or on mainframe computers. In engineering, computer models of newly designed structures undergo simulated test to determine their responses to stress and other physical variables.

Simulations of river systems can be manipulated to determine the potential effects of dams and irrigation networks before any actual construction has taken place. Other examples of computer simulations include estimating the competitive responses of companies in a particular market and reproducing the movement and flight of space vehicles.

#### 4.10.1 TYPES OF COMPUTER SIMULATIONS

1. Stochastics or deterministic (and as a special case of deterministic, chaotic)-see external links below for examples of stochastic vs. deterministic simulations.

2. Steady-state or dynamic.

3. Continuous or discrete (and as an important special case of discrete, discrete event or DE models)

#### 4.10.2 SIMULATION THEORY

The simulation hypothesis or simulation theory proposes that all of reality, including the Earth and universe, is in fact an artificial simulation, most likely a computer simulation. Some versions rely on the development of a simulated reality, a proposed technology that would seem realistic enough to convince its inhabitants the simulation was real. The hypothesis has been a central plot device of many science fiction stories and films.

#### 4.10.3 HOW DO SIMULATIONS WORK?

A computer simulation (or “sim”) is an attempt to model a real-life or hypothetical situation on a computer so that it can be studied to see how the system works. In such simulations, the model behaviour will change each simulation according to the set of initial parameters assumed for the environment.

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### 4.11 ADVANTAGES OF COMPUTER-ASSISTED INSTRUCTION (CAI):

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(1) **Immediate feedback:** The immediate feedback provided by interactive terminals keeps students interacting and eager to keep trying.

(2) **Active participation:** Even weaker students are obliged to participate actively. They often remain passive in lectures.

(3) **No annoyance:** The computer will wait patiently for an answer and does not express annoyance with wrong response.

(4) **Graphics facility:** Interactive graphics make it possible to sample many more illustrations that could easily be shown in a textbook.

(5) **Mathematical calculations:** Mathematical calculations can be done as readily for realistic examples as for artificially simple class that can be solved analytical.

(6) **Accurate data:** Large volumes data can be handled with accuracy and without drudgery.

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(7) **Enrichment of course:** The novel technique provides enrichment of course through added variety.

(8) One-to-one interaction

(9) Great motivator

(10) Freedom to experiment with different options

(11) Instantaneous response/immediate feedback to the answers elicited

(12) Self pacing - allow students to proceed at their own pace

(13) Helps teacher can devote more time to individual students

(14) Privacy helps the shy and slow learner to learn

(15) Individual attention

(16) Learn more and more rapidly

(17) Multimedia helps to understand difficult concepts through multi sensory approach

(18) Self directed learning – students can decide when, where, and what to learn

According to Traynor (2003), previous researches demonstrated that CAI programs have a positive effect on learners' cognitive processes and increasing motivation in the following mechanisms:

1. Personalizing information
2. Animating objects on the screen to increase motivation
3. Providing practice activities that incorporate challenges and curiosity
4. Providing a fantasy context
5. Providing a learner with choice over his/her own learning

In addition, with the privacy and individual attention afforded by computers, some students are relieved of the embarrassment of progressing more slowly through lessons or giving an incorrect answer. (Britannica, 2011)

### Shortcomings

1. CAI's are generally costly systems to purchase, maintain, and update.
2. The use of computers in education might decrease the amount of human interaction.
3. Ready-to-use courseware produced by software companies might not suit the particular needs of the individual class or curriculum.



4. Courseware template on the market allows educators to insert particular elements into a general format for tests and drill instruction. However, this system tends to be boring and repetitive.
5. Software can be developed in-house, that is, a school, course, or teacher could provide the courseware exactly tailored to its own needs, but this is expensive, time-consuming, and may require more programming expertise than is available.
6. Until recently, most CAI programs are off-line, pre-programmed instructional tools which do not include features for collaboration or discussion between users. This limits the interaction between task, instructor and learner(s).

## **NOTES**

### **LIMITATIONS OF CAI**

- (1) May feel overwhelmed by the information and resources available
- (2) Over use of multimedia may divert the attention from the content
- (3) Learning becomes too mechanical
- (4) Non availability of good CAI packages
- (5) Lack of infrastructure
- (6) Disadvantages include the need to own or have access to a computer with the necessary RAM and operating system,
- (7) Lack of computer skills of many students,
- (8) Physical problems such as carpal-tunnel syndrome and eye disorders (caused by sitting in front of the computer screen for long periods of time without blinking),
- (9) Prohibitive cost of educational software
- (10) The lack of human interaction in the learning process.

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## **4.12 COMPUTER MANAGED INSTRUCTION (CMI)**

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### **What is Computer –Managed Instruction (CMI)**

Teaching and tracking process in which the learning environment is enhanced with the use of a computer .It refers to use of computer and software to manage the instructional process. Functions of CMI can include a management administration system designed to track students' performance data, schedule training ,and provide support for other training management functions.

CMI systems work in conjunction with content-authoring tools such as Macromedia's Authorware and Director to render an inclusive environment for delivering and managing a Web-based training (WBT) program. CMI systems vary depending on the needs of an organization. A government agency may have laws requiring the tracking and data storage of the training records of its employees, but a small company

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would not need such intensive capabilities. CMI systems also vary depending on the vendor and are often developed and custom-designed to fit the needs of a specific organization. Courseware management is not limited to CBT courses, however, it is more common to have computer-based courses managed by a CMI system than instructor-led courses. The built-in evaluation tools allow a training administrator to assess courseware through learner outcomes and verify individual test questions through statistical analysis.

**4.12.1 THE GENERAL CHARACTERISTICS OF A CMI PROGRAM**

1. The teacher acts as a manager of instruction over an individualized objective based program;
2. The computer program is designed to locate and manage resources;
3. The computer program is designed to evaluate learner understanding;
4. The computer program is designed to monitor learner progress;
5. The computer program is designed to advise learners of their weak points and suggest areas that need improvement; and
6. The computer program is designed to record and generate reports on learner performance and progress.

**4.12.2 PURPOSES/VALUES OF CMI**

1. More direct control of the learner needs.
2. Systematic narrowing of instructional focus.
  - a. Assessment
  - b. Prescriptions for learning
  - c. Evaluation of learning outcomes
  - d. Segments and qualifies learning content
3. Facilitate support of the teaching process
  - a. Enhancing individualization
  - b. Identification of learning needs and tasks
  - c. Simplification of teachers direct instructional role
  - d. Provides more learning time for the learner and improvement of the instructional process, not just the individual.
    - a. Attendance
    - b. Changes in pre and post class assessment
    - c. Program and staff development

5. Administrative support of instructional process
  - a. Attendance monitoring
  - b. Tracking of instructional development of individual students
  - c. Progress on competency-based mastery
  - d. Efficiency and effectiveness of assessment and prescriptive time enhanced.

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#### **4.13 THE COMPUTER AS TOOL**

It's hard to deny that computers have taken a prominent role in modern society. From the smart phones in our pockets to the smart devices controlling our appliances at home and everything in between, computer technology is everywhere. It should come as no surprise that the use of computers in education has been steadily increasing and in many ways has revolutionized traditional education. Computers in the classroom have multiple benefits for both students and their teachers.

Computers are one of the most valuable resources in a classroom because they serve so many useful functions. With computers and the internet, students today have a wealth of information at their fingertips that can help them develop their research and communication skills while preparing them for a future career in a workforce that is increasingly reliant on computer technology.

One of the most common applications of computers in education today involves the ongoing use of educational software and programs that facilitate personalized online instruction for students. Programs like iReady use computers to assess students in reading and math. Students then work on interactive reading and math lessons that are designed to target the specific academic needs identified during diagnostic testing. Educational software like this makes it easier to differentiate instruction so that lessons meet each student's unique learning needs. These tools also provide a wealth of useful data and resources that teachers can use to work with their students in the classroom and maximize learning. Online assessments are more efficient than traditional paper testing because it allows for more immediate feedback and data.

Computers also have an important role beyond primary and secondary education classrooms. Thanks to computers and technological advancements, higher education is now more accessible than ever. Many colleges and universities offer online classes, and some even offer degree programs that can be completed exclusively online. Online classes and online degree programs make it easier for single parents or students with heavy workloads to continue their education from the comfort of their own home and at their own pace.

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To function as a tool, the classroom computer need only have some useful capability programmed into it such as statistical analysis, super calculation, or word processing. Students can then use it to help them in a variety of subjects. For example, they might use it as a calculator in math and various science assignments, as a map-making tool in geography, as a facile, tireless performer in music, or as a text editor and copyist in English.

Because of their immediate and practical utility, many such tools have been developed for business, science, industry, government, and other application areas, such as higher education. Their use can pay off handsomely in saving time and preserving intellectual energy by transferring necessary but routine clerical tasks of a tedious, mechanical kind to the computer. For example, the burdensome process of producing hundreds or even thousands of employee paychecks can be largely transferred to the computer through the use of accounting software; the tedious recopying of edited manuscripts of texts or even music can be relegated to the computer through word or musical notation processing software; the laborious drawing of numerous intermediate frames for animated cartoons can be turned over to the computer through graphics software; or the fitting of a curve to experimental data can be done by the computer through statistical software.

To use the computer as tutor and tool can both improve and enrich classroom learning, and neither requires student or teacher to learn much about computers. By the same measure, however, neither tutor nor tool mode confers upon the user much of the general educational benefit associated with using the computer in the third mode, as tutee.

### **4.13.1 COMPUTER AS A TOOL FOR STUDENTS**

Technology has struggled to find its way into the classroom in all sorts of ways, from projectors and televisions to computer labs and student laptops. Along with improving the way students are taught, it is also vitally important that students learn to use computers to improve their own work and prepare for careers in a world where computers have become as common as the pencil and paper.

#### **Modernizing Education**

Education has benefited from the inclusion of technology and computers by making it easier for students to keep up while helping teachers by improving the way lessons can be planned and taught. Students who use computers learn to use word processors for work, and subsequently they learn computer jargon and strengthen grammatical skills. Students can also look up lessons on websites or through email rather than lugging heavy textbooks with them every day.

## **Improving Student Performance**

Students who use computers have been shown to attend school more steadily and perform better than students who do not use computers. Along with getting higher grades on exams, students also stated they felt more involved with their lessons and work if they used a computer. Using computers gets students to become more focused on their work at home, in collaborative projects with other students and on their own.

## **Learning Job Skills**

Computers play a vital role in the modern business world, and many of even the most basic jobs involve technology and computers. Teaching students how to use computers helps them prepare for any number of possible careers, and classes based on computer education can get even more specific. Many classes teach students to use office suite programs, create presentations and data sheets, and learn any number of programming languages such as C++ or Java.

## **Efficiency**

Computers make the learning process a lot more simple and efficient, giving students access to tools and methods of communication unavailable offline. For example, students can check their grades or lesson plans online, and also communicate directly with their teachers via email or educational platforms such as Blackboard. Students can also send work to their teachers from home or anywhere else, letting them finish work outside the constraints of school hours and teaching them about procrastination and personal responsibility.

## **Research**

Technology has made research far easier than in the past. Decades ago, students learned history by going to the library and thumbing through history books and encyclopedias. Today, many of those same books are available in digital format and can be accessed online. As the Internet has grown, so too has the available research options. Students can research topics in minutes rather than the hours it used to take.

### **4.13.2 COMPUTER AS A TOOL FOR TEACHER**

Computers are being used actively in educational institutes to improve the learning process. Teachers can use audio video aids through computer to prepare lesson plans. They can use Microsoft Power Point to prepare electronic presentations about their lectures. These electronic presentations will be displayed on multimedia projectors in class rooms. This will be interesting and easy to learn for students. Multimedia presentations are easy to deliver for

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Teachers too, These presentations save a lot of effort and time. Moreover multimedia presentations are interesting to view and hear sound and visual effects. Computer will be helpful for

1. Instructing , the students using PowerPoint slides, Word documents or Web pages and using hyperlinks for better concept clarity.
2. Helps in improving pronunciation of students by using microphones, headphones, speakers, specially prepared software and special dedicated websites.
3. Encourage the students to use internet, surf web pages and gather relevant detailed information through search engines. Students will gain a lot of information and knowledge by positive use of internet.
4. Computers have revolutionized the teaching profession in multiple ways. Teachers use computers to record grades, calculate averages, manage attendance and access data on student performance in online programs and assessments.
5. Computers have also made it easier for teachers to vary their instructional delivery.
6. Instead of lecturing at the front of the room for an entire class period, teachers can incorporate technology into their lessons to keep students engaged while appealing to a variety of learning styles.
7. From using computers to create presentations on a topic to showing video clips that complement the lesson at hand, technology helps teachers make the content easier for students to understand.
8. CBT (Computer-Based Training): **CBT** stands for Computer Based Training. In CBT, we prepare different educational programs with the help of professional teachers and audio visual aids. These educational programs are generally in the shape of lectures on a specific subject. These programs are provided on CDs. Students will learn as and when they wish and at their own homes. They can, view lecture notes, books or video lectures about their course any time they need.

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### 4.14 LET US SUM UP

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In this unit we have looked in to the teaching through computer in school. We made a deep study about the status of Computer Assisted Instruction, objectives of CAI in different level. The unit also deals with the modes of CAI and CMI programmes and what are the skills needed for teachers.

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## 4.15 UNIT –END ACTIVITY

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Have we attained all the objectives of Computer Assisted Instruction.?.Explain

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## 4.16 ANSWERS TO CHECK YOUR PROGRESS

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1.Computing in education depends upon seeing all computer use in such application as in one of three modes. In the first, the computer functions as a tutor. In the second, the computer functions as a tool. In the third, the computer functions as paychecks a tutee or student.

2. According to a study, students who use computer for learning at home, achieved higher scores than other children, is because lessons at the computer completes teacher explanations with multimedia elements and virtual experiments. In this case students understand and retain easier difficult topics from books.

The role of computer in teaching activities is becoming more important because world is in a continuous and rapid modernization. The computer plays an important role in teaching and learning process. We live in a world where changes are made with high steps, and we must keep up with then. The computer can be used in teaching-learning of play form, drawing the children. Computer use in school has and will have a great role in the presentations of lessons, and for communication and information.

3.Computer-Assisted Instruction (CAI),is the instructional use of a computer to present training methods including simulations, games and tutorials. CAI offers an interactive presentation of materials through the use of graphics, text, video and audio enhancements. Often used as a tool to facilitate the training experience, it can enhance the user experience and increase engagement.

4. CMI systems work in conjunction with content-authoring tools such as Macromedia's Authorware and Director to render an inclusive environment for delivering and managing a Web-based training (WBT) program. CMI systems vary depending on the needs of an organization. A government agency may have laws requiring the tracking and data storage of the training records of its employees, but a small company would not need such intensive capabilities. CMI systems also vary depending on the vendor and are often developed and custom-designed to fit the needs of a specific organization. Courseware management is not limited to CBT courses, however, it is more common to have computer-based courses managed by a CMI system than instructor-led courses. The built-in evaluation tools allow a training administrator to assess courseware through learner outcomes and verify individual test questions through statistical analysis.

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#### 4.17 SUGGESTED READINGS/REFERENCES

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# UNIT-V E-LEARNING - 1

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*E-Learning - I*

## **STRUCTURES**

- 5.1 Introduction
- 5.2 Objectives
- 5.3 E-learning-Definition
- 5.4 Importance of E-learning
- 5.5 E-Learning Modalities
- 5.6 Preconditions of E-Learning
  - 5.6.1 Technological and E-Learning Components
  - 5.6.2 Organizational Components
  - 5.6.3 Pedagogical Components
- 5.7 Strategic Foundation for E-Learning
- 5.8 Integrating E-Learning and Classroom Learning
  - 5.8.1 E-Learning Vs Classroom Learning
- 5.9 Let Us Sum Up
- 5.10 Unit-End Activities
- 5.11 Answers to Check your Progress
- 5.12 Suggested Reading /References

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## **5.1 INTRODUCTION**

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Recently e-learning systems are experiencing rapid development. The advantages of learning through a global network are manifold and obvious: the independence of time and space, learners can learn at their own pace, learning materials can be organized in one place and used-processed all around the world. One of the most important segments in today's development and use of the e-learning system is the personalization of content and building of user profiles based on the learning behaviour of each individual user. The personalization options increase efficiency of e-learning, thus justifying the higher initial cost of their construction. In order to personalize the learning process and adapt content to each learner, e-learning systems can use strategies that have the ability to meet the needs of learners. Also, these systems have to use different technologies to change the environment and perform the adaptation of teaching materials based on the needs of learners. The process of adaptation can be in the form of adaptation of content, learning process, feedback or navigation. This chapter introduces the

motivation and objectives studied in the subsequently presented research, and presents major standards and specifications in e-learning.

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## 5.2 OBJECTIVES

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At the end of this unit, you will be able to

- Increase the effectiveness and efficiency of E-Learning
- Use the technology in the field of education
- Use the teacher made aids and mechanical aids in the teaching all subject

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## 5.3 E-LEARNING-DEFINITION

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The term “e-learning” has only been in existence since 1999 when the word was first utilized at a CBT systems seminar. Other words also began to spring up in search of an accurate description such as “online learning” and “virtual learning”. However, the principles behind e-learning have been well documented throughout history, and there is even evidence which suggests that early forms of e-learning existed as far back as the 19th century.

**E-learning** refers to a learning system that we can obtain through the internet using an electronic device. We also call it **online learning** or **online education**. The ‘E’ in E-learning stands for ‘*Electronic.*’ Hence, the original term ‘**electronic learning.**’

The word ‘online,’ in this context, means with an Internet connection or via the Internet.

The term may also refer to a network that can provide knowledge and skills to one or more individuals. The network can provide the knowledge or skills either to everyone simultaneously or individually.

**ALLENCOMM** says the following regarding the term:

“E-learning is training provided via a computer or other digital device, allowing technology to facilitate learning anytime, anywhere.”

Understanding eLearning is simple. eLearning is learning utilizing electronic technologies to access educational curriculum outside of a traditional classroom. In most cases, it refers to a course, program or degree delivered completely online.

There are many terms used to describe learning that is delivered online, via the internet, ranging from Distance Education, to computerized electronic learning, online learning, internet learning and many others. We define eLearning as courses that are specifically delivered via the internet to somewhere other than the classroom where the professor is teaching. It is not a course delivered via a DVD or CD-ROM, video tape or over a television channel. It is interactive in that you can also communicate with your teachers, professors or other

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students in your class. Sometimes it is delivered live, where you can “electronically” raise your hand and interact in real time and sometimes it is a lecture that has been prerecorded. There is always a teacher or professor interacting /communicating with you and grading your participation, your assignments and your tests. eLearning has been proven to be a successful method of training and education is becoming a way of life for many citizens in North Carolina.

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## **5.4 IMPORTANCE OF ELEARNING**

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Today's learners want relevant, mobile, self-paced, and personalized content. This need is fulfilled with the online mode of learning; here, students can learn at their own comfort and requirement. Let's have an analytical look at the advantages of online learning.

### **1. Online Learning Accommodates Everyone's Needs**

The online method of learning is best suited for everyone. This digital revolution has led to remarkable changes in how the content is accessed, consumed, discussed, and shared. Online educational courses can be taken up by office goers and housewives too, at the time that suits them. Depending on their availability and comfort, many people choose to learn at weekends or evenings.

### **2. Lectures Can Be Taken Any Number Of Times**

Unlike classroom teaching, with online learning you can access the content an unlimited number of times. This is especially required at the time of revision when preparing for an exam. In traditional form of learning, if you cannot attend the lecture, then you have to prepare for that topic on your own; in eLearning, you can attend the lectures whenever you want with ease.

### **3. Offers Access To Updated Content**

A prime benefit of learning online is that it makes sure that you are in synchronization with modern learners. This enables the learner to access updated content whenever they want it.

### **4. Quick Delivery Of Lessons**

eLearning is a way to provide quick delivery of lessons. As compared to traditional classroom teaching method, this mode has relatively quick delivery cycles. This indicates that the time required to learn is reduced to 25%-60% of what is required in traditional learning. There are some of the reasons why the learning time is reduced by eLearning:

Lessons starts quickly and also wrapped up in a single learning session. This enables training programs to easily roll out within a few weeks, or sometime even days.

Learners can define their own speed of learning instead of following the speed of the whole group.

Saves time as a student does not need to travel to the training venue. You can learn at the comfort of your own place.

Students can choose to study specific and relevant areas of the learning material without focusing on each and every area. For example, they can skip certain areas they do not want to learn.

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### **5. Scalability**

eLearning helps in creating and communicating new training, policies, concepts, and ideas. Whether it is for formal education or entertainment, eLearning is very quick way of learning!

### **6. Consistency**

eLearning enables educators to get a higher degree of coverage to communicate the message in a consistent way for their target audience. This ensures that all learners receive the same type of training with this learning mode.

### **7. Reduced Costs**

eLearning is cost effective as compared to traditional forms of learning. The reason for this price reduction is because learning through this mode happens quickly and easily. A lot of training time is reduced with respect to trainers, travel, course materials, and accommodation.

This cost effectiveness also helps in enhancing the profitability of an organization. Also, when you are studying at your own place, you are relieved from paying for travel expenses (e.g. accommodation) when training happens in another city/state and/or external learning materials.

### **8. Effectiveness**

eLearning has a positive influence on an organization's profitability. It makes it easy to grasp the content and digest it:

It results in improved scores on certifications, tests, or other types of evaluation.

Higher number of students who achieve 'pass' or mastery' level.

Enhanced ability to learn and implement the new processes or knowledge at the workplace.

Help in retaining information for a longer time.

### **9. Less Impact on Environment**

As eLearning is a paperless way of learning, it protects the environment to a lot of extent. As per a study done on eLearning courses, it has been found that distance-based learning programs consumed around 90% less power and generated 85% less amount of

CO2 emissions as compared to traditional campus-based educational courses. With eLearning, there is no need to cut trees for obtaining paper. Thus, eLearning is a highly eco-friendly way of learning.

1. Use of technology to enrich classroom/workplace ( Internet, CD-ROM, Interactive multimedia, games/simulations, social networks).
2. Online instruction for distance learning cost savings (no face-to-face meetings)
3. Blended instruction (combining online and face –to-face learning events)
4. **Synchronous** : real-time, multiple students online ,instructor-led
5. **Asynchronous**: Students and instructor in intermittent interaction
6. Instructor-led group work (combining both synchronous and asynchronous events)
7. Self-study (online tutorials, research and discovery learning events)
8. Self-study with subject matter expert (tutoring, mentoring, coaching)
9. Web-based tutorials (individual or group using self-paced online resources)
10. Computer-based tutorials (individual or group using CD-ROM resources)
11. Video and audio resources (distributed by tape, CD, DVD, online streaming, download, or pod-cast, etc.)

**NOTES**

**Check Your Progress-I**

**Note:** a) Space is given below for your answer

b) Compare your answer with these given at the end this unit

1. What is E-Learning?

\_\_\_\_\_

2. What are the importance of E-Learning?

\_\_\_\_\_

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**5.5 E-LEARNING MODALITIES**

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**1. Asynchronous audio or video**

Teachers can post audio (podcast as mp3 files) or video files (vodcast) These files are automatically sent to a subscriber’s computer or mobile hand held device like smart phones. There needs to be a centrally placed distributor called pod catcher which is responsible for sending the files to the subscribers (students).

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**2.Blended Learning**

Online or computer based learning with face to face teaching is called blended learning. The goal of blended learning is to provide the most efficient and effective instruction experience by combining different delivery modalities.

**3.Chat / Video Conference**

Chat can be in the form of text-only, audio or audio and video (e.g. Skype). Chats can include or be supervised by teacher or it can be among students only (for example, group discussions for online collaboration).

**4.Computer-aided Learning (Courseware)**

These are either online or most commonly media based textual, pictorial, video or interactive exercises with self-assessment questions and immediate feedback.

**5.Computer Based Tests**

Instead of having scenarios (A-type), MCQs can have audio, video or flash animations to improve their validity. Tests can be given with time limit and attempt restrictions. It's a very important tool especially for formative individualized feedback to students.

**6.Educational online games / experiences**

There is a large collection of online educational games; they allow students to interact and receive feedback from the game/ activities.

**7.ePBL**

A case is created and distributed through email or VLE. Students interact with each other and with a facilitator via chat room, forum, email or whiteboard. The facilitator may take the role of the traditional facilitator or role-play the characters in the case.

**8.ePortfolio**

The learner builds and maintains a digital repository of his activities and achievements online, which they can use to demonstrate competence and reflects on their learning.

**9.Online collaboration (Wikis, Blogs and Interactive Whiteboards)**

Students work collaboratively without restriction of time and space. There are many tools to enable group collaboration online, including wikis, blogs, Google Drive, interactive whiteboards. Teachers facilitate and answer questions but usually don't actively participate in collaborative assignments.

## **10. Online Discussions Forums**

Discussions can be started on a specific topic by a student or faculty member and others can reply to the issue posted (threaded discussions). There are various options for how to structure these; for example conversation topics can either be assigned or open. Another type of discussion forum is Question and Answer in which teacher asked a question and student have to post first their answer before they can see other students response. It is possible to keep participation restricted for students or students and teachers. In many postgraduate courses, discussion forums are used as collaborative learning activities.

## **11. Repository and Hypertext**

Teachers can post readings or links to readings on a public or secure website. Readings can be in the form of html pages, PDFs, Word documents or PowerPoint etc. Hypertext can be in the form of online books, WebPages of organized and interrelated materials, to random collection of text studded with links to pages all over the world.

## **12. Synchronous audio or video**

This could be an online broadcasting of a traditional lecture or seminar, but can also be a collective viewing of a presentation (Slide Share) with chat. Different paid and free solutions are available easily.

## **13. Virtual classrooms**

A virtual reality space (Second Life) can be used to resemble a traditional real life classroom. Students and teachers create avatars (online representations of their own) and login online simultaneously in the virtual space. The teacher can then lead a usual lecture or small group discussion or an entirely new, multimedia event can be created for more learning engagement.

## **14. Virtual learning Environments (VLE)**

These are frameworks into which learning material with different activities are inbuilt. In VLE teaching and administrative tools are available in a single system. The activities present in a typical VLE are forums, chats, lessons, wikis, blogs, assignments and quizzes etc. All VLE can incorporate third party modules with SCORM packages. VLE are either open source (Moodle, Sakai) or commercial (Blackboard, WebCT).

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## **5.6 PRECONDITIONS OF E-LEARNING**

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Successful implementation of e-learning relies on the presence and blending of the three preconditions namely technological, organizational and pedagogical components. These three categories of components will facilitate successful implementation of e-learn.

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### **5.6.1 TECHNOLOGICAL AND E-LEARNING COMPONENTS**

The findings revealed that computers and other e-learning access devices; network connectivity and Internet bandwidth; and reliable learning management system (LMS) are among the most important technological components necessary for successful implementation of e-learning. These technological components play a critical role in facilitating accessibility to e-learning by the users. Such technological components should be adequate to support a large population of users accessing e-learning. The common facilities used by the students in a university like lecture halls and halls of residence should have network and Internet connectivity to facilitate accessibility to e-learning. LMS as an important tool for student administration, tracking, and delivery of e-learning education courses should be efficient and reliable. This result is similar to ESIB (2003) who also established that the institution providing e-learning must provide adequate technological infrastructure, including network connections and computers, and technical support for both students and staff.

### **5.6.2 ORGANIZATIONAL COMPONENTS**

It is evident from the results that relevant and operational e-learning policies; financial allocation for e-learning activities; sensitization and training of stakeholders on e-learning; as well as top management support for e-learning implementation are the most important organizational components necessary for the successful implementation of e-learning. Policies provide a framework and direction for the implementation of e-learning in universities. Awidi (2008) points out that the universities must have clearly defined strategic plans that spell out e-learning policies and implementation strategies. Adequate budgetary allocations are equally critical in supporting e-learning related activities like installation and maintenance of the e-learning platform, training of instructors, e-content development as well as e-learning infrastructure development. On the other hand, students and staff require training in e-learning skills. Induction of students to prepare them to take courses through e-learning as well as sensitization and training of lecturers on e-learning through workshops, seminars and other forms of training are a necessity. E-learning user training manuals should be readily available to the users. Training will provide the necessary capacity and skills to enable users use e-learning as an alternative approach to teaching and learning. Romiszowski (2004) observes that e-learning presents an entirely new learning environment for students, thus requiring a different skill set to be successful. Since e-learning is still a new concept in most Kenyan universities, lecturers need to be trained on both technical and pedagogical skills on how to use e-learning in teaching as well as creating e-content. A survey done in Kenya showed that most of the academics in universities have low ICT skills because most of them were trained in the absence of ICT environment



(Wanyembi, 2002). Blinco et al (2004) further articulates that e-learning's success rests on the fundamental requirement that instructors and students possess adequate technical skills to use e-learning tools effectively. Creating comprehensive student and staff awareness, sensitization and training is by far the greatest measure that must be dealt with before the implementation of e-learning in universities. Most importantly, for successful implementation of e-learning, top management support plays a vital role. It's the top management that will influence the issues of policy and resources to support e-learning activities as well as acceptability of e-learning in the institution. Mapuva (2009, p. 3) also points out that institutional leaders are a determinant factor, given their decision-making roles which could either make-or-break the e-learning.

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### 5.6.3 PEDAGOGICAL COMPONENTS

Lastly, it emerged quite clearly that learner support and motivation by e-learning instructors; learner and teacher skills on e-learning pedagogy; and adequate and quality e-learning content are important pedagogical components necessary for successful implementation of e-learning. Relevant training of lecturers on e-learning skills will enable them develop quality e-learning content as well as take advantage of pedagogies available in using e-learning approach in teaching/learning for the benefit of their students. Mtebe and Raisamo (2014) also found out that instructors should develop quality course content that meet intended educational benefits, appropriate to learners' knowledge, skills and abilities in order to maximize LMS use, and increase learners' satisfaction with the system. Course quality has positive effect on learners' satisfaction towards the system as well as having positive effect on LMS use.

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## 5.7 STRATEGIC FOUNDATION FOR E-LEARNING

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### 1. Instilling The Right Mindset

Having the right mindset matters. Before you start learning or designing learning experiences, realize the importance of creating the right mindset for learning.

**Fixed Mindset** refers to the belief that improvement is not possible, or a person cannot change the state that he/she is in. The problem with this particular mindset is that it is very limited, and it does not necessarily promote improvement or learning.

**Growth Mindset** motivates us to do more than we can at the moment. If we have growth mindset, we can say things like "I can do better". The emphasis is on continuous improvement. This improvement does not necessarily mean we are not doing the right things at the moment, but rather, we can do things in better and more effective ways by improving ourselves. In other words, it doesn't mean there will not be

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any failures during the learning process, but rather that the learner would desire to try again to improve themselves.

It is important to instill the right kind of mindset to our learners or to ourselves when we learn new things. It should be our goal to design learning experiences that empower and encourage learners to move forward. As learning designers, the question we should ask is: "Does my course design look discouraging, or does it motivate students to achieve better?"

### 2. The Importance of Focus

The ability to focus is a requirement for learning. When the brain is focused on a task or activity, it can transfer information to the hippocampus region of our brains. However, our focusing capabilities are limited. According to research, people can focus on a task only for **20 minutes maximum**.

Instructors might want to put all the content and knowledge they have into a course they are teaching. Unfortunately, such an intention could result in unforeseen consequences, such as overwhelming learners with long texts and presentations. Instructional Designers, however, should be mindful about how to design the course in a less daunting way. There are ways to design content in shorter yet comprehensive units. Doing so requires an understanding of the science of focus, and students' attention span. It is true that we would want the students to learn everything, but it is also true their focus is limited, and they can be easily distracted if the instruction is taking longer than usual.

So, while designing a lesson or learning something by ourselves, it is crucial to remember this rule and avoid overwhelming our learners. Learning experiences could be designed in smaller chunks rather than lengthy presentations or texts. Increasing the variety of activities can also be helpful.

### 3. Learning Should Be A Positive Experience

By now, we all heard this sentence: "Learning should be a positive experience." But what does it really mean? How can learning be positive or fun?

From a biological standpoint, *amygdala* is the part of our brains where emotions are processed. When amygdala experiences positive feelings, it helps the hippocampus region of the brain to focus on tasks better. In return, retaining newly acquired information becomes much easier. Try to remember a time when you had much fun or felt relaxed during a learning experience. It would not be wrong to assume your learning performance skyrocketed due to the lack of all the other factors affecting your learning negatively.

We would ideally want to evoke positive feelings in our learners or while learning ourselves. It is sometimes challenging to design such learning experiences. There are various ways to make learning a positive experience: Incorporating games into the lesson, making the learning a social experience (social learning) where peers or groups learn from each other (discussions, group work, peer activities), making sure the learning content is relevant to learners, adding a variety of activities, and using appropriate reward mechanisms. And most importantly, at the end of the experience, learners should feel that they have made some progress or engaged in some meaningful learning activities (learning that matters to learners).

There is much more to learning than what we read in this short post. But I think it is extremely important to consider these three factors while designing for effective learning. Please also share your comments and insights about key factors that lead to effective learning.

eLearning has graduated from being a technical subjects' niche kind of teaching to be one growing, preferred & almost essential way to learn and teach everything. People's need & desire to learn everything at their suitable pace and on their convenient time is making eLearning the objective for a number of companies. The popularity of eLearning is witnessing new heights, especially with the expansion of the technology. eLearning apps such as ezTalks have evolved as a convenient and effective way of teaching and learning.

However, you cannot just think that the transition from classrooms to the space of virtual learning is a trade of one-for-one. Creating an eLearning course to be same like a normal & traditional instructor led course is basically one sure-fire way to create one virtually unusable or obsolete course, which is frustrating and annoying for both teachers and students alike. Although eLearning shares many characteristics or features with the classroom training, it has few unique attributes as well.

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## **5.8 INTEGRATING E-LEARNING AND CLASSROOM LEARNING**

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What is eLearning?

Understanding eLearning is actually simple. eLearning is basically learning to utilize electronic technologies and devices to access an educational curriculum, which is outside of one traditional classroom. Quite often, eLearning is referred to as a program, course, or degree that is delivered entirely online.

There are a number of terms that are commonly used to describe eLearning. It is sometimes described as computerized learning or electronic learning. Sometimes, it is also described as internet learning or internet learning. eLearning can be defined as courses, which are specifically and specially delivered online via the internet. eLearning is

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not the course that is delivered via video tapes, CD-ROM or DVD, or over some television channel. eLearning is interactive and provides ability to communicate with other students, professors, or teachers in the class. Sometimes eLearning is delivered live, where one can raise his/her hand “electronically” and interact with the person in actual time & at times it is some lectures, which has been pre-recorded. There is usually a professor or teacher communicating/interacting with you & grading your assignments, your participation & your tests.

What is Classroom Learning?

Classroom learning, as the name suggests, encompasses the merits of the setting of one traditional classroom. Classroom learning needs a certain number of participants or students to be active listeners & participate in that learning environment. The students and teachers need to be physically present in the classroom. Classroom learning promotes an open exchange of ideas and face-to-face interaction of the students and the teachers. The classroom learning also promotes socialization among the teachers and the students via team projects, peer evaluation, and group discussions.

The classrooms learning usually consist of one teacher and a fairly large number of students. The instructor often fails to give equal attention to each of the students and hence, passive learning takes place. This is the biggest disadvantage of classroom learning.

### 5.8.1 eLearning Vs Classroom Learning

#### 1. Social Interaction

Social interaction and communication among colleagues, students, & instructors tend to be one crucial part of the traditional or normal classroom learning. Questions asked & answered, and hands are raised are some common factors of the traditional learning. While these factors are sometimes absent in the eLearning environment, which does not mean that these are not possible in eLearning.

Studies show that online interactions encourage substantive discussion and participation. These social interactions occur through chat, forums, email, and discussion boards. As a matter of fact, eLearning encourages active learning.

#### 2. The Place to Learn

In the setting of the traditional classroom, there is one physical classroom, unlike eLearning. eLearning, however, transforms any place into a classroom. You can start and stop whenever you want, review/replay material or information during the process of learning & even after. This is not possible in the setting of the traditional classroom. However, you can record the lecture or take notes in the traditional classroom, but it's not as convenient as eLearning or online learning.

The ability to replay or review information of the student at any point of time is the biggest advantage of eLearning. It helps the students to understand the information better. This further improves the quality of the learning process.

### **3. Instructional Material**

Usually, when a student takes one training course, he/she will get the material presented verbally & sometimes with the help make PowerPoint Presentation or other similar visual aids. But in eLearning, the visual and written notes are presented in the place of a traditional instructor. The written and visual notes are presented differently in eLearning. There are usually headlines, highlighted/bold text, bulleted lists, subheadings & other similar devices, which make the material more interesting and important.

### **4. Audio, Visual & Beyond**

The majority of the teaching techniques of an instructor in traditional classrooms cannot be transferred directly to one virtual environment. eLearning, on the other hand, have a greater and wider range of tools and media that can be used such as visual storytelling, simulations, scenarios, and interactions. You can also use moving graphics as a part of eLearning presentations. These help the instructor to make the message clearer. However, the enhancing a message with visuals can be a distraction. Therefore, the instructor should use necessary enhancements only.

### **5. Learning Time**

An eLearning course is usually less time consuming compared to the time invested in traditional classrooms. eLearning courses take forty to seventy-five percent less time comparatively. Further, in the case of eLearning, the participants and students can choose to take a smaller session in order to understand the information better.

Just because the methods of traditional classroom are used in eLearning, it does not mean that the traditional classrooms are better. Traditional classrooms have drawbacks as well. eLearning is a revolution over the traditional classrooms. The process of learning and training has improved because of eLearning or online classrooms. Latest eLearning apps such as ezTalks Meetings offer personalized training sessions with interactive tools for better understandings.

eLearning is becoming popular because of its flexibility and time efficiency. Participants and students no longer need classrooms to learn new information. Students can now learn at their own convenient time and place. eLearning has effectively enhanced lives of employees and workers & at the same time, helping companies to grow as well.

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## **6.Instruction**

The instruction process is very different online than in the classroom. The eLearner typically gets assignment instructions and class content through an Internet portal. The instructor serves more as a class facilitator and guide, organizing the materials and making them available. In a classroom, the instructor has a more direct and engaging role with students, and they learn through a combination of auditory, visual and hands-on experiences. The eLearner must have the discipline to engage reading and assignment content more assertively than a classroom student, who experiences education by showing up for class ready to participate.

## **7.Teamwork**

Team-based or collaborate learning is a significant component of many college programs. Students must learn team skills and collaboration to meet the needs of employers. In a traditional classroom setting, students learn teamwork through direction communication, conflict and production within a small group. Online, students typically participate in virtual team activities, including small group discussion. On team projects, communication usually occurs via e-mail, social media or mobile devices.

## **8.Participation**

Class participation in group discussions, activities, case studies and other active learning processes are common in classrooms. During lectures, professors often ask for student input on topical discussions or in response to questions. They also want students to actively participate in role playing or team activities. Professors try to mirror as much of this participation component as possible through technology. E-mail interaction between students and professors is a common communication format. Team or class discussions through forums are often used to replace the typical classroom discussion.

## **9.Technology**

The role of technology in learning is a major difference between eLearning and classroom learning. Online students essentially complete the bulk of their active class involvement through a computer and Internet platform. While some students may be leery about learning this way, others like the opportunity to develop technology skills presented by online classes. Traditional classes often include student projects and presentations using computers, software programs and web tools. Some instructors also ask for students to use mobile devices and laptops for certain activities.

**Check your Progress-II**

**Note:** a) Space is given below for your answer

b) Compare your answer with these given at the end of this unit

3. Integrating E-Learning and classroom.

4. What are the types of preconditions of E-Learning?

**NOTES****5.9 LET US SUM UP**

In this unit you have studied in detail about the E-Learning and definitions of E-Learning. We have described the ways to use various teaching modes. This will make the teachers aware of the use of technology in the field of education.

**5.10 UNIT-END ACTIVITIES**

Discuss-e-learning replace classroom teaching learning process.

**5.11 ANSWERS TO CHECK YOUR PROGRESS**

**1.E-learning** refers to a learning system that we can obtain through the internet using an electronic device. We also call it **online learning** or **online education**. The 'E' in E-learning stands for '*Electronic*.' Hence, the original term '**electronic learning**.'

2.The online method of learning is best suited for everyone. This digital revolution has led to remarkable changes in how the content is accessed, consumed, discussed, and shared. Online educational courses can be taken up by office goers and housewives too, at the time that suits them. Depending on their availability and comfort, many people choose to learn at weekends or evenings.

Unlike classroom teaching, with online learning you can access the content an unlimited number of times. This is especially required at the time of revision when preparing for an exam. In traditional form of learning, if you cannot attend the lecture, then you have to prepare for that topic on your own; in eLearning, you can attend the lectures whenever you want with ease.

3. **E-Learning:** There are a number of terms that are commonly used to describe eLearning. It is sometimes described as computerized learning or electronic learning. Sometimes, it is also described as internet learning or internet learning. eLearning can be defined as courses, which are specifically and specially delivered online via the internet. eLearning is not the course that is delivered via video tapes, CD-ROM or DVD, or over some television channel. eLearning is interactive and provides ability to communicate with other students, professors, or teachers in the class. Sometimes eLearning is delivered live, where one can raise his/her hand "electronically" and interact with the person in actual time & at times it is some lectures, which has been

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The classrooms learning usually consist of one teacher and a fairly large number of students. The instructor often fails to give equal attention to each of the students and hence, passive learning takes place. This is the biggest disadvantage of classroom learning.

4.(i) Technological and E-learning Components

(ii) Organizational Components

(iii) Pedagogical Components

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**5.12 SUGGESTED READING /REFERENCES**

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## UNIT-VI E-LEARNING-II

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*E-Learning - II*

### STRUCTURES

6.1 Introduction

6.2 Objectives

6.3 Creating your e-learning strategy; analysing your current situation, describe your direct situation, set you vision and mission, gap analysis, and building an action plan

6.4 Limitation of e-learning

6.5 Let us sum up

6.6 Unit-end Activities

6.7. Answers to check your Progress

6.8 Suggested Reading /References

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### 6.1 INTRODUCTION

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In the 'Information Age' where the need for 'knowledge workers' increases as the need for manual workers decreases, 'lifelong learning' is seen as key to the continued success of modern society. 'e-Learning' is considered by many as the only viable solution to the problem of delivering the resources required to facilitate lifelong learning.

e-Learning is the employment of technology to aid and enhance learning. It can be as simple as High School students watching a video documentary in class or as complex as an entire university course provided online. e-Learning began decades ago with the introduction of televisions and over-head projectors in classrooms and has advanced to include interactive computer programmes, 3D simulations, video and telephone conferencing and real-time online discussion groups comprised of students from all over the world. As technology advances, so does e-learning, making the possibilities endless.

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### 6.2 OBJECTIVES

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At the end of that unit, you will be able to

- Develop insight into the E-Learning
- Understanding the role of teachers in recent trends in teaching learning process.

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## 6.3 Creating your E-learning strategy; Analysis your current situation, describe your direct

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### situation, set you vision and mission, Gap Analysis, and Building an action plan

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Online learning presents new challenges beyond those of a traditional classroom because students must become more responsible for their learning. Many learners are unfamiliar with the online learning environment, which may include unfamiliar technology, isolation from instructors and university staff, and a lack of face-to-face interaction other learners. As online instructors, we must give additional attention to strategies that will keep our learners engaged, create a successful learning environment, and provide a rewarding learning experience where learners feel supported, valued, and connected.

#### Ideas for best Practices

Start early by reaching out to your learners. One way to do this is to send an email that provides a PowerPoint, Jing, or YouTube video that highlights some of your experience and accomplishments. Do not forget to include personal interests. Students like to know their instructors are real people who have shared many of the same sorts of experiences that they have.

Provide your students with information on how to get started in the classroom (Briggs, 2015). Try creating a PowerPoint or other media presentation highlighting the class requirements (i.e. assignments and discussions). Keep the presentation short and succinct. Point out any nuances to the requirements, such as specifics in a discussion or assignment that many students neglect or the use of outside references in their writing. Then, schedule a telephone conference to discuss the major assignments or requirements of the course. This provides learners with the opportunity to ask questions on all aspects of the course. It also provides a more human element to the course. It is vital that students see you as a person and that they connect with you from the onset.

Create templates or outlines to help guide learners and clarify the expectations. Learners may have been out of the learning environment for a time or be unfamiliar with style guides or with how to write an effective paper. Many students struggle with APA or MLA. By providing templates that adhere to the requirements of the course you also provide learners with examples of the university required writing style (ie. APA) thus lowering the stress of learning both the writing style as well as the assignment requirements. Here's an example of a template we provide to our students.

Give specific feedback to students on what they did well and offer suggestions on how to improve. It is important that you always begin with a positive comment, and then introduce 2-3 specific ways to

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improve, and then end with a positive comment. Do not overwhelm learners with too many corrections. Instead focus on 2-3 areas that are attainable by the next assignment. For example: APA in-text citations for direct quotes or help in including transition statements that improve the flow of the paper or assignment. If there are too many “errors” then the learners become overwhelmed and it is less likely that they will address the issues on subsequent assignments. In addition, offer to schedule one-on-one telephone or Skype sessions with your learners to discuss any concerns or questions they may have. Just 10 minutes can get the students back on track and have them feeling more confident about their ability to be successful in the course.

Post weekly announcements, reminders, and tips for assignments or discussion postings. It is a good practice in these announcements to introduce the new week, call attention to anything that is due during the current week, and then provide a section on what learners can expect in future weeks. This is also a good time to remind students of timelines for major assignments, exams/quizzes, or special projects that are due in the course.

You can also provide learners with additional resources and links to assist them with their work. Research has documented that students report a strong positive connectedness and improved academic success with instructors that provide external resources/links to help them in the classroom (Brown &Starrett, 2017).

Finally, design a Frequently Asked Questions (FAQ) page that answers many of the common questions students have about a course. The FAQ page serves as a valuable tool that helps students quickly find the information they need, when they need it; resulting in more independent learners and fewer repetitive questions for you. It also reduces their stress levels because it outlines where to find key resources, such as writing tutors, technology support, and assistance with accommodations.

By being proactive as instructors we can take some of the stress out of the online learning environment while making the experience both rewarding and successful.

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## **6.4 LIMITATION OF E-LEARNING**

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All of us have access to the internet and we use it for many different things like researching for some information for school and college projects, downloading music, pictures, wallpapers, and screen-savers, to get updates on the latest happenings all over the world, emails, instant messaging, chats, and many other things. But do you know there is one more advantage of the internet, and that is learning? Yes! You can educate yourself in the comfort of your own home and get a degree through the internet now. With the latest technology, even the impossible seems possible now.

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**Web-based Learning At A Glance**

Web-based learning is commonly referred to as eLearning or online learning. It essentially includes learning online through the courses that are offered on the net. Emails, live lectures, and videoconferencing are all possible through the net. This enables all the participants to give their views on a particular topic and then discuss them further. They also offer static pages like course materials that are printed for the benefit of all the participants. One of the main advantages of accessing pages on the web is that most of the web pages have hyperlinks that will lead you to another page and thus opens up a vast amount of information on the net.

You don't have the time to actually go to a University and attend classes. Earlier it would have been a major problem, as you wouldn't know how to manage that, but not anymore. With the several courses available online, you can actually sit at home and learn. No more of waking up early and attending classes or that irritating class mate. Now take whichever course at peace and at your convenience. A web-based course would typically include course information, timetable, notice board, curriculum map, teaching materials like articles, slides, and handouts, communication through discussion boards and email, summative and formative assessments, student management tools like statistics, records, and student tracking, and also links to external and internal websites that are very useful.

But besides the benefits, are there any limitations of this practice? Let us have a look at the advantages and disadvantages of eLearning.

Well, there are not many disadvantages of eLearning, the main one being that you get knowledge only on a theoretical basis and when it comes to putting to use whatever you have learnt, it may be a little different. The face-to-face learning experience is missing, which may matter to some of you.

1. Most of the online assessments are limited to questions that are only objective in nature.
2. There is also the problem of the extent of security of online learning programs.
3. The authenticity of a particular student's work is also a problem as online just about anyone can do a project rather than the actual student itself.
4. The assessments that are computer marked generally have a tendency of being only knowledge-based and not necessarily practicality-based.

**NOTES****1. No self-discipline**

Proponents of e-learning claim that the main advantage of this learning method is that it is self-paced. And it's true. If you need to watch a video again, you can. If you want to take a break from the material, you can stop and come back to it when you are feeling refreshed.

However, because of this inherent freedom, e-learning often translates to no learning. In a self-paced environment, an e-learning task can undergo an irresistible gravitational pull to the bottom of the list, where it can languish for days, weeks, or even indefinitely. The fact is, many people find it much easier to internalize new skills and knowledge through active training sessions with other people, than through an impersonal e-learning module.

**2. No face-to-face interaction**

While e-learning can be quite interactive these days ,through the use of video conferences, webinars, and face-to-face video chat, it still is not the same as sitting across the room from a real person. Simply put,there is no substitute for interacting with, and learning from, a fellow human.

**3. Lack of flexibility**

E-learning can be great for learning specific skills and for knowledge that needs to be transferred. However, with more complex skills and competencies, it is incredibly difficult to put together an effective e-Learning programme. It is these skills, which can only be discovered when you start thinking deeply and engaging in an activity or topic, that can make or break an organisation. The best learning happens when students discover the solutions on their own by asking questions and obtaining clarification and with e-learning this is difficult, if not impossible to do.

**4. Lack of input from trainers**

E-learning is structured. When a programme is developed, it is based on what the course developers think is the right curriculum at the time. However, learning materials can quickly become outdated – and may contain errors even from the beginning. The best trainers will sit and talk to people and engage with them to find out what they need to know, and how they need to learn it. Student feedback is highly valuable, however, that's far less possible with an e-learning course. Skilled trainers and subject matter experts are at their very best when they are being grilled by - and interacting with - their students. This interaction results in a better training process and better trainers. In e-learning, it's largely not present.

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**5. Slow evolution**

After an e-learning course is developed, it can take an inordinately long time for any needed changes to be worked in. If a business model changes, or market conditions are disrupted, online training can quickly be made obsolete. This is a waste of the time and energy that were invested to get the course up and running. However, with standard training-conducted in the room, with live trainers-the course can be changed rapidly and even on the fly. Live training remains fluid, and will always be in tune with the particular needs of the business.

**6. Good e-learning is difficult to do**

Developing a really effective e-learning course takes time, money, and a great amount of expertise. A good e-Learning course involves multimedia, custom web development, technical support, and strong User Interaction design. Although the market is improving, many of the first e-learning courses were clunky and unwieldy, and the technical and design problems negatively impacted the learning process.

With live training, the standard system, process, and best practices are far more established and well understood. The best practices for e-learning courses are still evolving and are a lot trickier to get right.

**7. Lack of transformational power**

It should be said that e-learning is effective for training process execution and for imparting certain kinds of knowledge. However, real learning – game changing learning – comes about through live connection with a more experienced practitioner. It is through this engagement that a true transformation occurs and the learner becomes more effective as an individual, moving to their next level of performance. Such change is not par for the course with e-learning.

**8. No peripheral benefits**

When you bring together a team of people to be trained with subject matter experts, you set the stage for something more than just basic learning. If structured right, the dynamics of personality, intelligence, vision, and creativity all intertwine to create a group that is more than the sum of its parts. Group situations can produce solutions to core business problems and bring about massive transformations - largely because of the sheer energy that is produced by the environment of a team that has come together for a single purpose.

Similarly, live training can foster team-building and create an environment where individuals deepen their relationships, get know each other better and learn in a unique environment where they all have

the same goal. Done right, training is about much more than just pushing new information into employees' heads.

E-learning certainly has its benefits, but HR professionals must understand the limitations and disadvantages that are inherent with these training schemes. These factors should be carefully considered when developing any training schemes. These factors should be carefully considered when developing any training plan to determine the right solution for your business.

### **9. ELearning depends on technology a lot.**

While e-learning might look like a learning tool available to anyone, in reality, it's not. Not all people have stable internet access and computers that are powerful enough to support online streaming, for example.

Some might have all the necessary technologies but struggle with using it. For example, older students might find it hard to master all the newest tech gigs. This problem, however, can be solved by offering them some proper tutorials.

### **10. Some find it hard to motivate and organize themselves.**

Being able to learn at a comfortable pace and organize your learning on your own is a disaster for some students. While some people are good in self-organization, some cannot do this without having a clear deadline on writing a term paper and the need to report their progress to the teacher. Some can do so but still feel better working and learning around people because it motivates them more.

### **11. Some students might feel isolated.**

For some students college is not only the place where they can learn – it's also the place where they come to socialize, to make new friends, and to learn something more from their professors. With e-learning, this can be hard (if not impossible) to achieve. Sure, you'll still have online chatrooms and you'll be able to ask your instructor questions but the level of personal connection would hardly be the same as it would in college. That's why some students might feel isolated and deprived of support.

### **12. The feedback might not be enough.**

The feedback is one of the biggest drivers of students' progress. The students are able to improve only when they know their flaws and weak points.

While online instructors do give students feedback, they still might not have enough time to work with them properly, explaining every detail. This could lead to some students falling behind, having gaps in their knowledge, and not completing the course successfully enough.

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Summing this up, online learning does have its pros and cons. The pros are mostly focused on the availability, low costs, and flexibility of the whole process. The cons, however, are mostly about the personal and emotional factors. Most of them aren't critical and can be easily fixed with time.

However, while the benefits of e-learning are obvious, it's still important to remember that not all courses can be taught online. Some education does require physical presence, working with non-digital objects and in a different environment. Moreover, sometimes only the

### **Check your Progress-I**

**Note:** a) Space is given below for your answer

b) Compare your answer with these given at the end of this unit

1. What are the Limitations of E-Learning?

physical presence can help students build necessary skills, both professional and social.

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## **6.5 LET US SUM UP**

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In this unit we have seen the E-Learning strategy and Limitation of E-Learning. Hence they should allow the various methods correctly to facilitate learning.

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## **6.6 UNIT-END ACTIVITIES**

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Make the case study of the e-learning and classroom learning which is suitable for and your student.

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## **6.7.ANSWERS TO CHECK YOUR PROGRESS**

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- Most of the online assessments are limited to questions that are only objective in nature.
- There is also the problem of the extent of security of online learning programs.
- The authenticity of a particular student's work is also a problem as online just about anyone can do a project rather than the actual student itself.
- The assessments that are computer marked generally have a tendency of being only knowledge-based and not necessarily practicality-based.

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## **6.8 SUGGESTED READINGS/REFERENCES**

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- **Jill Alred, and Candace Adams (2018)**, *Strategies for Creating a Successful Online Classroom* ,Retrieved from<https://www.facultyfocus.com>

## **NOTES**



- **Isabelle Clover (2017)**, *Advantage and Disadvantages of eLearning*
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***NOTES***

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# UNIT- VII MULTIMEDIA AND LEARNING

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## STRUCTURES

- 7.1 Introduction
- 7.2 Objective
- 7.3 Multimedia
  - 7.3.1 Meaning
  - 7.3.2 Definition
- 7.4 Applications of Multimedia
- 7.5 Multimedia classroom environment for learners at school level
- 7.6 Features of Multimedia
  - 7.6.1 Sound effect
- 7.7 Image effect
- 7.8 Animation effect
- 7.9 Video effect
- 7.10 Let us sum up
- 7.11 Unit-end Exercise
- 7.12 Points for discussion
- 7.13 Answers to check your progress
- 7.14 Suggested Reading/References

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## 7.1 INTRODUCTION

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Multimedia is defined as any combination of text, graphic, sound, video and animation. Multimedia can be delivered to user via electronic or digital manipulated means. In order to create a good multimedia project, you need to be creative, technical, organizational and business skills. When the user is allowed to control what and when these elements are delivered, it become an interactive multimedia. Interactive multimedia can be called hypermedia. This happened when a user is provided with a structure of linked elements for the use of navigation.

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## 7.2 OBJECTIVE

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At the end of the unit, you will be able to:

- Explain the concept of multimedia and its implications
- Realize the multimedia in the classroom environment

- Describe the features of multimedia

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## 7.3 MULTIMEDIA

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Multimedia means that computer information can be represented through audio, video, and animation in addition to traditional media (i.e., text, graphics drawings, images).

Multimedia is more than one concurrent presentation medium (for example, on CD-ROM or a Web site). Although still images are a different medium than text, multimedia is typically used to mean the combination of text, sound, and/or motion video. Some people might say that the addition of animated images (for example, animated GIF on the Web) produces multimedia, but it has typically meant one of the following:

- Text and sound
- Text, sound, and still or animated graphic images
- Text, sound, and video images
- Video and sound
- Multiple display areas, images, or presentations presented concurrently
- In live situations, the use of a speaker or actors and "props" together with sound, images, and motion video

### 7.3.1 MEANING

Any visual representation that has a combination of audio, video, animation, or graphics. Multimedia is usually a more enjoyable and informative experience than text. For example, a Thesaurus that is in multimedia format could have audio of famous speeches instead of only the transcription.

### 7.3.2 DEFINITION

According to Vaughan (2006), multimedia is a combination of text, graphic, animation, audio, and video which are everything we can see and hear in our daily life. Multimedia also refers to the uses of computer technology to create, store and experience multimedia content (Singh, 2007). Multimedia applications play a crucial role in education which range from preschool education to postgraduate students and corporate training packages.

Multimedia is the field concerned with the computer-controlled integration of text, graphics, drawings, still and moving images (Video), animation, audio, and any other media where every type of information can be represented, stored, transmitted and processed digitally.

A Multimedia Application is an Application which uses a collection of multiple media sources e.g. text, graphics, images, sound/audio, animation and/or video. Hypermedia can be considered as one of the multimedia applications.

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- a combination of media, as film, tape recordings, slides, and special lighting effects, used for entertainment or education.
- a combination of communication media, such as television, newspapers, and radio, used in an advertising or publicity campaign.
- mixed media.
- a combination of text, data, pictures, sound, video, etc., as on a CD-ROM compact disc, for interactive access through electronic computers.

In the last few years, multimedia became a common expression. Every day you are confronted with multimedia applications without really realizing it. It is to say that multimedia does not only exist on a computer's screen, but also in today's newspapers.

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### 7.4 APPLICATIONS OF MULTIMEDIA

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Multimedia applications can be defined as an application that uses a combination of many media sources such as texts, graphics, audios, videos and animations. It is often use to deliver information which is more powerful than printed learning resources such as printed text book. It also allows users to interact with the information quickly and accurately. Educational multimedia applications enable students to get information in various formats. Examples of multimedia applications are World Wide Web, courseware, interactive TV, computer games, and virtual reality.

In education, multimedia application is used to provide computer based training courses and reference books such as encyclopedia. A computer based training courses lets the students go through a series of presentation, text about a particular topic in various information format (Singh, 2007). Multimedia applications are used by teachers and lecturers to convey information such as lecture slides, assessment materials and others learning resources. It can also use by students to learn new skills and knowledge without lecturers guidance.

According to Steinmetz and Nahrstedt (1995), “Multimedia applications are moving from a single PC environment to either a multi-user environment or to a personalized user environment.” The rapid innovation and development in information and communication technologies has been increased the used of multimedia applications in our daily life and brought the changes to computing, entertainment and education. However, educational multimedia applications will not going to replace the roles of teachers or lecturers, it will only allow students to learn more when compare with traditional teaching methods.

Multimedia applications for educational purposes are similar like the printed text books and other teaching materials, but they can be come in a wider range of sources. The potential of multimedia

applications for educational purposes is well-recognized by the universities, school, government and private organization. Educational multimedia applications can be more focused on specific objectives or in more comprehensive ways (Norhayati&Siew, 2004).

### **Multimedia tools and Applications**

A Multimedia Application is an application which uses a multiple media sources e.g. text, graphics, images, sound/audio, animation and/or video. Multimedia conference covers the selected tools applied in multimedia systems and key multimedia applications. It comprises of Audio, video processing, Virtual reality and 3-D imaging, Virtual reality and 3-D imaging, Multimedia and Artificial Intelligence.

Multimedia Applications is the creation of exciting and innovative multimedia systems that communicate information customized to the user in a non-linear interactive format. Multimedia conference discusses the basic and novel characteristics of multimedia document handling, programming, security, human computer interfaces, and multimedia application services.

- Audio, video processing
- Education and training
- Multimedia analysis and Internet
- Artificial Intelligence
- Virtual reality and 3-D imaging
- Wireless, Mobile Computing
- Animation and Graphics
- Visual Communication

Multimedia is vital in our life. This is because it is pack with various elements such as text, graphic, sound, video and animation. All of this element can be seen in our surrounding. It is also used in various fields such as in education, training, business, games and science and technology. This is a proof that multimedia is important. In fact, multimedia is changing the ways of learning itself. Instead of just limiting you with a linear presentation such as reading text from a book, multimedia makes many improvement in learning by bringing various elements in order to make it more dynamic.

### **"Multimedia is a synthesis:**

A hybrid offering the advantages of the user-driven book with the wonders of electronic technology" -Robert Winter; UCLA Roundtable in Multimedia

### **Education courses, skills and knowledge are often taught in a context**

To overcome this, the use of multimedia as education aids help to provide a real world example using a computer with high quality

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content. The various type of software available on the market can also help to provide a friendly interactive method of learning.

Multimedia and tool such as the internet can provide teacher an instant excess to millions of resource available. These material can help the teacher to provide the students with cooperative learning, critical thinking, discussion, and problem solving. So, multimedia approach in education provide many advantage over the traditional method.

### **Multimedia Elements In Education**

Multimedia elements can be use for many thing. With the help of a computer software such as Adobe Photoshop, Adobe Illustrator and Adobe Flash you can create and combine various multimedia elements to create a great project. But, you must know each and every function of those multimedia elements so that you can applied it in your learning.

#### **A. Text**

Text are the most basic element in multimedia and it is very easy to use. But, you must not underestimate it because text can give the most impact on the quality of the multimedia interaction compared to the other elements.

This is because text contain a lot of font. A font is a collection of characters of a single size and style belonging to a particular typeface family as shown in Figure 1. In general, text are used in order to provide important information. This is because text are more direct and easy to understand rather than the other multimedia elements.

In learning, text are the most commonly used element. But, by using multimedia text, the word can be much more interesting rather that plain text thus increasing the learning effectiveness.

#### **B. Graphic**

Graphic are two-dimensional figure or illustration. It is the most creative ways of learning approach. It can be either a photograph, drawing or picture. There are many types of picture format such as GIF, JPEG and PNG. Using graphic in education will increase the students understanding.

It will also enhance their memory skill because picture are easy to remember. This is because image use a massive amount of cortical skills such as color, form, line, dimension and imagination. This will help the students to get a clear picture of what they are learning.

#### **C. Audio**

Audio has been use in education for many decade. Because everything that we learn can be recorded, it is an effective tool for the students because they use it to interact with the course content provided by their teacher at any times and any location that they want. Audio

also ease the students by conducting live online discussion via audio tools and platform. There are a few widely use software that can be use for this such as Wechat, Whatapps, Line and Skype.

This will not only save some time rather than meeting face-to-face it also frequently used for long distance learning. Sound can also be use by teacher to present a lot of information at once. This will help teacher to explain the content of the topic in a much interesting ways which will help the students to understand the topic.

#### **D. Video**

Video is widely used multimedia element. It also has the highest performance on your computer or device among the five elements. There are a few standard video format for educational use such as MPEG2 that is used for Digital Versatile Disc (DVD) playback or MPEG4 for home video.

Sometimes, using text or other multimedia elements to convey information are hard and complex This type of multimedia element are used because it can provide visual stimulation for students so that they can have a better understanding in learning.

This prove to be helpful in surgical training where students cannot just understand the producer for surgery just by reading. So, a video of a surgery in action is needed so that the students can understand. Teacher can also ask their students to make a video project. This is because it can help them getting in touch with the real element of what they are learning and show it to their other classmate.

It also can help to enhance their practical skill. This is because, by doing a video they are expose to the outside element rather than just sitting in the classroom. So, they can gain more experience and improve their skills. This shows that video can help to improve our educational system.

#### **E. Animation**

Animation are created using continuous motion and shape change combined together to produce an animation. This happened because of a biological phenomenon called persistent of vision and psychological phenomenon called phi. This enable us to see animation the way it is. Animation are different than video. This is because video is taken from real life event while animation are usually taken from drawing. There are a few animation software that are used in educational field such as Adobe Flash, Authoware and Director.

By using this software, students can use their own creativity and idea to present a project that they like. this help to improve their creativity while bringing fun in learning. Animation also can help students to learn faster and easier.

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This is because they can help teacher to explain a difficult topic. For example, the flow of blood throughout the body cannot be seen. The flow of blood in and out of the heart are difficult for students to understand in the beginning.

By providing a structural animation of our blood circulatory system and the heart, students can see clearly how it work. This can help provide a better understanding about the topic to students. With the help of computer animation, learning and teaching can be much more easier faster and amusing.

### **Multimedia Approach In Education**

There are many advantages in applying multimedia elements in education. One of it is that multimedia enable students to represent information using several different media. This prove to be helpful when students need to do their project.

By using multimedia elements, they can present their project in a much more creative ways. Moreover, multimedia approach also provide flexibility of where and when can they learn.

This is because by using multimedia approach such as audio and video, student can record or make connection with one another for discussion or listening to the previous topic that they have recorded.

Multimedia approach also helps the students to develop a higher order thinking skills. By using the multimedia elements, students use their own idea and creativity to combine the elements of multimedia to produce something fresh and new.

Furthermore, multimedia approach are also much more engaging compare to the traditional one. With multimedia, interactive learning can be done with live-action video, feedback, questions and answers to keep the students interested and help enhancing their skills. Next, with multimedia simulation technique can be effectively applied.

#### **Check your progress 1**

1. What are the applications of multimedia ?

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## **7.5 MULTIMEDIA CLASSROOM ENVIRONMENT FOR LEARNERS AT SCHOOL LEVEL**

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### **Multimedia Classroom**

The time it takes to earn the degree in education today is based on an increasingly outdated model: so many hours in a classroom entitle a student to a receipt in the form of a grade, and so many receipts can be redeemed for a credential in the form of a degree.



Education today is just beginning to think of shifting the basis of certification from time served to skills and knowledge obtained.

Traditionally classroom situation is teachers stand in front of the students, giving explanations, informing, and instructing. They usually use chalk to write something on the blackboard. These technique needs slightly to be modified regarding with the development of the technology.

The using of multimedia in classroom cannot be denied anymore. That will make possible for teachers giving more opportunity to students being happier and more enjoy during the course. Traditional classrooms have different settings from the multimedia classrooms. Students seat in rows and a chalkboard in the front. The teacher is standing in front of the class giving a lecture.

Compared with traditional classrooms, multimedia classrooms setting differ greatly from traditional classrooms. Traditional classrooms have the seats in rows and a chalkboard in the front. In the multimedia classrooms, students' seat can be modified according to the situation needed.

Inside the classrooms, all the equipment is available and makes the students feel comfortable to study. They sit at wide tables in comfortable chairs and have plenty of room to spread work. Furthermore, they also have the opportunity to move the furniture around for group discussions.

A large teaching station is located at the front and to one side of the room. Inside the station cabinet there are controls for the rooms built – in equipment. The use of multimedia described here makes use of print texts, film and Internet to develop and enhance linguistics and knowledge.

Through their interactions with multimedia texts on topic of interest, students become increasingly familiar with academic vocabulary and language structures. As they pursue sustained study of one content area through focus discipline research, the students become actively engaged in the process of meaning construction within and across different media.

Working though the complex intermingling of meanings, embedded within different texts encourages students to make connections as they build a wider range of schemata, which are then available to help them grasp future texts.

Using print, film and Internet as resources for studying provides students with opportunities to gather information through stimuli that will stimulate their imaginations, engage their interest and introduce them to the raw materials for analysis and interpretation of both language and context.

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Students develop solid foundation in several subject areas and become “content experts” in one. Thus they greatly increase their overall knowledge base, as well as their English language and critical literacy skills, facilitating their performance in future college courses.

Although various studies support the application of multimedia in the classroom, Liu, Jones and Hem street (1998) point out that the design of multimedia is useful when technology is to have any effect on learning.

One of the main purposes of software in writing is to facilitate the development of academic writing skills for students through the use of the objects matter for writing assignments. The program is presented as a simulation game to interest and motivation. Students using the program found themselves in the virtual world of education.

### **The Computer Internet**

Computer technology has given us Internet, which has various uses. Dealing with education, Internet presents the students a wide range of collection of English language texts in many discipline departments. Before the general use of computers in colleges and universities to teach writing, students met in a traditional classroom and were taught to write standard essay.

Instruction was personified commonly by the teachers standing behind a lectern or by the teacher marking errors on student texts (Blair, 1997). With the rapid proliferation of the personal computer, many institutions of higher education created “computerized writing courses” emphasizing word processing skills and collaborative critiquing; believing that using the technology “democratizes the classroom discussion, allowing students to transcend the limits of the traditional Computer technology has given us Internet, which is an electronic medium in which both print and visual resources are invariably bound.

At the click of a mouse, text resources present students with a diverse collection of authentic English language texts dealing with a wide variety of interdisciplinary topics, and at each web page link, students have the advantage of reading print texts with the benefit of immediate visual reinforcement provided by pictures and slide shows, facilitating the collaborative effects of print and visual information processing. Integrating the Internet yields the additional benefit of increased student motivation.

Students are eager to begin class and often arrive early at the computer lab, logging on to the Internet and beginning research on their own. They also often stay after class to continue working on the Internet. Overall, students develop greater confidence in their ability to use English because they need to interact with the Internet entirely through reading and writing.

Using the Internet for focus discipline research not only teaches higher order thinking skills, but also promotes critical and social literacy as students encounter a variety of information, synthesizing that information through cooperation and collaboration with their peers.

Members of focus discipline groups generally form strong multicultural friendship fostered by their collaborative efforts throughout the semester. However, the general uses of computers are rarely found in traditional classroom.

For instance, students attend the regular classes that were taught to write the standard essay. With the technology use, the students do not only literate the ability to read and write but also to be able to understand music, video, hypertext and networked communications.

Whitaker (1995) points out clearly that technology as something to expand human potential rather than substitute for it and which enhances the thought process rather than cripples it.

### **The Print Text**

The Print text used in presenting students with sophisticated reading that contains cognitively demanding language and introduces a wide range of vocabulary. However, these texts may be difficult to understand. This is suggested to present in printed and visual text. By reading print texts will the benefit of immediate visual provided by pictures or slide show.

In writing class of using multimedia, students watch the selected video novel. After watching students are asked questions about the video and assigned essay topics, then divided into brainstorming groups. They discuss and develop the topics in their group.

They then make rough draft before presenting in front of other groups. It is obviously that in the multimedia classroom students are engaged to learn how to brainstorm, how to use groups for draft and how to critique other presentations.

However, to benefit from the Internet, the students have to learn to navigate and then evaluate the information found there. The students must know how to use search engines, web browsers, and met sites evaluate information in terms of its validity and reliability, as well as its relevance to the topic (Carlson, 1995).

Therefore to guide the students in determining whether an Internet source is reliable and credible, students should consider the source and time frame, as well as the evidence supporting the information provided.

As the students become more comfortable surfing the Internet, they discover it can be used to develop not only content area knowledge but also to improve their language skills. They know how to

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compose an essay, using information from the sources they have found in the Internet; also they learn how to cite references in a bibliography.

A study conducted by Kasper (1997) illustrate that teaching English using multimedia such as print, film, video, Internet to students encourage them to write a critical analysis on assignments. Overall, the students' achievement increased significantly. 92 % of the students passed on departmental reading and writing examinations. In addition, their feedback on discussions is very positive.

They express confidence in their ability to use English. They attribute this improvement to the multimedia model that the texts teach them English and provide helpful information in other courses and the film and Internet help them make material easier to understand because they see, hear, and read about the topic.

### **The Film**

Film can be used to provide a visual material. The students can read a print text and watch the film later, according to Kasper and Singer (1997), the film can clarify comprehension, consolidate concepts and reinforce learning. It is expected to the students to fully understand both visual and verbal comprehension.

By watching the complete film the students expected to understand various areas of academic discourse such as psychology, environmental science and others to broaden the verbal and written perspective (Kasper and Singer, 1997).

A study case from Florida International University (1994), has examined a multimedia classroom, the students watching the video novels Tom Jones (the new six part A & E version) and The Scarlet Pimpernel (Anthony Andrews and Jane Seymour). After viewing it, the class asked questions about the movie and assigned essay topics, to help them the teacher asked the students to brainstorm.

Through the interaction with multimedia, the students become increasingly familiar with academic vocabulary and language structure. Connecting with the Internet will make the benefit of increased student motivation. Students are eager to begin class and often arrive early at the computer lab, logging on the Internet and beginning research on their own.

They also often stay after class to continue working on the Internet. Overall, students develop greater confidence in their ability to use English because they need to interact with the Internet through reading and writing.

Using multimedia provides the students to gather information through media that encourages their imaginations, interests. Also it using this technology combined with the sense of teaching will create a successful teaching method.

In our imaginations, we enjoy and value all the benefits of education on-demand. We wish the future was here already because deep down inside, we all are lifelong learners. We just want learning to be easy, personalized. This vision is inviting, yet we must live and work in present time. And today, the reality stays apart from the dream.

The challenge to educators is clear. We must also establish rigorous standards of quality in the products, services, and solutions we offer to our youth. We must learn how to prepare all of our students for lives that are becoming more and more complex. We must prepare our students to master change.

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### 7.6 FEATURES OF MULTIMEDIA

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One can download digital online multimedia or can be streamed. This Streaming multimedia can be on-demand or live Multimedia games and simulations may be used with exclusive effects in a physical environment, in an online network, with diversified users; it can also be used at offline mode, game system, or hosier.

#### 7.6.1 SOUND EFFECT

- Multimedia presentations may be looked at by person on stage, projected, transmitted, or can be played locally with a media player.
- A transmission of multimedia presentation may be live or could be recorded. Transmission and recordings can be either digital or analogue electronic media technology.
- The differing layout of methodological or digital multimedia may be destined to embellish the users' empiricism, for example to convey information it is made accessible and faster in entertainment or art, to surpass experience on daily basis.
- Enlarged levels of interactivity are being made possible by joining assorted forms of media content.
- Online multimedia is becoming object-oriented to a great extent and data-driven, which enables applications with synergetic end-user modernization and embodiment on many forms of content over time. These Examples are the various mixed forms of media materials available on the numerous internet websites to counterfeit whose coefficient, events, demonstrations, animations or videos are changeable, and that allows, the multimedia "experience" to be amended without reprogramming.
- Besides seeing and hearing, with the help of hepatic technology virtual objects can be felt. Emerging technology which involves deception of taste and smell can also improve the multimedia experience.”  
It makes the learning activity more fast and interesting.
- The programme never asks for a raise the more you use it, the less it cost per use.

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- No mood swings, yawns, or lapses.
  - Ask what you want, no one will laugh, no one will scold.
  - Experience nuclear meltdown without fallout, experience drunken driving accidents or electrocution without blackout or death.
  - It's never tires of praising and motivating through positive feedback and boosts the moral.
  - It is a strong foundation on which to build mastery.
  - It is a tool to make a remembering, longer, easier. Many parts of the brains are stimulated.
  - More information faster – Few things, like space, shuttle repair, brain surgery, black hole sailing etc. can be studied in a more interactive and natural way.
  - Like a game, like in which with a joystick and screen has already captured the brains and fingers of an entire generation. Using multimedia tools with education provides the students with an opportunity to represent and express their prior knowledge.
  - It helps the students to act as designers; they can represent their knowledge in more represent able way.
  - Tools can be used for analysing the world, accessing and interpreting information and representing what they know to others.
  - It provides valuable learning opportunities to the students that can boost up their moral.
  - Usage of multimedia empowers the students to create and design the ideas, rather than absorbing the representations created by others.
  - Addition of multimedia encourages deep reflective thinking among the students.
- It creates the meaningful learning opportunities for the learners.

### Sound Effects

Audio deals with the various sound effects and sound quality .Sound is a basic requirement, as it enhances the sense to observe and interpret the contents. There are so many features and file formats available to create and modify a sound according to requirement. Various terms regarding audio

production are-:

- Digital audio
- Sampling Rate
- Sound Bit Depth
- Mono or Stereo
- Digital recording
- Sound Editors
- Sound file formats

## **Digital audio:**

The process of recording a sound on an electronic media such as mobilephones, sound recorder and computers is called digitization. It is a convenient way of preserving voice recordings in various academics and entertainment fields such as lectures, seminars, live performance etc.

Digital audios are in great demand today as it can keep preserving the contents which can be used for multiple times at multiple places by generating digital copies and distributing it globally. Recording studios deal with the digital audios.

## **Sampling Rate:**

The quality and capacity of sound is measured through sampling rate. It can be measured in hertz (Hz). A common sampling rate which is suitable in any multimedia application must be of 44.1 kilo Hz, 22.05 kilo Hz and 11.026 kilo Hz. The quality of sound depends upon the sampling rate.

The Higher the sampling rate, higher will be the quality of sound. If the sound has a low quality the sampling rate will also be low. Higher sampling rate sounds occupy more space in disks. The sampling rate of any sound can be converted easily from higher to lower as per requirement.

## **Sound Bit Depth**

The bit depth means the resolution of the sound. In any graphic image more the no. of pixels, the higher will the resolution. In the same way more the no. of audio samples, the higher will the bit depth of an audio.

The bit depth is the no. of bits used to take samples of an audio. Sound bit depth depends on the sampling rate. High quality of sound depends on the high no. of bits in a sample of voice which is generally of 32 bits, and 64 bits.

## **Mono or Stereo**

Transmission of a sound through a no. of channels is called mono and stereo. In Mono one channel for the reproduction of sound whereas in stereo more than one channel is used, it creates a very impressive and natural effect of a sound.

Mono sounds are used in mobiles and basic sound equipments like radio and audio devices. Stereo sounds are used for better effects as in home theatres, movie theatres, auditoriums, and on highly recommended sound platforms. Stereo sounds are great in demand today, as it gives a real effect to sound from all dimensions.

There are different Mono and stereo are available. With the evolution in the technology sound system has also been advanced. For

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effective sounds there are 5.1 and 16. 2 surround sounds systems which make us feel listening as sitting in an actual place.

### **Digital recording**

Recording and of the sounds through various hardware devices such as microphone, synthesizers, data audio tape and keyboard etc is known as digital recording. Digital recording is widely used to enhance the quality of audio recording, we can connect mixtures with the microphones and computer on the consecutive ends as they support for increasing or decreasing the voice gain.

They can add reverbs, reduce noise and bypass the sound. Transitions can be applied to fade in and fade out simultaneously while recording an audio.

### **Sound Editors**

Sound editors are used for the Post production of sound after recording and saving it in computer, treating the sound to enhance as well as refine the quality of sound. There are a no. Of softwares developed for editing the sound such as, Sound forge, cool edit, Nuendo, Studio 1, Logic pro for Mac etc.

Logic pro has been used as professional level software. A sound editors give a wonderful and magical effects in changing pitch, scale, and the tempo of an audio. Sound editorsposses the capability to mix multiple tracks recorded at different time period.

### **Sound file formats**

A file format is a container that stores the sound information in bits. Every operating system supports different file formats .Mac OSX native file format is m4a, Windows native file format is wma.

The Universal recommended format is mp3, as it can be played in almost any audio device, whether it is computer, phones, or mp3 players. These various file formats can be used according to the file requirements.

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## **7.7 Image effect**

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Graphics are the most commonly used visuals designs created by computer, which represent any information through pictures, diagrams using text. The graphics are designed through various softwares such as Adobe Photoshop, Coral Draw and Adobe Illustrator.

In educational multimedia package graphics are highly recommended as they convey the information of the concepts clearly. The richness of multimedia and the effective communication depend upon graphic presentation. The attributes of colour, texture, pattern and animation enrich a multimedia presentation. There are two



## Types of Graphics:

Raster Graphics- The real world images are called raster graphics, which are based on pixels and depended on resolution. The pixels an image will be distorted if resize to large scales. Figure is showing the each pixels of the flower when it is scaled and zoomed.

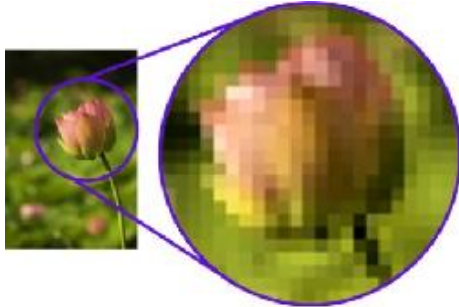


Image - Raster image

## Vector Graphics

The abstract designs are vector graphics which are made of shapes, lines, drawings and diagrams. Vector graphics are resolution independent. They can be scaled to any size, without any distortions and the image will clear and perfect. The figure shows that on scaling the vector image it is not disturbed and the quality is as original.



Image - Vector image

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## 7.8 ANIMATION EFFECT

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### Animation effects

Animation is a process of moving vector graphics which are computer generated (CG) images. In any multimedia package it is the chief element. Animations are designed through giving motion effects to various diagram, sketches, paintings, line and scales.

It is a form visual illustration. Computer generated softwares are very necessary to build animations. Animation has a wider scope as it is very much popular in commercial fields such as entertainment, business, and educational fields.

**NOTES**

## NOTES



Image -key frames of a moving object.

Key Frames Recording the different frames of an animation sequentially and consecutively. Key frames are the major part of animation, which able to shows the different single timing of a moving object. frames of a moving object.

### Software tools

The computer animation production is determined by a no. of softwares to increase the qualities of an animation. Popular animation software packages for windows are 2D Flash, after effects, Studio Max, Adobe Premiere, etc. These softwares require a proper training and skill to operate.

---

## 7.9 VIDEO EFFECT

---

Synchronizing video with audio makes the presentation highly interactive as it catches viewer's interest towards the concepts, presented through visuals. It can be used to communicate the ideas and concepts of real world events through visual effects. Various terms regarding video production are:

- Digital video
- Frame Rating
- Video Formats
- Colour Depth for Digital Video
- Video compression
- Colour Depth for Digital Video

The colour depth is the resolution of the digital video which depends upon the bit, a tiny individual unit or dot used for composing an image. More no of bits in an image create better image quality: see figure no.

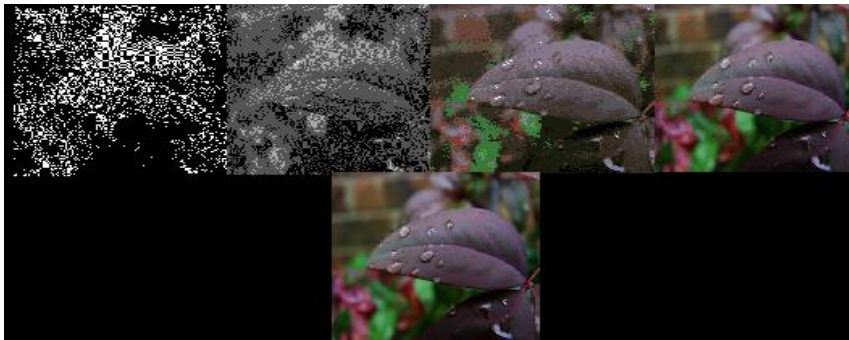


Image 16 - 1 bit, 2 bit, 4 bit, and 8 bit and 24 bit image

## NOTES

### Video compression

It is used to reduce the bit size of a video. Video compression is important to make a video convenient in transferring and uploading or downloading. The MPEG is basically the highest compression format, to reduce up to half of the size of a video.

### Video editors

After recording video, it comes to convert the video into a refined movie; these contain transitions, colour correction and various other effects for giving a professional look. Various software are available to edit video such as Adobe premiere CC, FCP (final cut Pro), and Windows movie maker.

Video editors contain a project window which can store all media files, a monitor that displays the final edit and the timeline where multiple video clips are combined. Special hardware, RAM and graphics cards are required for large video projects like movies.

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## 7.10 LET US SUM UP

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In this unit we have started with the concept of multimedia and its various applications. Multimedia possesses a lot of advantages to make learning interesting. With the help of its elements, it can invoke creativity in both teacher and students so that they can apply it in order to teach or learn. Learning also becomes much more easier with the help of multimedia. Multimedia can help improve our educational system. This is a must because we need to keep up our pace with the evolution of our technology. Using the Internet for focus discipline research not only teaches higher order thinking skills, but also promotes critical and social literacy as students encounter a variety of information, synthesizing that information through cooperation and collaboration with their peers. We have realized the multimedia usage in the classroom environment for learners of school level. Finally, we have concluded with features of multimedia.

---

## 7.11 UNIT-END EXERCISE

---

Explain concept of multimedia

State the educational implications of multimedia

Multi media has Revolutionized education. justify.

---

## 7.12 POINTS FOR DISCUSSION

---

Discuss about the computer network

---

## 7.13 ANSWERS TO CHECK YOUR PROGRESS

---

Multimedia applications can be defined as an application that uses a combination of many media sources such as texts, graphics, audios, videos and animations. It is often use to deliver information which is more powerful than printed learning resources such as printed text book. It also allows users to interact with the information quickly and accurately. Educational multimedia applications enable students to get information in various formats. Examples of multimedia applications are World Wide Web, courseware, interactive TV, computer games, and virtual reality.

In education, multimedia application is used to provide computer based training courses and reference books such as encyclopedia. A computer based training courses lets the students go through a series of presentation, text about a particular topic in various information format (Singh, 2007). Multimedia applications are used by teachers and lecturers to convey information such as lecture slides, assessment materials and others learning resources. It can also use by students to learn new skills and knowledge without lecturers guidance.

---

## 7.14 SUGGESTED READING/REFERENCES

---

- NorhayatiAbdMukti, &Siew, P. H. (2004). **Malaysian Perspective: Designing**

### Interactive

- **Multimedia Learning Environment for Moral Values Education. 143-152.**
- **Singh, V. P. (2007). A Text Book of Multimedia. United Stated: Global Media.**
- <https://whatis.techtarget.com/definition/multimedia>
- <https://users.cs.cf.ac.uk/Dave.Marshall/Multimedia/node10.html>
- <https://www.collinsdictionary.com/dictionary/english/multimedia>
- <https://techterms.com/definition/multimedia>
- <https://dictionary.cambridge.org/dictionary/english/multimedia>
- <https://www.omicsonline.org/conferences-list/multimedia-tools-and-applications>
- <https://www.essay.uk.com/free-essays/information-technology/application-multimedia-education.php>

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# UNIT-VIII HYPERMEDIA

---

*Hypermedia*

## STRUCTURES

8.1 Introduction

8.2 Objectives

8.3 Hypermedia

8.3.1 Designing hypermedia

8.3.2 A metaphor for hypermedia

8.3.3 Definition - what does *hypermedia* mean?

8.3.4 The various roles of hypermedia

8.3.5 Hypermedia types

8.4 Development of multimedia courseware for learners at school level

8.5 Steps involved in the courseware development

8.6 Advantages and limitations of the multimedia based courseware

8.6.1 The benefits of multimedia based courseware

8.6.2 Limitations of multimedia based courseware

8.7 Let us sum up

8.8 unit –end activity

8.9 answers to check your progress

8.10 suggested readings/references

## NOTES

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### 8.1 INTRODUCTION

---

The term hypermedia comprises a set of ideas, although it seems to be understood somewhat differently within different disciplines. We will therefore start by examining what some of the more well-known researchers and developers of hypermedia say about it, in order to find some typical, common features. Hypertext and Hypermedia systems are used increasingly in educational environments even if their efficiency is by no means clear (Jonassen&Grabinger 1990). The active participation of readers and authors is generally supposed to be one of the major advantages of hypertext systems (e.g. Landow 1992). There is some evidence from cognitive psychology supporting this assumption. Deep processing and elaboration usually leads to better comprehension than information analysis at higher levels of processing. One way of reaching these deep processing levels is "doing things" (Mayes 1992). Active involvement of learners does not

NOTES

mean, however, letting students browse in a hypertext base aimlessly. Students must be encouraged to actively seek out information This can only be done by giving students well-defined tasks (Hammond 1992). Even if there is some evidence substantiating this approach in educational hypertext, it is necessary to study the impact of such an approach in day-to-day teaching and learning practice at universities.

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## 8.2 OBJECTIVES

---

At the end of this unit, you will be able to

- Know about the hypermedia
- Development of multimedia courseware for learners of school level
- Realize the advantages and limitation of Multimedia based courseware

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## 8.3 HYPERMEDIA

---

Hypertext and Hypermedia Hypertext is a text which contains links to other texts. The term was invented by Ted Nelson around 1965.

Information is linked and cross-referenced in many different ways and is widely available to end users. Hypertext means a database in which information (text) has been organized nonlinearly. The database consists of pages and links between pages.

A link is defined by source and destination nodes, and by an anchor in the source node.

Two types of link: (a) Internal link

(b) External link

Hypermedia is not constrained to be text based. It can include other media, e.g., graphics, images, and especially the continuous media – sound and video.

### 8.3.1 DESIGNING HYPERMEDIA

Important questions in designing the hypermedia are:

- Converting linear text to hypertext
- Text format conversions
- Dividing the text into nodes
- Link structures, automatic generation of links
- Are nodes in a database or are they separate files on file system
- Client-server or standalone

- It must be possible to use hypermedia both for writing and reading information.
- The information comprises non-sequential structures, and may thus be followed along alternative paths.
- The information must follow natural associations from one information unit to another.
- The information may be hierarchically structured.
- Each information unit is presented in a separate on-screen window.
- It must be possible to share the information or parts of it among several users.
- It must be possible to have several people working against the database at the same time.
- The information resides in a database.

## NOTES

These diverse types of interlinked, nonlinearly accessed media forms are called *hypermedia*. As software architect Irakli Nadareishvili explains, “Hypermedia is the matter of which the World Wide Web is made. Much like the physical world is built of interacting elementary particles (Bosons and Fermions), the web is essentially a universe of myriad interacting hypermedia documents.” The more common term *hypertext* is closely related to hypermedia, with the bulk of the Web consisting of webpages primarily written in Hypertext Markup Language (HTML). But *hypermedia* transcends hypertext, the word suggesting that more than just text is capable of being hyperlinked, such as graphics, videos, and music files.

In essence, then, hypermedia is just another name for everything that we see, hear, and interact with on the Web. But since the early 1990s, the general concept of hypermedia has been largely superseded in popular usage by the term “interactive multimedia.” It is primarily only in the world of software engineering and architecture that people continue to speak of hypermedia. And these days, the term is most often used in the context of developing Web-based Application Programming Interfaces, or APIs.

As the complexity of software applications and systems continues to grow, there’s an increasing need for different components within a single application—and for entirely separate applications—to be able to communicate with each other simply and clearly. This cross-linguistic data-exchange is what APIs have always been used for, but the variety of APIs and the languages used to code them can vary as widely and be as idiosyncratic as individual software applications themselves. An API developed by Facebook and an API developed by Twitter may not communicate nicely with each other, and developers usually have to sort through any given API’s unique documentation to

**NOTES**

figure out how to use it with their own application. Many system engineers and software developers believe their jobs would be far simpler if there existed a common format for writing APIs, following a shared, agreed-upon structure. And they look to the Web as a proven example of such a possibility.

The Web is a system of hyperlinked hypermedia that, despite the endless varieties of software languages that are used to construct its websites and media types, generally manages to stay remarkably interconnected and communicate clearly between its many constituent parts. A single hyperlink, clicked within a Web browser, can serve up a YouTube video just as easily as it can display a BuzzFeed text-and-gif listicle.

Hyperlinking can do quite a bit more than just take us from one spot to another. First of all, it's about being able to manipulate navigation in a lot of different ways, instead of just one way every time. Usually, we start from point A and read, listen, or watch straight to point B. This is called linear content - we can only go from beginning to end with no detours.

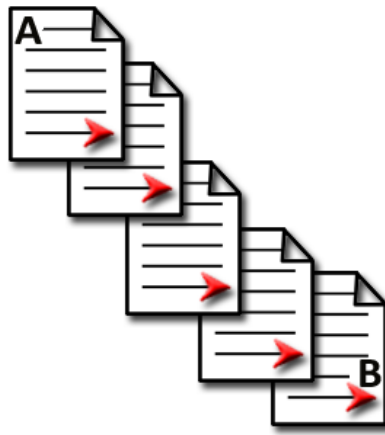


Fig.1

***Example of linear content (point A to point B)***

But with hypermedia, we aren't stuck with this linear form of navigation. The user can take control of the web experience and direct his or her own journey in a nonlinear way. That can make you feel exhilarated! Just as important, designers can plan these detours to provide for much more engagement, and with that, much more business/educational opportunity. Hypermedia lets us tailor content to a diverse audience with diverse needs.

A second benefit of hypermedia is that this hyperlinking concept allows us to create associations between many different kinds of information. The end result is neither book, nor video, nor sound file, but a web of associations we can traverse in whatever way seems





## NOTES

***Hypermedia links function a bit hyperspace*****8.3.3 DEFINITION - What does *Hypermedia* mean?**

Hypermedia is an extension to what is known as hypertext, or the ability to open new Web pages by clicking text links on a Web browser. Hypermedia extends upon this by allowing the user to click images, movies, graphics and other media apart from text to create a nonlinear network of information. The term was coined by Fred Nelson in 1965.

**Techopedia explains *Hypermedia***

Hypermedia allows links to be embedded in multimedia elements like images and videos. You can tell if something is hypermedia by hovering the mouse cursor over the image or video - if the element is hypermedia, the cursor changes, usually into a small hand.

Although the Internet is the best example of the use of hypermedia, there is a lot of software that makes use of both hypermedia and hypertext. A lot of word processing, spreadsheet and presentation software like Microsoft Office allow hypermedia and hypertext to be embedded into the documents created. For example, in Microsoft Word, users can add hyperlinks to any word and even add links to pictures. Microsoft PowerPoint has the same feature for hypermedia.

"The WWW is fundamentally a *distributed hypermedia* application".

**-Taylor, Medividovic, Dashofy (2010)**

"Hypermedia is defined by the presence of application control information embedded within, or as a layer above, the presentation of information. Distributed hypermedia allows the presentation and control information to be stored at remote locations."

**-Roy T. Fielding (2000)**

"*Hypermedia Types* are MIME media types that contain native hyper-linking semantics that induce application flow. For example, HTML is a hypermedia type; XML is not." **-Mike Amundsen (2010)**

"The WWW is fundamentally a distributed hypermedia application".

**- Richard Taylor**

"Hypermedia is defined by the presence of application control information embedded within, or as a layer above, the presentation of information." **- Roy T. Fielding**

**8.3.4 THE VARIOUS ROLES OF HYPERMEDIA**

The history of hyper[text|data|media] is long and varied. Although a full treatment of the history of hypermedia is beyond the scope of this chapter, several aspects will be covered here. The first three are 1) hypermedia as read-only links, 2) hypermedia as GUI

controls for local applications, and 3) hypermedia as state transition controls for components in a widely distributed network. In addition, the notion of hypermedia as an essential part of distributed network architecture as well as the use of MIME Media Types in HTTP. Finally, a definition of “Hypermedia Type” will be presented.

### **1) Hypermedia as Links**

The idea of hypermedia was given public voice by Vannevar Bush as a way to help researchers deal with what was perceived in the 1940s as an explosion of information. Bush described his idea for the “Memex” in a 1945 article, “As We May Think.” In it he states, “The human mind ... operates by association. With one item in its grasp, it snaps instantly to the next that is suggested by the association of thoughts, in accordance with some intricate web of trails carried by the cells of the brain.” He wanted to make it possible for information to be shared (using microfilm) and loaded into personal readers that could find links between subjects and allow the user to easily jump from one document to the next, following a single line of thought through a vast array of available content.

Decades later, in the 1974 self-published work, *Computer Lib/Dream Machines* Theodor Nelson echoed Bush claiming “...writers do better if they don’t have to write in sequence ... and readers to better if they don’t have to read in sequence...” In this same work, Nelson coins the terms “hypertext” and “hypermedia” saying “By ‘hypertext,’ I mean non-sequential writing – text that branches and allows choices to the reader, best read at an interactive screen. As popularly conceived, this is a series of text chunks connected by links which offer the reader different pathways.” In both these examples, hypermedia is thought of as a way to provide links between related materials and enable readers to move freely along these related paths. Hypermedia, in this case, is limited to a read-only experience meant for enriching reading, discovery, and comprehension of text.

### **2) Hypermedia as GUI Controls**

While the movement to enable improving the use-ability of text was underway, a second line of thought was also taking shape. That of using hypermedia as a way to control the location and retrieval of data for display to the user: hypermedia as a feature of graphical user interfaces. As a radar station operator in the Philippines during World War II, Doug Engelbart happened upon Vannevar Bush’s magazine article and was fascinated with the idea of the “Memex.” Years later, Engelbart would publish “Augmenting Human Intellect: A Conceptual Framework”[6] where he laid out his interpretation of Bush’s vision. “Most of the structuring forms ... stem from the simple capability of being able to establish arbitrary linkages between different substructures, and of directing the computer subsequently to display a set of linked substructures with any relative positioning we might

## **NOTES**

## NOTES

designate among the different substructures.”[6] By 1968, Engelbart had developed the NLS (oN-Line System) for sharing research information. His demonstration included not just a computer information system capable of supporting links between items, but the first “mouse” pointing device that could be used to actuate those links on screen. A video demonstration of this early hypertext system is still available for viewing[7]. Later, in 1987, Jeffrey Conklin published “Hypertext: An Introduction and Survey”[3] which described hypertext as “...a computer-supported medium for information in which many interlinked documents are displayed with their links on a high-resolution computer screen.” Conklin’s work focuses on the role hypertext plays in graphical user interfaces (GUIs) and their influence on user interfaces in general. Conklin also compares editing environments for hypertext content. Additional development of the personal computer through the 1980s and early 1990s introduced more display options and richer ways to express hypermedia links. The concept of hypermedia was expanded to include actuating interface controls such as selectors and buttons and spawned an emphasis on visual controls users can activate at any time. Hypermedia had become more than linking text, it was also a visual “affordance” to animate user displays.

### 3) Hypermedia as Application Controls

At the same time personal computer displays were providing more graphical controls, early versions of the World Wide Web appeared. In 1991, Tim Berners-Lee’s WWW was available and, by 1993 the NSCA Mosaic Web Browser had become the popular graphical user interface for the WWW. Along with the assumed graphical link elements that allowed WWW users to “jump” from one document to the next (or within documents), Web browsers had the ability to render images within the current document and the ability to send content to the server using link templates implemented as forms with input elements users fill in and submit. With the introduction of forms, hypermedia was no longer limited to static, read-only experiences. Documents could be created that allowed users to send data as well as find and retrieve it. HTML, the de facto document format for the WWW, allowed for the inclusion of application controls along with human-readable text. Years later, in a slide presentation to ApacheCon 2005 Roy Fielding would describe this use of hypertext: “When I say hypertext, I mean the simultaneous presentation of information and controls such that the information becomes the affordance through which the user (or automaton) obtains choices and selects actions.”[9]

### 4) Hypermedia as Architecture

The notion of hypermedia as more than text, more than data, but also application controls that allow users to make choices along the way is an important requirement for RESTful implementations over

distributed networks. In addition to representing the state of the requested resource, Hypermedia documents contain the affordances for changing the state of the client application. It is the hypermedia that makes state transitions possible. This alters the role of server responses from simple data replies to that of an essential part of the network architecture. The idea that data itself (whether simple state information or hypermedia controls) can be part of the network architecture was articulated by Fielding[8] as "...the nature, location, and movement of data elements within the system is often the single most significant determinant of system behavior." Even more directly, Fielding continues "The nature of the data elements within a network-based application architecture will often determine whether or not a given architectural style is appropriate." Finally, Fielding identifies hypermedia specifically as the "engine of application state."

## NOTES

### 8.3.5 HYPERMEDIA TYPES

1. X/HTML
2. Atom
3. VoiceXML
4. CCXML
5. SMIL
6. SVG
7. Turtle
8. Notation 3
9. TriX
10. TriG
11. RDF/XML
12. SensorML
13. CSS
14. text/uri-list
15. Sitemap XML

## NOTES

**Check your Progress-I**

Note: a) Space is given below for your answer

b) Compare your answer with these given at the end of this unit

1. What is Hypermedia?

---

2. what are the types of Hypermedia?

---

3. Definition of Hypermedia.

---

**Common Hypermedia Types**

In the design of APIs you are quite likely to end up in a quagmire on how to represent your data. Now in some way we have already looked at the problem in the past <http://206.189.161.181/2015/05/dry-up-your-api-with-microformats/>. However micro formats can only take you so far, you may need to design a full on API service and that is where hypermedia comes into play.

```
<ul>
<li>
<a href="/list/1" rel="item" class="item">
<span class="identifier">1</span>
</a>
<span class="name">First item in the list</span>
<span class="scheduledTime">2014-12-01</span>
<span class="status">pending</span>
</li>
<li>
<a href="/list/2" rel="item" class="item">
<span class="identifier">2</span>
</a>
<span class="name">Second item in the list</span>
<span class="scheduledTime">2014-12-01</span>
<span class="status">pending</span>
</li>
<li>
<a href="/list/3" rel="item" class="item">
<span class="identifier">3</span>
</a>
<span class="name">Third item in the list</span>
<span class="scheduledTime">2014-12-01</span>
<span class="status">complete</span>
</li>
</ul>
```

There are an innumerable number of hypermedia types so I will just stick to the main ones.

### **HTML (Hyper Text Markup Language)**

This is by far the most familiar media type of all.

It is characterized by use of tags to differentiate document content.

An example of a representation in HTML would be:

You can learn more about HTML from <http://www.w3.org/TR/html5/>

### **JSON-API**

This hypermedia type uses JSON (JavaScript Object Notation) to define content in your representation. It has been around for a while and is currently stable at v1 at the time of this writing.

```
{
  "data": {
    "type": "articles",
    "id": "1",
    "attributes": {
      "title": "JSON API paints my bikeshed!",
      "body": "The shortest article. Ever.",
      "created": 1432306588,
      "updated": 1432306589
    },
    "relationships": {
      "author": {
        "data": {"id": 42, "type": "people"}
      }
    },
    "included": [
      {
        "type": "people",
        "id": 42,
        "attributes": {
          "name": "John",
          "age": 80,
          "gender": "male"
        }
      }
    ]
  }
}
```

You can read more on this media type from here <http://jsonapi.org/>

### **Collection+JSON**

Another media type based on JSON.

## **NOTES**

## NOTES

Collection-JSON can be used to do much more than just describe data. It provides query templates that instruct the client on how to properly format requests.

It provides specifications for the entire conversation between server and client.

It borrows a lot of its semantics from the Atom format

```
*** REQUEST ***
GET /my-collection/1 HTTP/1.1
Host: www.example.org
Accept: application/vnd.collection+json
*** RESPONSE ***
200 OK HTTP/1.1
Content-Type: application/vnd.collection+json
Content-Length: xxx
{ "collection" : { "href" : "...", "items" : [ { "href" : "...", "data" : [...] } ] } }
```

You can read more about this media type here <http://amundsen.com/media-types/collection/format/>

### Siren

Like the above two, this media type is also based on JSON.

Siren emphasizes on your data structures (they call them entities) and the relationships between them.

The media type is however not yet stable and still in active development

```
{
  "class": [ "order" ],
  "properties": {
    "orderNumber": 42,
    "itemCount": 3,
    "status": "pending"
  },
  "entities": [
    {
      "class": [ "items", "collection" ],
      "rel": [ "http://x.io/rels/order-items" ],
      "href": "http://api.x.io/orders/42/items"
    },
    {
      "class": [ "info", "customer" ],
      "rel": [ "http://x.io/rels/customer" ],
```



```

"properties": {
  "customerId": "pj123",
  "name": "Peter Joseph"
},
"links": [
  { "rel": [ "self" ], "href": "http://api.x.io/customers/pj123"
}
]
],
"actions": [
  {
    "name": "add-item",
    "title": "Add Item",
    "method": "POST",
    "href": "http://api.x.io/orders/42/items",
    "type": "application/x-www-form-urlencoded",
    "fields": [
      { "name": "orderNumber", "type": "hidden", "value": "42"
    },
      { "name": "productCode", "type": "text" },
      { "name": "quantity", "type": "number" }
    ]
  }
],
"links": [
  { "rel": [ "self" ], "href": "http://api.x.io/orders/42" },
  { "rel": [ "previous" ], "href": "http://api.x.io/orders/41" },
  { "rel": [ "next" ], "href": "http://api.x.io/orders/43" }
]
}

```

**NOTES**

You can contribute and learn more about this particular media type from their official repo <https://github.com/kevinswiber/siren>.

**UBER (Uniform Basis for Exchanging Representations)**

Of all the representations above, this is the most comprehensive.

UBER can be represented in both XML and JSON. It is designed to enable the developer represent transitions in their APIs.

**NOTES**

```
{
  "uber" :
  {
    "version" : "1.0",
    "data" :
    [
      {
        "rel" : ["self"],
        "url" : "http://example.org/"
      },
      {
        "name" : "list",
        "label" : "ToDo List",
        "rel" : ["collection"],
        "url" : "http://example.org/list/"
      },
      {
        "name" : "search",
        "label" : "Search",
        "rel" : ["search","collection"],
        "url" : "http://example.org/search{ ?title}",
        "templated" : "true"
      },
      {
        "name" : "todo",
        "rel" : ["item","http://example.org/rels/todo"],
        "url" : "http://example.org/list/1",
        "data" :
        [
          { "name" : "title", "label" : "Title", "value" : "Clean
house"},
          { "name" : "dueDate", "label" : "Date Due", "value" :
"2014-05-01" }
```

```

    ]
  },
  {
    "name" : "todo",
    "rel" : ["item","http://example.org/rels/todo"],
    "url" : "http://example.org/list/2",
    "data" :
      [
        { "name" : "title", "label" : "Title", "value" : "Paint the
fence"},
        { "name" : "dueDate", "label" : "Date Due", "value" :
"2014-06-01"}
      ]
    }
  ]
}
}

```

**NOTES**

```

<uber version="1.0">
<datarel="self"url="http://example.org"/>
<data          name="list"          label="ToDo
List"rel="collection"url="http://example.org/list"/>
<data          name="search"        label="Search"rel="search
collection"url="http://example.org/search{?title}"templated="true"/>
<data          name="todo"rel="item
http://example.org/rels/todo"url="http://example.org/list/1">
<data name="title" label="Title">Clean House</data>
<data name="dueDate" label="Date Due">2014-05-01</data>
</data>

```

## NOTES

```
<data name="todo" rel="item"
  http://example.org/rels/todo" url="http://example.org/list/2">
  <data name="title" label="Title">Paint the fence</data>
  <data name="dueDate" label="Date Due">2014-06-01</data>
</data>
</uber>
```

o read more on this check out

<https://rawgit.com/uber-hypermedia/specification/master/uber-hypermedia.html>

### URI List

A very simple example of a hypermedia type is the text/uri-list media type. This media type consists of nothing more than a list of URIs:

[#urn:isbn:0-201-08372-8](#)

<http://www.huh.org/books/foo.html>

<http://www.huh.org/books/foo.pdf>

<ftp://ftp.foo.org/books/foo.txt>

This media type is designed to convey a list of one or more URIs that can be resolved and/or processed by the recipient. For the sake of analysis, this media type provides support for the LO (Outbound Link) Hypermedia Factor. It might be argued that the URIs could be treated by recipients as LE (Embedded Links) (e.g. image links merged into an existing document), but most of the suggested uses in documentation point to de-referencing and processing each URI in turn rather than using the list to produce a single composite document.

### SVG

Similar to the text/uri-list media type, the SVG media type[5] (application/svg+xml exhibits support for a limited set of Hypermedia Factors. In this case, they are

- 1) the LO factor and
- 2) the LE factor.

While the SVG media type has a number of elements and attributes that support some form of URIs, all of these elements exhibit either the LO or LE H-Factors. Specifically, the SVG media type does not provide native support for LT (Templated Links), LI (Idempotent Link), or LN (Non-Idempotent Link) H-Factors.

### Atom

The Atom media type profile is defined by two specifications Atom[20] and AtomPub[12]. There are three registered media types associated with Atom: application/atom+xml, application/atomcat+xml, and application/atomsvc+xml. The Atom specification outlines the message format and elements for the application/atom+xml media type. The AtomPub specification covers the details for the remaining two media types as well as the read/write semantics for all three media types.

The primary hypermedia element in the Atom media type family is the atom:link element: The link element show above supports LO, CR, and CL H-Factors. The Atom semantic model also supports LI and LN H-Factors by identifying markup elements within the response that have special significance. For example, non-idempotent writes can be used to add new entry elements to the collection. Clients are instructed to locate the atom:link

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## 8.4 DEVELOPMENT OF MULTIMEDIA COURSEWARE FOR LEARNERS AT SCHOOL LEVEL

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### COURSEWARE

Courseware is educational material intended as kits for teachers or trainers or as tutorials for students, usually packaged for use with a computer. Courseware can encompass any knowledge area, but information technology subjects are most common. Courseware is frequently used for delivering education about the personal computer and its most popular business applications, such as word processing and spreadsheet programs. Courseware is also widely used in information technology industry certification programs, such as the Microsoft Certified Systems Engineer ( MCSE ) and the Computing Technology Industry Association's A+ examination.

#### Courseware can include:

- Material for instructor-led classes
- Material for self-directed computer-based training (CBT)
- Web sites that offer interactive tutorials

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- Material that is coordinated with distance learning, such as live classes conducted over the Internet
- Videos for use individually or as part of classes

## NOTES

The CD-ROM is the most common means of delivering courseware that is not offered online. For teachers and trainers, courseware content may include set-up information, a course plan, teaching notes, and exercises.

### **Courseware development methodology**

In order to ensure effective learning outcomes from educational courseware, careful planning are required before the development process begins. The basic steps used to develop the courseware in this study are shown in

#### **Phase I: Background Analysis**

The background analysis for the courseware was conducted by interviews, literature review and by conducting a survey on related courseware in the market. The requirement analysis obtained include aspects such as target group, course content, learning time, learning style, learning objectives, and learning outcome.

#### **Phase II: Data mining, Selection & Learning the Content**

In this phase, materials that are relevant to the subject matter are selected from textbooks, reference books, original source materials, CD, and most importantly, people knowledgeable in the area.. Designers must also learn the contents to become thoroughly familiar with the contents even though working in conjunction with experts in the area. This is to ensure effective courseware that includes instruction which challenges the student in creative ways. Shallow understanding can only produce a shallow lesson.

#### **Phase III: Structure the lesson and Production of Content**

A structure is a series of diagrams describing flow of operations in a computer regarding any related applications. Structure is important because computer-based instruction should be interactive, and interactions are best depicted as a visual representation of decisions and events. While the structure does not include the actual text and pictures for the lesson, it should include their sequence. The structure in flowchart form includes information about when the computer will draw or animate pictures, what happens when the student makes mistakes, and when the lesson should end. Flowcharting can be done in varying amount of details. Different amount of details for different instructional methodologies can be used. For simpler operations such as tutorial, drill, and tests; simple flowcharts give an overview on the scope of the lesson. For complex methodologies such as simulations and instructional games, more detailed flowcharts that include the

algorithms underlying the simulation models, game rules, and so on are recommended. Regardless of the amount of details, producing flowcharts in a series of drafts can be beneficial.

#### **Phase IV: Digitization of content**

Hand drawn sketches can be digitized by scanning and transferred them to Adobe Photoshop or Adobe Illustrator. Color, typography, or composition or certain features such as shading can be added to produce attractive drawing. Audio are recorded using Sony Sound Forge and edited to make it suitable for specific modules. Video are also captured and edited using Adobe Premiere by combining video clips, sound and graphics together in a way that can convey meaning and fulfill attractive learning process.

#### **Phase V: Multimedia Design**

The courseware design is essential to the effective use of multimedia and educational technology so that the interaction between the meaning and media can be conducted in the learning process. The courseware attempts to incorporate major principles for the effective use of multimedia: modality, contiguity, multimedia, personalization, coherence, redundancy, pre-training, signaling, and pacing. In the courseware, Jawi texts with audio narration, practices of certain content, on-line tests with instant checking, graphical images and multimedia movies (whenever appropriate) are all presented in the courseware, both temporally and spatially contiguity principle . They are implemented in learner-paced segments so that students can control their learning pace and deliberate practice and self-evaluation with the courseware, corresponding to the pacing principle: the pace of presentation is controlled by the learner, rather than by the program .

The content of the courseware is laid out with simplicity and consistency. The content is divided into three thematic sections : Introduction to the topics; theories and practical aspects; and evaluation for understanding of the topics. Each section includes several topics, each with several learning activities or on-line tests. Narration and animation are combined to aid students into visual and virtual contexts in order to engage them with real understanding. The well-structured content of the courseware plays a scaffolding role to help students develop or improve understanding and knowledge for subjects.

#### **Phase VI: Development and Implementation**

Once the previous five phases have been carried out, the courseware can be developed. The multimedia objects are blended together in order to produce courseware that help students into an engaging experience during their learning process. Contents are delivered to students in an interactive format, ensuring high audience retention. The advantages and flexibility of this medium is extremely valuable, especially when time/student enthusiasm/student ability is a

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factor. The main authoring software used for development process is Adobe Flash and Adobe Director. Adobe Flash can manipulate vector and raster graphics which are representation of images, and supports bidirectional streaming of audio and video. It contains a scripting language called ActionScript. Adobe Director is used because it has a powerful scripting language called Lingo which allows sufficient interaction with external files and certain Windows APIs. It can also be used to create graphical user interfaces and create prototypes of applications, as well as create self-running Kiosks on CDs and DVDs. It has also been used to author interactive games with rich graphics and embedded QuickTime movies. Director supports many different bitmap, audio, and video formats. Adobe support both 2D and 3D multimedia projects.

**Phase VII: Testing, Consultation, and Modification**

The development of this courseware employs the technique of user centered design where testing from the beginning of the development to its final phase is important to avoid errors to be left until the last minutes when errors that should have been corrected at the beginning. Information can be obtained from future users, content experts or those who have gone through the material. Modifications have to be made to the courseware after.

**Phase VIII: Completion of Project**

A software project is said to be completed once all the modules have been tested and accepted by the product owner. In this project, multiple topics are developed in parallel by the development teams and then related topics are combined to form a complete courseware product prototyping.

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**8.5 STEPS INVOLVED IN THE COURSEWARE DEVELOPMENT**

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A courseware generally refers to content specific instructional software which functions to generate instruction with the support of instructional delivery system. A courseware product involves five elements: the contents and the learning/pedagogical methods as its main component, the learning objectives and the medium as its attributes and the architecture which organizes the courseware in a way convenient to use (Zhiting, 1996).



## NOTES

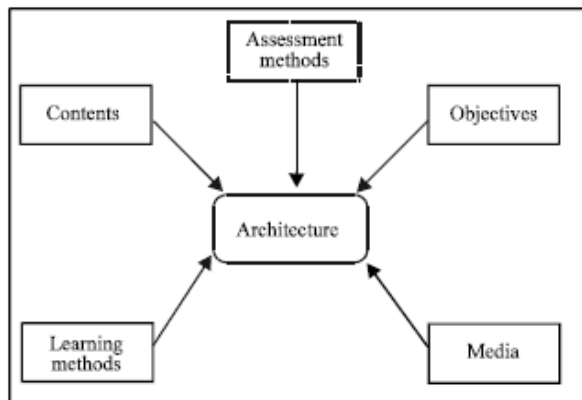


Fig. 1: Structure of courseware

This definition is illustrated graphically in [Fig. 1](#) showing an extra courseware element assessment methods, which we believe should be an important part of a courseware in the context of distance learning. The architecture plays a central role in the courseware and is used to denote the specific way in which other components are organized into a specific courseware product. Also, the contents or the subject matter is the essential component of the courseware; the contents component is linked to some types of learning/pedagogical methods or instructional strategies. The media is the physical basis representing the contents. Since allocation of specific media type (text, audio, video, etc) to pieces of the instructional material should be done, the medium can be regarded as attribute of the courseware. In addition, a well-designed courseware should have a clear specification of learning objectives or goal structure. The assessment methods are used to assess the achievements of a learner so that he can be appropriately directed through the courseware.

Developing multimedia courseware (i.e., contents, methods, media etc.) is a difficult and challenging exercise. It requires the developers to undertake a number of related activities for the development of effective, successful and quality courseware. It is believed that, like traditional software development, one should use a systematic, well-disciplined and practical approach to design and develop a multimedia courseware. A development process model provides the developers with such a systematic and disciplined approach which explicitly shows what is to be done and in which sequence. There are a number of courseware process models that have been proposed in the literature (Lee and Sullivan, 1996; Bradler, 1999; Allesi and Trollop, 1991; Bostock, 1996; Koper, 1995). However, there is no single recipe for courseware

development which is either universally accepted or could be used in all circumstance (Bostock, 1996).

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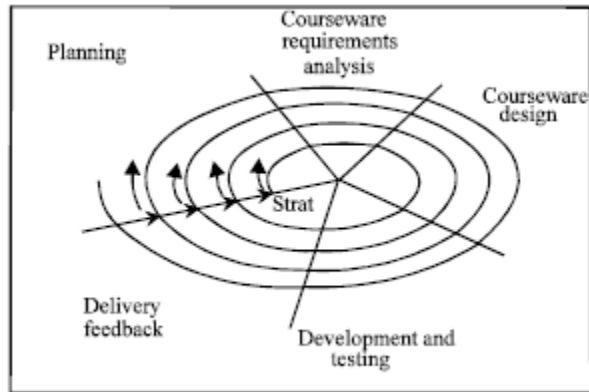


Fig. 2: Courseware development process

We present a variation of spiral model (Boehm, 1988) for courseware development. The main reason for using a spiral model is the fact that the courseware development is a highly iterative process which can well be illustrated by spiral model. It allows courseware to evolve and absorb the changes in the contents and presentation of material with time. The major phases of the propped model are shown in Fig. 2. We would like to emphasize that the spiral model given in Fig. 2 provides a general framework for courseware development. Each of the phases should be carried out using other suitable processes as is discussed in the following sections.

### Step 1: Planning

Like any software engineering project, a successful courseware development project requires careful planning. The development team must understand and specify the scope of the work to be done, the required resources, the risks to be incurred, the tasks to be accomplished, the effort (cost) to be expected and the schedule to be followed. Unfortunately, no widely accepted methods and tools exist for managing and planning courseware development. However, many effective project planning methods and techniques have been proposed in the software engineering literature of which can be used for courseware development planning. For example, bar charts which graphically illustrate the work plan and project *milestones* can be used. Also, cost estimation techniques (Papasyrou *et al.*, 1997; Marshall *et al.*, 1994) and the quality management techniques (Grutzner *et al.*, 2004) have specially been proposed for courseware engineering which can be used during this phase. It is of utmost importance that the

management plan should be written down which should included details of the objectives of the project, work schedule, deliverables, cost estimation and so on.

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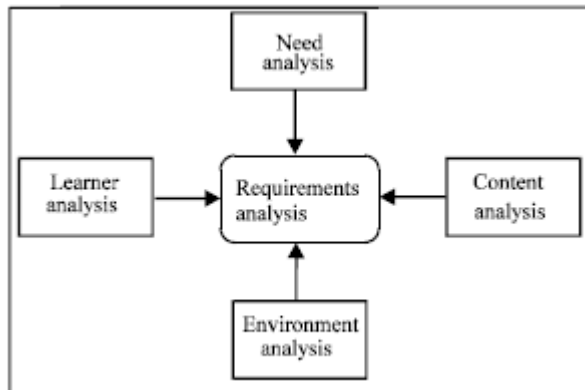


Fig. 3: Types of analysis

### Step:2 Courseware requirements analysis

After doing a careful planning, development of multimedia courseware begins with the analysis phase. Analysis is the process of defining what is to be learned by the students in a course in a given environment. There are four different types of analysis that should be carried out: need analysis, learner analysis, content analysis and environment analysis ( [Fig. 3](#)).

The first step in the systematic design of courseware often begins with analyzing the underlying needs and problems in instructional delivery. Need analysis enables identification of problems related to teaching and learning that are specific to content of a course (Bourdeau and Bates, 1996; Zhiting, 1996; Allesi and Trollop, 1991; Grutzner *et al.*, 2004). The data is generally gathered from the real environment and the results are used to determine if the multimedia courseware can be used to solve problems in the conventional lectures. The need analysis helps to identify the skills and knowledge lacking in the students that can be addressed in the courseware. This is easily done by feedback from students and academicians.

The purpose of learner analysis is to identify general characteristics of the audience or students, their readiness for the course and their preferences (learning styles) and limitations. This done using diagnostics test (or pretest) to determine students' level of subject expertise (Carver *et al.*, 1999; Low *et al.*, 2003). Audience skills that are needed in using multimedia courseware, such as technical expertise in using Web as a tool, computer skills, study skills, communication skills and language skills, are all vital

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in ensuring the effectiveness of courseware. Learner analysis provides a better understanding of students to enable better planning for learner-centered program and to better guide students to process online information.

The purpose of content analysis is to identify topics and subtopics for a course. It helps in identifying the prerequisite skills required for the students to learn the course effectively.

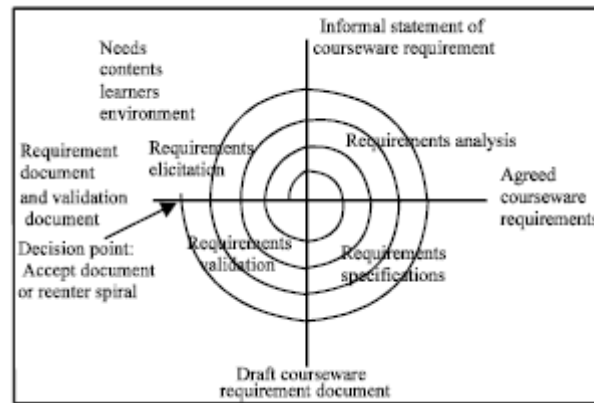


Fig. 4: Courseware requirements analysis process

It allows for the identification of relationships between topics and for the selection of the right contents for the tasks and skills necessary to learn them (Carver *et al.*, 1999; Lee and Sullivan, 1996; Low *et al.*, 2003). The relevant information sources are then gathered from textbooks and references to achieve the intended learning outcomes. A closer investigation on the key learning concepts and contents to be taught has to be identified. Note that the contents for a particular course might have been already defined in the curriculum. A careful analysis of the contents has to be carried out to discover the contents that can be learned by discovery or peer interaction and the part of the contents that cannot be learned using multimedia courseware or other resources other than by having an interaction between students and teachers. Therefore, a decision is made on which part of the course contents should be constructed. Task analysis and contents analysis result in a listing of learning objectives, learning tasks, subtask and contents scope that enables the arrangement of the courseware into relevant modules, units and topics.

The purpose of environment analysis is to gather the information about the learning environment and its affect on the learner. It also involves technological analysis to discover the strengths and weakness of available technologies and infrastructures to be used in delivering the courseware. The courseware analysis should be

properly documented in courseware requirements specification document.

The courseware requirements analysis should be conducted through a well-defined process. Figure 4 shows, conceptually, how these activities comprise an iterative requirements engineering process. The different activities in courseware requirements analysis (Fig. 4) are repeated until an acceptable courseware requirements specification document is produced or until external factors such as schedule pressure or lack of resources cause the process to terminate. Requirements elicitation is the first stage in building an understanding of the need contents, environment and learner characteristics.

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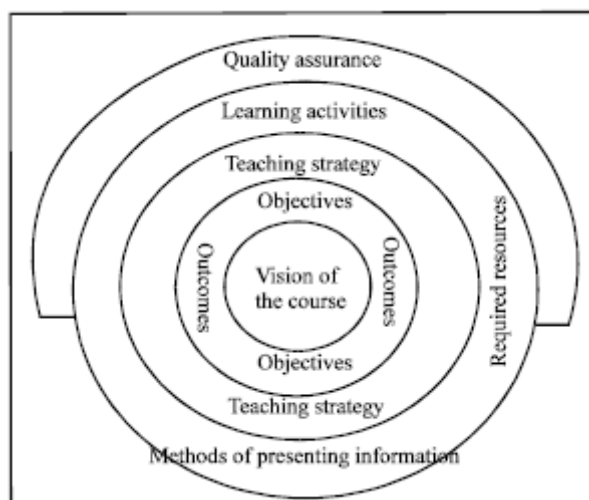


Fig. 5: Content design framework activities

It is fundamentally a human activity and is where the audience (learners (students), instructors, etc.) are identified and relationships established between the courseware development team and the audience. The outcome of this activity is informal courseware requirements statement. During the requirements analysis phase, we detect and resolve conflicts between requirements, discover the bounds of the courseware and how it must interact with its environment and elaborate courseware requirements. This culminates into an agreed courseware requirements. From courseware requirements, requirements specifications are derived and they are validated and verified.

### Step:3 Courseware design

Course design is the process of specifying how the contents are to be learned and presented (Allesi and Trollop, 1991). The

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system is closely examined to design a learning program to be delivered that will ensure mastery of the competencies in the area of knowledge, skills and attitudes (Shih and Davis, 1997). In a multimedia courseware development, various types of design are required. Content design is one of the most crucial design activities. The major content design activities are shown in Fig. 5. The purpose of content design is to identify important information about the course to be communicated to students. The contents have to be properly defined and presented in an effective manner (contents architecture). The content delivery strategies (Gagne, 1985) and media selection should also be outlined during this phase. This serves to direct the learners' attention to the expected learning outcomes and desirable performance. In order to achieve the expectation from the students, the objectives are classified according to levels of learning and to set the criteria for measuring the learning outcomes.

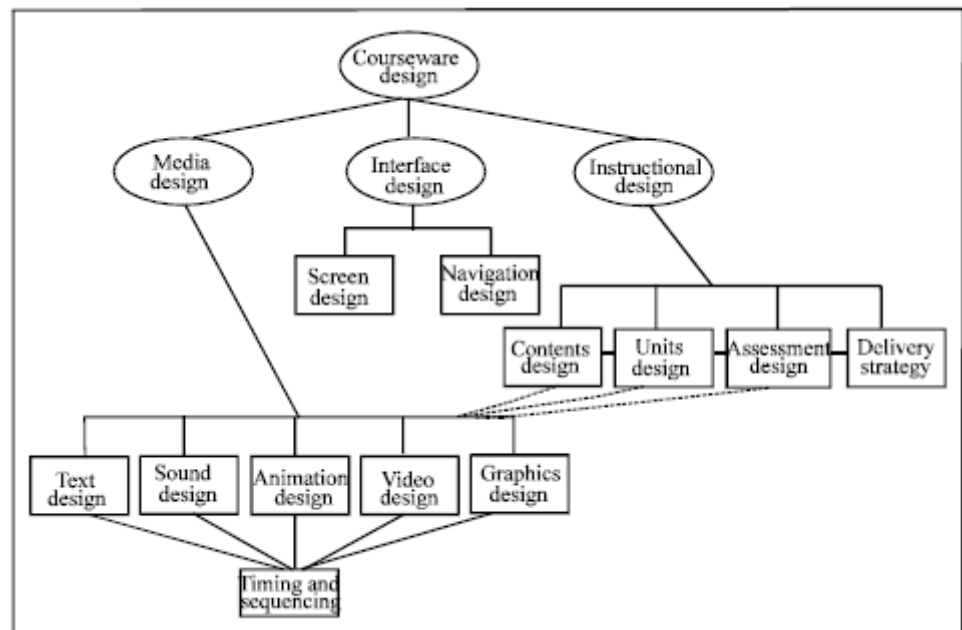


Fig. 6: Design activities and interdependencies

During the content design, the developers must give the **quality assurance** a central role. The assurance activity helps achieving high quality contents. User interface design, layout, navigation etc are also important design activities. Table 1 summarizes various design activities and sub-activities to be carried out in each one of them and Fig. 6 shows dependencies of some of the activities (shown as dotted lines). Timing and sequencing of contents and related multimedia objects must be considered, so that the sound and other media match each other.

#### **Step:4Development and testing**

The analysis specification and design specification guide us to the next development phase-courseware development and testing. Development is the process of authoring and producing the learning material. The testing is performed to make sure that the courseware has been developed according to the specification and meets the requirements. There are various activities that are carried out during this phase. Authoring of the course contents is, perhaps, the most important activity during which the contents of the course are written in a way that can achieve the objectives of the courses and intended learning outcomes. During the development phase, graphics, sound, animation and video are developed. Once various courseware components are developed, they are integrated into a whole. Testing is a major activity which can begin as early as the production of individual components is complete (unit testing). Once all the components are integrated, the whole courseware needs to be tested using various integration testing methods (Pressman, 2005). Major activities and sub-activities of this phase are shown in Table 2.

#### **Step:5Delivery and feedback**

Once the courseware is developed and tested, it can be delivered to the users (tutors, students). A continuous feedback is required from the users to maintain the system. The feedback helps in correction of errors, perfection of courseware and adaptation for new contents and media elements. A very elaborate process should be in place to receive the feedback from the users. Based on the result of feedback, we can continue with the next iteration of spiral.

#### **Step:6Courseware quality assurance**

A good courseware development process/approach must support continuous **quality assurance** of all development artifacts and the courseware to be produced itself. Most of the existing courseware **quality assurance** approaches propose only evaluations of the fully implemented courseware. The major drawback of this late **quality assurance** is that solving problems introduced during the requirements analysis, specification and design phase are much more expensive than solving them in an early phase when they are introduced (Grutzner *et al.*, 2004). Even the prototype **quality assurance** approach (Driscoll, 1998) assures the quality of only a few artifacts at early development phases. Therefore, it is important to have a life-cycle **quality assurance** approach that covers all development artifacts and the final courseware as is proposed in software engineering. The quality of artifacts that are produced during each phase is assured using four different methods.

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**Table 1: Design Activities and Sub-activities**

<b>Activities</b>	<b>Sub-Activities</b>
Instructional Design	Allocation of contents to courseware parts. Allocation of learning activities to courseware parts. Courseware unit design, learning step specification. Media selection for each components of courseware. Content delivery strategies design.
Media Design	Design of text. Design of Graphics. Design of sound Design of animation Design of video
User-interface design	Navigation design Screen design

**Table 2 Development and testing activities and sub-activities**

<b>Activities</b>	<b>Sub-Activities</b>
Contents development	Authoring of course content Definition of links glossary entire etc. Development of assignment Development of quizzes, exams etc.
Multimedia development	Authoring of script and sound recording for voice over Preparation of graphics Preparation of animation Preparation of video
User-interface development	User-interface implementation Screen and interaction template implementation Insertion of multimedia components (sound, graphics etc) as appropriate places
Courseware integration Testing	Integration of units to make a whole Unit testing Integration testing User-interface testing Pilot testing with real tutors, students



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These methods include perspective-based inspections, prototyping, tests and both formative and summative methods. The responsibility of **quality assurance** rests with different people who play various roles during the life-cycle, such as Project Manager (PM), quality manager, instructional courseware designer (ID), subject matter expert (SE), Courseware Author (CA), programmer, multimedia developer, graphics designer and artist, video recording expert, potential learners, tutors and so on. This is the approach that was used in our courseware development process.

The output artifacts of analysis and design phase are verified against the output of the previous phases by means of perspective based inspections. Each participating role checks whether the artifact (e.g., requirements specification, courseware design) meets the definitions and specifications of the previous phase. The problem statement and planning documents produced during the planning phase is inspected by project manager, learner, instructional courseware designer, subject matter expert and courseware programmer to ensure that the objectives and scope of the work, the required resources and schedule are realistic and can be achieved. The requirements specification produced during the analysis phases are inspected by all the roles mentioned before to ensure that the requirements specifications meet the goals and objectives of the courseware as outlined in the planning document. Note that the requirements verification and validation is an integral part of the requirements analysis process model shown in [Fig. 4](#). The courseware design specifications produced during the design phase are validated against the requirements specification. This activity is also performed by all the people involved in the development of courseware. The errors and problems that are discovered during the inspections are collected and discussed in an inspection meeting. Errors are corrected and, if necessary, another inspection cycle might be started. Our experience with the development of courseware shows that inspection based method coupled with prototyping and the participation of various roles at every stage of the project facilitates an agreement about the current development of the product among the project members and provides a very valuable input to improve the quality of the end-product.

The design artifacts which are produced as a result of different activities as given in [Table 1](#) can be verified against the design specification using inspections and prototyping of certain

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aspects of the courseware. This helps in achieving a high-quality product. Once the courseware is developed, it can be verified against the design specification and by testing the individual components and courseware as a whole. The test cases for testing are generated during requirements specification, courseware unit design and during the specification of functional requirements. A test case contains instructions of activities that have to be performed with the courseware as well as expected results or system behavior. All the tests are organized and supervised by the quality manager along with development team; they specify the test cases to be applied and compare the test results with the expected results from the test case specification. If there are any deviations, they identify the problems behind the deviations and make arrangements in order to solve them. A test cycle ends when all test cases run properly without any deviation from the expected results. Summative evaluation is performed to deduce the effectiveness of the courseware and the mode of instructional delivery. A commonly used approach for summative evaluation is the pre-test and post-test (Retalis, 1997). Two types of questionnaires should be given to the learners. The first one concerns the pre-test which aims at identifying the expectations of the learners as well as organizational matters of the instructional delivery. These questionnaires should be filled in during the first days of the courseware delivery and not later than the first week. The post-test questionnaire helps to deduce overall judgments and criticism on the courseware, learning environment and instructional delivery. The questionnaires should be collected for analysis, interpretation and reports of the results.

### **Step:7 Application and evaluation of the process model**

The courseware development process presented in to develop several courseware for different undergraduate and postgraduate courses. In each project, initial requirements analysis was carried out by a team of faculty members of the department of computer science. A survey of various other universities already offering that course was also carried out to determine the learners' characteristics, needs and learning outcomes. Keeping in view the results of our surveys and discussions with students and teachers, existing course description was revised so that the intended learning outcomes of the course could be achieved. Topics and subtopics and their relationship to learning outcomes were then established. The course specification prepared was reviewed by a committee of experts in each course to get their feedback on course topics, subtopics, objectives and so on. The course specification was then revised again keeping in view the feedback provided the reviewers. This helped us in precisely outlining the courseware

description so that the intended learning outcomes could be achieved.

During the instructional design phase, we carefully divided the contents into a number of units and learning objectives and outcomes were assigned to each unit as determined during the analysis phase. Using the Gagne (1985) description of nine external instructional events aimed at facilitating the acquisition of different kinds of intellectual skills in a systematic way, we derived a content delivery strategy for each unit of the courseware. The learning strategy aimed at the ways of gaining the learner attention, informing the learner of the objectives and outcomes of each unit and its relationship to overall course objectives, presenting the important points and concepts in a distinctive manner, proving learning guidelines, presenting the assessment methodology, providing the feedback aimed at reinforcement of learning and so on. We also planned and designed the relevant graphics, sound/voice requirements and animation suitable for various courseware components. An easy to use and consistent user-interface was also designed. The whole designed was reviewed by a team of developers, content writer and project director and necessary improvements were made before starting the implementation following the activities and process model describe earlier.

Once the revision of design was found to be adequate with respect to course objectives, learning outcomes, learning methodology, planning and design suitability and consistency, the development phase began. During the development phase, course contents were prepared. A subject expert or team of experts is given the task of authoring the course contents. Once the course contents were ready, they were reviewed by an independent committee of subject experts for their accuracy, organization, clarity, suitability and its conformance with the course objectives. The authors were asked to make the necessary revisions.

The multimedia aspect of the courseware was limited to text, graphics, animation and sound/voice. Using various technologies (voice recording, digitization and editing, Adobe Photoshop, Corel Draw, scripting using action scripts, HTML, etc), various components of the courseware were produced and each unit was tested individually and then integrated with the other units. Reading material to further the learning process and glossary are also provided on each topic. At the end of each unit, a learner is assessed with a well prepared quiz for self evaluation. The questions in each quiz are prepared in such a way that they test learner's ability to retain important concepts, application of concepts to various situations and skills to be acquired.

The testing of the courseware was performed at the unit level, integration level as well as at course-level by the members of

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development team, subject experts, a sample of students and external independent testers. The feedback from various testers was discussed among the development team and necessary changes were made before releasing the courseware on the internet and CDS.

We also evaluated how successful the proposed model has been in achieving our objective of developing of high quality courseware within time and budget constraint. Since there have been no data available on the performance of the existing models to which present results could be compared, the focal question in evaluation of our process model was how do we know and judge that the courseware development process has helped in developing high quality courseware within time and budget. However, it is suggested (Retalis, 1997) that a process method should be evaluated by testing and validating the quality of the courseware and by determining whether the money as well as the time spent for its development were within the predicted limits. Therefore, we evaluated our process model based on this criterion.

To determine whether we were able to complete the courseware development within time and budget, we collected the required data from the project manager and checked against the management plan. The data shows that five out of total eight projects were completed according to the time set within the minimal deviations which were within the tolerances and the budget of the projects was not exceeded more than a predicted threshold. The data also revealed that course analysis and design were the most time consuming activities followed by the development of multimedia components. The remaining three projects were delayed from three to six months. The investigations revealed that the major reasons for their delays were the lack of expertise in developing the course contents for those particular courses and design and development of multimedia components. The review of content material by external reviewers was another contributing factor who failed to complete the review within the allotted time. However, this situation was improved in the last three projects when the project manager followed up the review process. Without a doubt, our success rate in developing the courseware within time and budget has been very good by all standards when compared with the courseware and software development success rates reported by others (Pressman, 2005; Retalis, 1997). We believe that our success rate will further improve as we get more experience in using the proposed model and available technologies as is the case with software engineering.

To determine the quality of the courseware, we used the guidelines provided by Retalis. (1997). We collected data using the formative evaluation questionnaires and the pre-test questionnaires from subject experts, tutors and learners for three courses. The data

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show that the quality of the courseware checked against the standards is quite high. The initial summative data collected from the tutors and students show that the courseware has been found very useful by the students and tutors. 67% respondents was fully satisfied with the quality of the courseware and 25% were partially satisfied and pointed out some areas of improvements both in the contents and delivery method. Remaining 8% suggested major improvements and they were not satisfied with major portion of the courseware. Feedback from the tutors shows that with the use of the courseware, students learning time was reduced by 10-15%. These results are comparable or better than those reported in the literature (Papasprou *et al.*, 1999; Whittington and Scalter, 1997; Kunst *et al.*, 1997; Johnson *et al.*, 2004; Margi *et al.*, 2000; Cochran and Rodrigo, 2006). Furthermore, the application of the **quality assurance** methodology showed that performing inspections of the early products/artifacts revealed many errors and problems, which were removed with minimum of effort. This was also evident from the fact that only 5-10% changes/corrections were suggested by the independent reviewers when they evaluated the completed courseware. However, more detailed evaluation of various aspects of multimedia courseware is being conducted to further improve both the development process and the product. However, complete data will not be available until the mid of next year. As a future work, we intend to improve the courseware once we get all the feedback and complete the performance evaluation study.

Based on our evaluation results and experience with the proposed model, we conclude that the proposed courseware development process provides developers with a systematic and formal methodology that could be used in developing high quality, easily maintainable and flexible courseware. Since the proposed process provides a general framework for courseware development, it can be tuned up according to the specific preferences and needs of the developer. In a sense, it can be seen as a generic courseware development methodology. In addition, the propose model is scalable as has been proved in our project of developing courseware of various sizes and complexities.

**Check your Progress-II**

Note: a) Space is given below for your answer

b) Compare your answer with these given at the end of this unit

4. what are the steps involved in the development of hypermedia?

5. what is Multimedia courseware?

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## 8.6 ADVANTAGES AND LIMITATIONS OF THE MULTIMEDIA BASED COURSEWARE

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### 8.6.1 THE BENEFITS OF MULTIMEDIA BASED COURSEWARE

#### NOTES

#### 1. Deeper understanding

According to research, a benefit of multimedia learning is that it takes advantage of the brain's ability to make connections between verbal and visual representations of content, leading to a deeper understanding, which in turn supports the transfer of learning to other situations. All of this is important in today's 21st century classrooms, as we are preparing students for a future where higher-level thinking, problem solving and collaborative skills will be required.

#### 2. Improved problem solving

A large percentage of the human brain dedicates itself to visual processing. Thus, using images, video and animations alongside a text stimulates the brain. Student attention and retention increase. Under these circumstances, in a multimedia learning environment, students can identify and solve problems more easily compared to the scenario where teaching is made possible only by textbooks.

#### 3. Increased positive emotions

According to psychologist Barbara Fredrickson, experiencing positive emotions makes people see more possibilities in their lives. Using multimedia during instructions impacts student's mood during the learning process. With a positive attitude they learn better and tend to be more proactive.

#### 4. Access to a vast variety of information

With computers, tablets, smartphones and the internet, students are today better equipped than ever to search and find the information they need. A study revealed that 95% of students who have access to internet, use it to search for online information. Sharing the information and participating in class discussions is done in a more confident way when access to information is as easy as today.

#### 5. World exploration

There is no surprise here. With the help of multimedia children can explore and learn about places they would never been to. In a geography class, students can explore different cities of the world, the tallest mountains and the most dangerous jungles. In a science class, space and planets exploration is now possible. In a biology class, the dissection of rare animals and different habitats exploration are like a walk in a park for students benefiting of a multimedia learning environment.

All together, multimedia learning environments have a direct effect on learning and even on growing as a person. An effect that differs and can't be achieved as easy whilst using traditional education materials. Therefore, it is no wonder the business is increasing and schools desire more and more to create multimedia learning environments for their students.

Although the multimedia teaching technology is applied to the classroom teaching, which can improve the efficiency of classroom teaching and make the classroom teaching more attractive, the multimedia teaching is also a double edged sword whose limitations can't be ignore.

### **8.6.2 LIMITATIONS OF THE MULTIMEDIA BASED COURSEWARE**

#### **A. The Limitations of “teacher's explanation + multimedia courseware show”**

The teaching mode as “teacher's explanation + multimedia courseware show” is made in advance with multimedia courseware which can substitute the blackboard in the traditional classroom teaching mode. This mode is a kind of update in teaching tools.

1)To make the multimedia teaching to improve the teaching effect, we must display the advantages of the multimedia teaching technology compared with the traditional teaching tools, such as the advantages of dynamic image, more prominent auditory and visual effects, etc. Therefore, the classroom teaching mode requires that teachers master the technology of making multimedia courseware combining course features, which will be more attractive no matter from the vision, or from the content.

2)Making the Teacher Marginalized in the Classroom Teaching. The common defect in the multimedia courseware and the blackboard is the single flow of information. There is no feedback mechanism, which makes that teachers can't accept students' feedback. The two-way flow of information between the teachers and students means that the teacher is not only the submitter of the information, but also the receiver of the students' feedback information. Then the teacher can make adjustment timely and solve students' questions according to students' feedback on teaching information. So the teacher is the important source for educational communication channel. In the teaching mode of “teacher's explanation + multimedia courseware show” , the multimedia courseware becomes the focus for teachers and students, and the teacher is marginalized, thus should be in the leading position in teaching.

3)Rich Expression without Thinking Process. Learning is a process of wisdom accumulation and ability training. But for the college courses and the speculative courses with basic theory, it is more

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important for the teacher to give students knowledge besides the conclusion. The process of knowledge inference and interpretation for the teacher is not a simple process of knowledge transfer, but a complicated system with ability training. First of all, students learn to think through observing teacher analysis process, and learn to think from a professional perspective, which can make students undertake independent analysis, judgment and decision-making, and then improve students' contemplative faculties. Secondly, the students observe the problem thinking activity line or track taken by teachers; they can learn to look for the right ideas to solve the problem. Finally, students actively participate in the process of teachers' interpretation and analysis of knowledge; they can get trained on their logical thinking ability which represents the ability to solve problems. The mode of "teacher's explanation + multimedia courseware show" abandons the traditional knowledge carrier that teachers use to inference, but show simple analysis process and conclusion only with a multimedia courseware. Thus cannot achieve the purpose of training students' thinking.

4)Improving Instruction Efficiency but Losing Flexibility. Multimedia courseware is made in advance, and it generally can be played in the teaching process. But teachers can scribble the content written on the blackboard according to the students' feedback information timely, and then adjust the train of thought, update relevant content, add and delete some content. At the same time, the classroom teaching can stimulate inspiration for teachers and students mutually, and the blackboard is indispensable props for interaction mechanism. For instance, in problem conductive teaching, the teachers will list the questions and ideas on the blackboard, and then guide the students to think and discuss. And then the students' ideas and questions are listed on the blackboard, discussed by the teachers and students, possible conclusion can be inducted at last. In the mode of "teacher's explanation + multimedia courseware show", due to the lack of the blackboard, this content can be displayed only through the language. That means there is only one channel for information transmission, which is very drab, and it cannot put the content in a picture to explain, analyze and discuss. In addition, in the process of the explanation, the writing by the teacher is also the process of noting but thinking for the students. But the rapid play of multimedia courseware and interpretation by the teachers will leave no time for the students to think and digest what the teachers explain. In view of the limitation for the mode of "teacher's explanation + multimedia courseware show", this generally applied to academic report. Because the academic report is a research report, which has no obligation to stimulate students' interest in learning, training students' ability to think. But those are the basic responsibility for the classroom teaching.



## **B. Limitations in the Mode of “Teacher’s explanation + multimedia courseware show + the blackboard inference”**

The mode of “Teacher's explanation + multimedia courseware show + the blackboard inference” is the organic combination of the modern teaching techniques and traditional teaching tools, which retains traditional teaching tool such as the blackboard, and increases the multimedia. Those two with teachers together form the three main bodies to transfer information to the students.

1)Teaching information will be lost. In the multimedia classroom, the computer operating platform and multimedia screen is commonly set by the each side the classroom platform. Teachers need to go to the operation platform to turn the page at any time, and even the teachers stand after computer operation platform all the time. If the students make multimedia screen as main body to receive teaching information, the teacher will be often free out of the students' visual pictures, or not in the students’ visual images, so the teacher's explanation becomes a voiceover. The students cannot receive information transferred by the teachers' eyes, face and body language. Some research shows that 80% of the information is not transferred by language. If students take with the teachers as the main body of receiving information, it will weaken the function of multimedia information. In addition, if the content that the teacher interprets is completely consistent with the multimedia, students usually search the content that the teachers explain in multimedia screen, because visual identity and memory effect higher than hearing. But it would waste time, and at the same time, there is also a phenomenon that what the students actually see is not synchronous with the content that the teachers explain.

2)Scattering the students' attention. The original intention to encourage utility of the multimedia for teaching is that it can combine auditory and visual, and combine text, images, colors and elegant layout design, which can attract students' attention, stimulate students' interest in their study. But in fact, everything has two sides. The factor that can attract the attention of students also may disperse students' concentration. In the limited time and space, the students are likely to be attracted by beautiful picture, wonderful music, and ignore the teaching information the teacher wants to convey.

3)Adversely matching between the blackboard content and multimedia courseware content affects the teaching effect. The blackboard and multimedia courseware have their own advantages, how to combine both better is a kind of art. There are two extreme cases in using the multimedia courseware and the blackboard: one is that the detailed multimedia courseware is played, meanwhile, some teachers will write the main teaching content on the blackboard again,. The second is that some teachers will be completely dependent on multimedia courseware. The right way should be that the dynamic

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image shows for the teaching content, a lot of blackboard writing for background material, data, education and discussion topic and so on should be left to the multimedia courseware, then the logical shows and some chart display should be left to the blackboard. Compared with the first mode, the second mode integrates the advantages of teacher, the blackboard and multimedia courseware, and it should be applied more widely in the teaching.

### **The Application Errors in the Technology of Multimedia Teaching**

At present, there are still some errors in the multimedia teaching management of the college and the application of the multimedia technology for teachers to finish teaching, which will influence the teaching effect that the multimedia teaching will improve.

#### **A. Blind Encouraging Multimedia Classroom Teaching**

The multimedia technology and the information for classroom teaching are related by form and content. On the one hand, any content has a certain form, any form is the form of certain content; On the other hand, and the form is decided by the content, the form has the reaction to the content.

1)The multimedia teaching technology is not suitable for all the courses. Course nature and course content determines the form of the transition for teaching information. If you need a lot of image or caption to show teaching content, or large amount of data and complicated charts, or the experiments need showing teach knowledge but without experimental conditions, the multimedia teaching will be better.

2)The multimedia teaching is not necessary in the whole process. Teachers should use the proper technology in the multimedia teaching according to each lecture; otherwise it may produce the effect of the wasted effort. In fact, in the interpretation of knowledge, many methods are available, but for a particular knowledge teaching, the methods are not many. In order to improve the effect of teaching, The teachers need to determine which teaching process the multimedia courseware need be used to display the teaching information, and which should be abandoned.

3)Not all teachers can use multimedia for teaching. Writing on the blackboard and multimedia courseware production and use are necessary skills for all teachers, and they cannot replace each other, but with complementary relationship. Therefore, the new teachers in colleges and universities should train their basic skills from the writing on the blackboard, lecture notes and teaching plan writing, and they can't jump in using the multimedia technology in the classroom teaching.

## **B. The Process of Multimedia Teaching Is without Supervision and Evaluation on the Effect**

At present, there are some management systems in most colleges to encourage the multimedia teaching. But teaching supervision mechanism on the multimedia teaching has not set up in most of universities. At present, the common problems for the application of multimedia technology in the college classroom teaching include:

1)When the teachers make multimedia courseware, they will just make original content written on the blackboard or the contents of the textbook moved to the multimedia courseware, and they do not combine with the advantages of multimedia to choose and allocate;

2)When the multimedia courseware is played, continuous full pages will be played. The teachers do not consider whether the students can accept and their feedback on the information.

3)There are much more content on the multimedia courseware page, which will increase the cognitive load of students. The students need to spend time in looking for the corresponding words in the page that the teachers just explain, because of the delay between vision and hearing; it is difficult to deal with both better. These problem existing in the application of multimedia teaching will be able to cause unnecessary loss of the teaching information. Therefore, the department of teaching management shall make some quality supervision and inspection on the teaching courseware made by the teachers. And they should take spot check on the multimedia teaching, which will ensure that the advanced teaching media will be used to the fullest.

## **C. Multimedia classroom layout is not rational, which will influence delivery function of teaching information**

The computer operating platform and multimedia screen are set in front of the classroom in the arrangement of the multimedia classroom by some colleges and universities, instead of the original platform and the blackboard. Although the multimedia teaching technology, compared with the relative traditional AIDS is more expressive and stronger in reproduction, the teachers is relatively weak in control of teaching information transition, and the students' participation is also weak. Two spaces should be given to the teachers in the layout of the multimedia classroom: One is the space for the interaction between the teacher and students. The teacher cannot sit in front of the computer screen, but stand in front of students to explain. The second is the space for displaying the teaching content. The teacher may leave the content on the blackboard, which makes the students have internal overall view, and refer to the above knowledge when listening to the following content at the same time. Only one page can be displayed by the multimedia each time, which makes the students lack of integrity and continuity on the teaching content.

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**D. The Multimedia Technology Is Regarded as a Kind of Means to Reduce Preparing Pressure and Energy Consumption**

Some teachers use the multimedia in the classroom teaching, because they think the multimedia courseware can get “once and for all” result, as long as the repeat classes, the teacher will not write on the blackboard any more. This detail content that should be remembered is written in the multimedia courseware, and then the teachers only need to read out in the classroom, which can save the preparing time. In the multimedia teaching, the teachers can sit in front of the computer to explain what is in the computer screen. It is so easy. In fact, in order to improve the teaching effect, the teachers who use multimedia teaching technology may be more tired. The teachers should prepare lessons according to the different characteristics of different classes and specialties to produce or adjust courseware content. In addition to language interpretation and the blackboard inference in the classroom, the multimedia courseware should be also played.

**E. The Students Can Copy Multimedia Courseware after Class and They Are Not Required to Take Notes**

The role other information channels play is ignored by the approaches the teachers adopt besides auditory and visual. Only the “listening + looking+ writing+ thinking” can achieve the best teaching effect. In fact, the students who attend a lecture with noting think about the content again. Some content in the lectures is not in the courseware, the teachers increase some information according to students’ feedback temporarily, which the students record for their thinking and analyzing after class.

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**8.7LET US SUM UP**

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In this unit you have studied in detail about the basic concepts of hypermedia and different types of hypermedia. You have also studied about the what are the steps involved in development of multimedia courseware in classroom. Moreover you have learnt about the limitation and advantages of multimedia classroom.

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**8.8UNIT-END ACTIVITIES**

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- Write the conversation between Teacher and pupil for the development of Multimedia Courseware for the learners.
- Describe the various steps involved in development of multimedia courseware

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**8.9ANSWER TO CHECK YOUR PROGRESS**

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Hypertext and Hypermedia Hypertext is a text which contains links to other texts. The term was invented by Ted Nelson around 1965.

Information is linked and cross-referenced in many different ways and is widely available to end users. Hypertext means a database in which information (text) has been organized nonlinearly. The database consists of pages and links between pages.

A link is defined by source and destination nodes, and by an anchor in the source node.

Two types of link: (a) Internal link

(b) External link

Hypermedia is not constrained to be text based. It can include other media, e.g., graphics, images, and especially the continuous media – sound and video.

- X/HTML, Atom, VoiceXML, CCXML, SMIL, SVG, Turtle, Notation 3, TriX, TriGRDF/XML, SensorML, CSS, text/uri-list, Sitemap XML
- "Hypermedia is defined by the presence of application control information embedded within, or as a layer above, the presentation of information. Distributed hypermedia allows the presentation and control information to be stored at remote locations."

**-Roy T. Fielding (2000)**

- Step 1: Planning
  - Step:2 Courseware requirements analysis
  - Step:3 Courseware design
  - Step:4 Development and testing
  - Step:5 Delivery and feedback
  - Step:6 Courseware quality assurance
  - Step:7 Application and evaluation of the process model
- Courseware is educational material intended as kits for teachers or trainers or as tutorials for students, usually packaged for use with a computer. Courseware can encompass any knowledge area, but information technology subjects are most common. Courseware is frequently used for delivering education about the personal computer and its most popular business applications, such as word processing and spreadsheet programs. Courseware is also widely used in information technology industry certification programs, such as the Microsoft Certified Systems Engineer (MCSE) and the Computing Technology Industry Association's A+ examination.

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## 8.10 SUGGESTED READING/REFERENCES

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- **Homeed T.S.K. , Mahmood A (2006)**,“*Systematic Multimedia CoursewareDevelopment Using a Software Engineering Style Process Model*”, Information Technology Journal Volume 5 (4): 726-734, Retrieved from <https://sialert.net>
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## UNIT –IX INTERACTIVE MULTIMEDIA AND LEARNING

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### STRUCTURES

9.1 Introduction

9.2 Objectives

9.3 Interactive Multimedia-Meaning

    9.3.1 Developments Of Interactive Multimedia

9.4 Definition of Interactive Multimedia

9.5 Factors Influencing Learning with Interactive Multimedia

9.6 Principles of Instructional Design for Multimedia and Interactive  
Multimedia; Split-

Attention Principle, Modality Principle, Redundancy Principle, Spatial  
Contiguity

Principle, Temporal Contiguity Principle, Coherence Principle

9.7 Advantages And Limitations Of Interactive Multimedia

    9.7.1 Advantages Of Interactive Multimedia

    9.7.2 Limitations Of Interactive Multimedia

9.8 Let us sum up

9.10 Unit-end activities

9.11 Answers to check your progress

9.12 Suggested Reading /References

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### 9.1 INTRODUCTION

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In education, multimedia is used to produce computer-based training courses (popularly called CBTs) and reference books like encyclopedia and almanacs. ACBT lets the user go through a series of presentations, text about a particular topic, and associated illustrations in various information formats. Edutainment is the combination of education with entertainment, especially multimedia entertainment.

Learning theory in the past decade has expanded dramatically because of the introduction of multimedia. Several lines of research have evolved, e.g. cognitive load and multimedia learning.

From multimedia learning (MML) theory, David Roberts has developed a large group lecture practice using PowerPoint and based on the use of full-slide images in conjunction with a reduction of visible text (all text can be placed in the notes view' section of PowerPoint). The method has been applied and evaluated in 9 disciplines. In each experiment, students' engagement and active

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learning has been approximately 66% greater, than with the same material being delivered using bullet points, text and speech, corroborating a range of theories presented by multimedia learning scholars like Sweller and Mayer. The idea of media convergence is also becoming a major factor in education, particularly higher education. Defined as separate technologies such as voice (and telephony features), data (and productivity applications) and video that now share resources and interact with each other, media convergence is rapidly changing the curriculum in universities all over the world.

Multimedia provides students with an alternate means of acquiring knowledge designed to enhance teaching and learning through various mediums and platforms. This technology allows students to learn at their own pace and gives teachers the ability to observe the individual needs of each student. The capacity for multimedia to be used in multi-disciplinary settings is structured around the idea of creating a hands-on learning environment through the use of technology. Lessons can be tailored to the subject matter as well as be personalized to the students' varying levels of knowledge on the topic. Learning content can be managed through activities that utilize and take advantage of multimedia platforms. This kind of learning encourages interactive communication between students and teachers and opens feedback channels, introducing an active learning process especially with the prevalence of new media and social media. Technology has impacted multimedia as it is largely associated with the use of computers or other electronic devices and digital media due to its capabilities concerning research, communication, problem-solving through simulations and feedback opportunities.

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## **9.2 OBJECTIVES**

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At the end of the course, the student-teachers will be able to

- Learn the definition of multimedia and what it means to use it
- Discover the kinds of media and understand how to combine them
- Distinguish between linear presentations and user-controlled interactive environments
- Find out about basic technical concepts and early desktop computers
- Learn a bit of multimedia history and understand the difference between older uses of media compared with current digital media uses
- Get familiarized with the various aspects of the interactive multimedia
- Acquire knowledge of the current trends in the teaching and learning



- Acquire the knowledge of concepts and needs of interactive multimedia
- Develop essential skills in teaching

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## **9.3 INTERACTIVE MULTIMEDIA-MEANING**

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### **What is interactive multimedia?**

Interactive multimedia has been called a "hybrid technology." It combines the storage and retrieval capabilities of computer database technology with advanced tools for viewing and manipulating these materials. Multimedia has a lot of different connotations, and definitions vary depending on the context. For the purposes of this Guide, in the context of upper secondary and postsecondary education, interactive multimedia is defined by three criteria:

- Interactive Multimedia is any package of materials that includes some combination of texts, graphics, still images, animation, video, and audio;
- These materials are packaged, integrated, and linked together in some way that offers users the ability to browse, navigate and analyze these materials through various searching and indexing features, as well as the capacity to annotate or personalize these materials;
- Interactive multimedia is always "reader-centered." In interactive multimedia, the reader controls the experience of reading the material by being able to select among multiple choices, choosing unique paths and sequences through the materials. One of the key features of interactive multimedia is the ability to navigate through material in whatever ways are most meaningful for individual users.

### **9.3.1 DEVELOPMENTS OF INTERACTIVE MULTIMEDIA**

The analogue video disc developed by NV Philips was the pioneering technology for interactive media. Additionally, there are several elements that encouraged the development of interactive media including the following:

- The laser disc technology was first invented in 1958. It enabled the user to access high-quality analogue images on the computer screen. This increased the ability of interactive video systems.
- The concept of the graphical user interface (GUI), which was developed in the 1970s, popularized by Apple Computer, Inc. was essentially about visual metaphors, intuitive feel and sharing information on the virtual desktop. Additional power was the only thing needed to move into multimedia.

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- The sharp fall in hardware costs and the unprecedented rise in the computer speed and memory transformed the personal computer into an affordable machine capable of combining audio and color video in advanced ways.
- Another element is the release of Windows 3.0 in 1990 by Microsoft into the mainstream IBM clone world. It accelerated the acceptance of GUI as the standard mechanism for communicating with small computer systems.
- The development by NV Philips of optical digital technologies built around the compact disk (CD) in 1979 is also another leading element in the interactive media development as it raised the issue of developing interactive media.

All of the prior elements contributed in the development of the main hardware and software systems used in interactive media.

### **Terminology**

Though the word media is plural, the term is often used as a singular noun.

Interactive media is related to the concepts interaction design, new media, interactivity, human computer interaction, cyber culture, digital culture, interactive design, and can include augmented reality and virtual reality.

An essential feature of interactivity is that it is mutual: user and machine each take an active role (see interaction). Most interactive computing systems are for some human purpose and interact with humans in human contexts. Manovich complains that 'In relation to computer-based media, the concept of interactivity is a tautology. Therefore, to call computer media "interactive" is meaningless – it simply means stating the most basic fact about computers.'<sup>[5]</sup> Nevertheless, the term is useful to denote an identifiable body of practices and technologies.

Interactive media are an instance of a computational method influenced by the sciences of cybernetics, autopoiesis and system theories, and challenging notions of reason and cognition, perception and memory, emotions and affection.

Any form of interface between the end user/audience and the medium may be considered interactive. Interactive media is not limited to electronic media or digital media. Board games, pop-up books, game books, flip books and constellation wheels are all examples of printer interactive media. Books with a simple table of contents or index may be considered interactive due to the non-linear control mechanism in the medium, but are usually considered non-interactive since the majority of the user experience is non-interactive reading.

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## 9.4 DEFINITION OF INTERACTIVE MULTIMEDIA

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Interactive media is a method of communication in which the output from the media comes from the input of the users.

Interactive media works with the user's participation. The media still has the same purpose but the user's input adds interaction and brings interesting features to the system for better enjoyment.

### NOTES

#### Check your Progress-I

**Note:** a) Write your answer in the space given below:

b) Compare your answer with the one given at the end of the unit

1. What is Interactive Multimedia?

2. Definition of Interactive Multimedia.

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## 9.5 FACTORS INFLUENCING LEARNING WITH INTERACTIVE MULTIMEDIA

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The introduction of interactive media has greatly affected the lives and inner workings of families, with many family activities having integrated with technology quite seamlessly, allowing both children and parents to adapt to it as they see fit. However, parents have also become increasingly worried about the impact that it will have on their family lives. This is not necessarily because they are opposed to technology, but because they fear that it will lessen the time that they get to spend with their children. Studies have shown that although interactive media is able to connect families together when they are unable to physically, the dependence on this media also continues to persist even when there are opportunities for family time, which often leads the adults to believe that it distracts children more than it benefits them.

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## 9.6 PRINCIPLES OF INSTRUCTIONAL DESIGN FOR MULTIMEDIA AND INTERACTIVE MULTIMEDIA; SPLIT-ATTENTION PRINCIPLE, MODALITY PRINCIPLE, REDUNDANCY PRINCIPLE, SPATIAL CONTIGUITY PRINCIPLE, TEMPORAL CONTIGUITY PRINCIPLE, COHERENCE PRINCIPLE

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### 1. Split-Attention Principle

Split-attention occurs when learners are required to split their attention between and mentally integrate several sources of physically or temporally disparate information, where each source of information is essential for understanding the material. Cognitive load is increased by the need to mentally integrate the multiple sources of information.

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This increase in extraneous cognitive load (see chapter 2) is likely to have a negative impact on learning compared to conditions where the information has been restructured to eliminate the need to split attention. Restructuring occurs by physically or temporally integrating disparate sources of information to eliminate the need for mental integration. The split-attention effect occurs when learners studying integrated information outperform learners studying the same information presented in split-attention format. The split-attention principle flows from the split attention effect. It states that when presenting disparate sources of information that must be mentally integrated in order for the information to be understood, those sources of information should be presented in integrated format.

**Examples of the Split-Attention:** Effect The different sources of information that cause split-attention vary. For example, the sources can be text and text, or text and mathematical equations, or different forms of multimedia. Using Mayer's definition of multimedia as "the presentation of material using both words and pictures" (Mayer 2001, p. 1) it can be seen that split-attention will frequently occur using multimedia as there will always be at least two sources of information involved.

### **2. Modality Principle**

The Principle: People learn better from graphics and narration than from animation and onscreen text.

Though the Modality principle may sound similar to the Redundancy principle, it is not. According to Mayer, "...put words in spoken form rather than printed form whenever the graphic (animation, video, or series of static frames) is the focus of the words and both are presented simultaneously." *E-Learning and the Science of Instruction* by Ruth C. Clark & Richard E. Mayer (2016).

The Modality principle states that e-learning courses that contain graphics must have an audio script explaining the graphics, rather than onscreen text. When graphics and audio are combined to present information, graphics are processed by the visual channel of the learner and audio is processed by the auditory channel.

If complex graphics and familiar words are presented together on the screen at a rapid pace, the learner's attention gets dissipated and he will not be able to learn effectively.

There are certain exceptions to using onscreen text when:

- You cannot record your narration or cannot afford the cost of outsourcing it

- You face technical constraints of having an audience who will be using devices without audio capability
- You have an audience of learners who will find it difficult to process spoken words
- You have exercises in your course that require your learners to refer to the instructions
- You have screen simulations which require a mixture of text, audio, and visuals.

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### **3. Redundancy Principle**

The Principle: People learn better from graphics and narration than from graphics, narration and onscreen text.

Some e-learning courses have text on the screen and narration in the background. This might look like a good way to present information, but it does not work. In fact, studies conducted by Mayer and others indicate that better transfer of learning happens when graphics are explained by audio alone, rather than with both audio and text. In such a case, the onscreen text becomes redundant.

When visuals and onscreen text are used together, it presents a sensory overload to the learner, because he must simultaneously understand the graphic and read the onscreen text. The reason for this is learners can process only one thing at a time. They cannot pay attention to both onscreen text and graphics, simultaneously. So, if only audio narration is added, learners process the information through their ears and focus on the graphics with their eyes. However, when there is no other visual content on the screen, research says, it is better to present the content as both text and narration, for better retention.

### **4. Contiguity Principle**

According to the Contiguity Principle it is preferable that the words be presented simultaneously with the corresponding images, rather than separately in a multimedia application. Clark & Mayer demonstrated that graphics must be present next to the text mentioned, as distance generates increased cognitive load, to the already knowledge-limited capacity of active memory, with the direct consequence of dissuading the learner from active learning.

#### **(a) Spatial Contiguity Principle**

- People learn better when corresponding words and pictures are presented near rather than far from each other on the page or screen (Mayer, 2005 AU43: The in-text citation &quot;Mayer, 2005&quot; is not in the reference list. Please correct the citation, add the reference to the list, or delete the citation.

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- An instructional principle proposing that learners learn more deeply when related words and pictures are presented near one another than far apart (Mayer, 2005d).
- Students learn better when corresponding words and pictures are presented near rather than far from each other on the page or screen.

**Example:** In an animation on lightning formation, captions are presented at the bottom of the screen (separated presentation) or are placed next to the event they describe in the animation (integrated presentation). In a booklet on lightning formation, the text is presented on a different page than the illustrations (separated presentation), or each paragraph is placed next to the illustration it describes (integrated presentation).

**Theoretical Rationale:** When corresponding words and pictures are near each other on the page or screen, learners do not have to use cognitive resources to visually search the page or screen, and learners are more likely to be able to hold them both in working memory at the same time. When corresponding words and pictures are far from each other on the page or screen, learners have to use cognitive resources to visually search the page or screen, and learners are less likely to be able to hold them both in working memory at the same time.

**Empirical Rationale:** In five out of five tests, learners performed better on transfer tests when corresponding text and illustrations were placed near each other on the page (or when corresponding on-screen text and animation segments were placed near each other on the screen) than when they were placed far away from each other, yielding a median effect size of  $d = 1.09$ .

People learn better when corresponding narration and animation are presented simultaneously rather than successively, i.e. the words are spoken at the same time they are illustrated in the animation (Mayer, 2005)

### Temporal Contiguity Principle

- An instructional **principle** proposing that learners learn more deeply when related animation and narration are presented concurrently rather than consecutively (Mayer, 2005d).
- The corresponding words and pictures are contiguous in time. What is successive presentation? –The corresponding words and pictures are not contiguous in time. What is simultaneous presentation? –The corresponding words and pictures are presented at the same time.
- The case for separating words and pictures simultaneous presentation –Allows for only one exposure with verbal and visual depiction happening at the same time. successive presentation –Allows two separate exposure.

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- The case for separating words and pictures (Cont.) The information-delivery theory –Students should learn more with successive presentations –Students receive two deliveries – Predicts that students given successive presentations should outperform simultaneous presentations on tests.
- The case for integrating words and pictures Cognitive theory of multimedia learning –Simultaneous presentation increase the chances to hold visual and verbal representations at the same time. –Successive presentations require a learner to hold the entire narration in working memory until the animation presented.
- The case for integrating words and pictures (Conts.) Cognitive theory of multimedia learning (Conts.) –Predicts that : simultaneous presentation are better able to understand the explanation. (using transfer test ) Simultaneous presentation would perform better on retention Successive presentation are more likely to focus on the wording of the verbal presentation.
- Distinction between spatial contiguity and temporal contiguity spatial contiguity –Deals with placing corresponding words and pictures close to each other on the page temporal contiguity – Deals with presenting corresponding words and pictures close to each other in time.
- Temporal contiguity effect for retention
- Temporal contiguity effect for retention (Conts.) Why did we fail to find a temporal contiguity effect for the retention? –In simultaneous, students were able to build a deeper understanding of the material. –In successive, students were able to listen to the narration without any other distractions, which should help them in verbal retention.
- Temporal contiguity effect for transfer
- Temporal contiguity effect for transfer (Conts.) Transfer test are intended to measure the learner ’ s understanding of the presented material The simultaneous performed much better than the successive. This evidence support the cognitive theory of multimedia learning and against the information delivery theory.
- Extensions of the temporal contiguity effect for retention and transfer.
- Extensions of the temporal contiguity effect for retention and transfer (Conts.) The successive small-segments presentations enable the same kind of active cognitive processing as simultaneous presentations.
- Extensions of the temporal contiguity effect for retention and transfer (Conts.)
- Presenting simultaneous resulted in transfer performance essentially equivalent to presenting successively in small

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segments. These results are consistent with the cognitive theory of multimedia learning and inconsistent with the information-delivery theory.

- Implications for multimedia learning The results are largely inconsistent with the information-delivery theory of multimedia learning –That two deliveries of the same information must be better than one When verbal and visual presentations are separated more than a few seconds, students perform more poorly on transfer than simultaneously.
- Implications for multimedia learning (Conts.) Simultaneous presentations take advantage of –The dual-channel capabilities of humans –The limited capacity of each channel –The need for active cognitive processing by encouraging learners to make connections between corresponding visual and verbal representations.
- Implications for multimedia design Present words and pictures near rather than far from each other in time. The job of designers is not only to present information. Simultaneous presentations prime the learner to build connections between corresponding visual and verbal material.

### **5. Coherence Principle**

The Principle: Learning is better when extraneous words, pictures and sounds are not included in the course.

Some instructional designers tend to go overboard when it comes to including graphics, illustrations, videos, and sounds in the course. Their aim is to present content in multiple dimensions so that it is easily comprehended by the learner. However, the opposite happens and they fail in their endeavor. The sensory overload that results from using extraneous pictures, visuals, text, and sounds will create a cognitive overload and confuse the learner.

Mayer conducted experiments on learners who were presented with basic details and another set which was presented with extraneous details on the same course. On assessing the 2 groups, he found out that those presented with basic details fared much better and showed better learning than the other set.

Research on why learners fail to learn effectively when presented with extraneous details, concluded that details distract learners from the core information in the course. Such details prevent the learner from organizing the material into coherent knowledge, or activate irrelevant prior learning that diverge his focus from the course. Visuals or text not relevant to the instructional explanation are best avoided.



Music at the beginning of the course to evoke learner interest and sounds for right and wrong answers in assessments are admissible, while any other sounds are extraneous. The base rule of this principle is ‘less is more’, when the primary motive is learning.

## **6. Signaling Principle**

The Principle: Learning is better when there are cues that highlight the critical elements of the course.

This principle states that the use of visual, auditory, and progressive cues helps to draw attention to critical elements of the lesson. To quote Mayer, “People learn better when cues that highlight the organization of the essential material are added.”

Imagine presenting your learners with a large block of text on the screen; do you think they would go through the whole text? You are right if you guessed ‘no’. Learners are intimidated by large chunks of text on the screen. If the same text is broken down into smaller chunks, and headings and images are used, then it becomes more appealing to the learner. Other ways to do this is by including illustrations, arrows, circles, highlighting or using bold format to emphasize important text, line work, or even using whitespace that can increase visual appeal.

In narration, this can be applied as pauses or vocal narration. Using the signaling principle helps to direct the vision of the learner to certain areas on the screen and the use of cues helps him to follow a natural path that guides him through the course.

## **7. Personalization Principle**

The Principle: Learning is better when words used in the narration are in conversational style rather than a formal style.

The Personalization principle states that the learner will be engaged if first and second person narrative is used, rather than formal language. When the narration directly addresses the learner, he establishes a connection with the course.

Mayer says, “Based on cognitive theory and research evidence, we recommend that you create or select e-Learning courses that include some spoken or printed text that is conversational rather than formal.” Other research studies on this topic recommend the use of a learning agent such as a character or an avatar, who speaking in a formal style, can improve learning.

## **8. Multimedia Principle**

The Multimedia Principle argues that the multimedia application must include a combination of words and images, as information is transferred, processed, and maintained better by the trainee when the teaching environment links its presentation with those

## **NOTES**

two elements. Consequently, based on the Cognitive Theory of Multimedia learning model, both channels of sensation are used, creating in the long-term memory a fuller and more structured representation that contributes to the acquisition of knowledge.

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## **9.7 ADVANTAGES AND LIMITATIONS OF INTERACTIVE MULTIMEDIA**

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### **9.7.1 Advantages of Interactive Multimedia**

Communicate more effectively by allowing users immediate access to material

- Let people get stories and information with a combination of audio, visual and interactivity.
- Most people expect interactive media at public events/public places now days and they often do not want to use their mobiles, large multi touch displays are preferred.
- Save money over print and other media costs.
- Create a modern image for your business.

Deep Creek Digital has had many years of designing and producing a large range of interactive multimedia projects, for use offline on standalone PCs, online over the Internet, for mobile apps and on a range of professional electronic systems.

- It helps disabled people perform their tasks like iPad and other interactive devices used. For example, in latest home AC, disabled people can control the temperature of a room, check the voltage of AC, AC timer from mobile or tablet device.
- Interactive systems are easy to use.
- These systems are used in testing phase also like testing interface elements and before launching product all items can be checked accurately.
- It is used in the medical field like cardiac device and different chips used in the body which sends signals to the computer screen.
- Performs better in doing marketing than old marketing like TV, radio or newspaper. It gets an immediate response from the audience.
- Also performs well in the promotional offer like we see on various websites. If a user performs some actions on the websites then a popup may appear to offer user discounted prices of products.

- It helps business to make a long-term relationship between customers.
- Interactive tools provide continuous support to customers in an easy way.
- Getting feedback from the customer is also done with the interactive system, for example, online polls and surveys.
- Giving rewards on more purchases is also done by interactive tools. On getting rewards customers feel more comfortable and it builds his interest and trust in the company.
- Learning is part of every human and human continues his learning in his entire life. Now learning becomes easy in modern life. E-learning is a new way of learning which involves projectors, interactive screens, and presentations. The audience becomes interested in the class and they tend to be active and innovative. Audience response becomes higher in this type of presentation learning. Due to high audience response they not get bored and get their attention in focus. Communication becomes higher during the speech of speaker and more questions and answers are exchanged between audience and speaker. Due to interactive technology more realistic feedback is received from the audience. More interactive and visual items are used for audience training like interested videos, animated graphics, graphs which makes the training interested and meaningful.
- Interactive systems are used for voice recognition and many tools are available in the market which performs well in this field.
- The attractive portable software is available to be downloaded and use on the internet. These software work on internet and they perform by user input combined with web-based data.

## **NOTES**

### **9.7.2 LIMITATIONS OF INTERACTIVE MULTIMEDIA**

#### **(i) Effects on learning**

Interactive media is helpful in the four development dimensions in which young children learn: social and emotional, language development, cognitive and general knowledge, and approaches toward learning. Using computers and educational computer software in a learning environment helps children increase communication skills and their attitudes about learning. Children who use educational computer software are often found using more complex speech patterns and higher levels of verbal communication. A study found that basic interactive books that simply read a story aloud and highlighted words and phrases as they were spoken were beneficial for children with

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lower reading abilities. Children have different styles of learning, and interactive media helps children with visual, verbal, auditory, and tactile learning style.

### **(ii) Intuitive understanding**

Interactive media makes technology more intuitive to use. Interactive products such as smart phones, iPad's/iPod's, interactive whiteboards and websites are all easy to use. The easy usage of these products encourages consumers to experiment with their products rather than reading instruction manuals.

### **(iii) Relationships**

Interactive media promotes dialogic communication. This form of communication allows senders and receivers to build long term trust and cooperation. This plays a critical role in building relationships. Organizations also use interactive media to go further than basic marketing and develop more positive behavioral relationship.

- Interactive systems may cause extra noise pollution like recognizing the voice in public places.
- These systems are easy to break and get scratched by touching interface.
- Designing complex and nice graphical interactive systems are difficult and take longer time.
- Nowadays some telephone systems are interactive and they record and recognize the voice. But it is difficult for old aged people to communicate with these systems. These systems are difficult to design and perform inaccurately.
- Text to speech is another type of interactive system in which user interacts by inputting text. Some text cannot be converted as we pronounce it due to culture difference. The real-time text of the speech is difficult to understand and requires highly skilled people for voice over.
- During receiving calls of customers, text to speech software needs to be accurate to respond and if the customer takes interest in product then guiding him to the accurate path is difficult to manage and may involve live representative to talk.
- Automatic calls are also managed by interactive systems. Sometimes people are busy with their work and when receiving automatic calls make them insecure. These calls are made by company computers for campaigns which sometimes result in bad result.

- Some interactive web-based software needs an internet connection to perform which limits access to the user. Sometimes web-based software needs to put information to the public which effects company business.
- Some interactive software needs extra hardware and memory resources to perform well.
- In interactive marketing, if a customer has already a product then he will just pass away without taking the interest.
- Some interactive system cost higher due to its installation and setup, for example, interactive whiteboard. It also makes bad impact on user's eyes. The content preparation for the interactive whiteboard is also tough.

## **NOTES**

### **Check your Progress-II**

**Note:** a) Write your answer in the space given below:

b) Compare your answer with the one given at the end of the unit

3.What are the Principles of Interactive Multimedia?

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4.List out the Advantages of Interactive Multimedia.

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5.List out the Limitations of Interactive Multimedia.

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## **9.8 LET US SUM UP**

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In this unit we have looked into the Interactive Multimedia teaching learning in schools. We made a deep study about the principles of instructional design for multimedia and interactive multimedia. The unit also deals with the advantage and limitations of interactive multimedia.

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## **9.10 UNIT-END ACTIVITIES**

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Discuss the Advantages and Disadvantages of Interactive Multimedia.

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## **9.11 ANSWERS TO CHECK YOUR PROGRESS**

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1.Interactive multimedia has been called a "hybrid technology." It combines the storage and retrieval capabilities of computer database

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technology with advanced tools for viewing and manipulating these materials. Multimedia has a lot of different connotations, and definitions vary depending on the context. For the purposes of this Guide, in the context of upper secondary and postsecondary education, interactive multimedia is defined by three criteria:

- Interactive Multimedia is any package of materials that includes some combination of texts, graphics, still images, animation, video, and audio;
- These materials are packaged, integrated, and linked together in some way that offers users the ability to browse, navigate and analyze these materials through various searching and indexing features, as well as the capacity to annotate or personalize these materials;
- Interactive multimedia is always "reader-centered." In interactive multimedia, the reader controls the experience of reading the material by being able to select among multiple choices, choosing unique paths and sequences through the materials. One of the key features of interactive multimedia is the ability to navigate through material in whatever ways are most meaningful for individual users.

2. Interactive media is a method of communication in which the output from the media comes from the input of the users.

Interactive media works with the user's participation. The media still has the same purpose but the user's input adds interaction and brings interesting features to the system for better enjoyment.

### 3. Spatial contiguity Principle

- Temporal contiguity Principle
- Modality Principle
- The Redundancy Principle
- Coherence Principle
- Split Attention Principle

4. Communicate more effectively by allowing users immediate access to material

- Let people get stories and information with a combination of audio, visual and interactivity.

- Most people expect interactive media at public events/public places now days and they often do not want to use their mobiles, large multi touch displays are preferred.
- Save money over print and other media costs.
- Create a modern image for your business.

5. Interactive systems may cause extra noise pollution like recognizing the voice in public places.

- These systems are easy to break and get scratched by touching interface.
- Designing complex and nice graphical interactive systems are difficult and take longer time.
- Nowadays some telephone systems are interactive and they record and recognize the voice. But it is difficult for old aged people to communicate with these systems. These systems are difficult to design and perform inaccurately.
- Text to speech is another type of interactive system in which user interacts by inputting text. Some text cannot be converted as we pronounce it due to culture difference. The real-time text of the speech is difficult to understand and requires highly skilled people for voice over.
- During receiving calls of customers, text to speech software needs to be accurate to respond and if the customer takes interest in product then guiding him to the accurate path is difficult to manage and may involve live representative to talk.
- Automatic calls are also managed by interactive systems. Sometimes people are busy with their work and when receiving automatic calls make them insecure. These calls are made by company computers for campaigns which sometimes result in bad result.
- Some interactive web-based software needs an internet connection to perform which limits access to the user. Sometimes web-based software needs to put information to the public which effects company business.
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- In interactive marketing, if a customer has already a product then he will just pass away without taking the interest.
- Some interactive system cost higher due to its installation and setup, for example, interactive whiteboard. It also makes bad impact on user's eyes. The content preparation for the interactive whiteboard is also tough.

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## 9.12 SUGGESTED READINGS /REFERENCES

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# UNIT-X COMPUTER SIMULATION AND LEARNING

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*Computer Simulation and  
Learning*

## **STRUCTURES**

- 10.1 Introduction
- 10.2 Objectives
- 10.3 Computer Simulation
- 10.4 Definition of Computer Simulation
- 10.5 Characteristics of Interactive Computer Simulation
- 10.6 Importance of Interactive Computer Simulation
- 10.7 Interactive Computer Simulation
- 10.8 Objective of Interactive Computer Simulation
- 10.9 Virtual Science Lab at School Level
  - 10.9.1. Description of virtual laboratories environments
- 10.10 The Objectives of Virtual Science Lab System
- 10.11 Advantage And Limitations of the Virtual Science Lab
  - 10.11.1 Advantage of the virtual science lab
  - 10.11.2 Limitations of the virtual science lab
- 10.12 Let us sum up
- 10.13 Unit - end activities
- 10.14 Answers to check your progress
- 10.15 Suggested Reading/Reference

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## **10.1 INTRODUCTION**

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Simulations can be considered a variant of cognitive tools, i.e. they allow students to test hypothesis and more generally "what-if" scenarios. In addition, they can enable learners to ground cognitive understanding of their action in a situation. (Thomas and Milligan, 2004; Laurillard, 1993). In that respect simulations are compatible with a constructivist view of education.

Most authors seem to agree that use of simulations needs to be pedagogically scaffolded. "Research shows that the educational benefits of simulations are not automatically gained and that care must be taken in many aspects of simulation design and presentation. It is not sufficient to provide learners with simulations and expect them to

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engage with the subject matter and build their own understanding by exploring, devising and testing hypotheses.” (Thomas and Milligan, 2004: 2). The principal caveat of simulations is that students rather engage with the interface than with the underlying model (Davis, 2002). This is also called video gaming effect.

Various methods can be used, e.g.:

- the simulation itself can provide feedback and guidance in the form of hints
- Human experts (teachers, coaches, guides), peers or electronic help can provide assistance using the system.
- Simulation activities can be strongly scaffolded, e.g. by providing built-in mechanisms for hypothesis formulation (e.g. as in guided discovery learning simulation)
- Simulation activities can be coached by humans.

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## 10.2 OBJECTIVES

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*At the end of this unit you will be able to*

- *Understand the concept of Computer Simulation, Interactive Multimedia*
- *Objectives of Interactive Computer Simulation and Virtual Science Lab*
- *Realise characteristics features of Computer Simulation*

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## 10.3 COMPUTER SIMULATION

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**Computer simulation** is the reproduction of the behavior of a system using a computer to simulate the outcomes of a mathematical model associated with said system. Since they allow to check the reliability of chosen mathematical models, computer simulations have become a useful tool for the mathematical modeling of many natural systems in physics (computational physics), astrophysics, climatology, chemistry, biology and manufacturing, human systems in economics, psychology, social science, health care and engineering. Simulation of a system is represented as the running of the system's model. It can be used to explore and gain new insights into new technology and to estimate the performance of systems too complex for analytical solutions.

Computer simulations are realized by running computer programs that can be either small, running almost instantly on small devices, or large-scale programs that run for hours or days on network-based groups of computers. The scale of events being simulated by computer simulations has far exceeded anything possible (or perhaps even imaginable) using traditional paper-and-pencil mathematical modeling. Over 10 years ago, a desert-battle simulation of one force

invading another involved the modeling of 66,239 tanks, trucks and other vehicles on simulated terrain around Kuwait, using multiple supercomputers in the DoD High Performance Computer Modernization Program. Other examples include a 1-billion-atom model of material deformation; 2.64-million-atom model of the complex protein-producing organelle of all living organisms, the ribosome, in 2005; a complete simulation of the life cycle of *Mycoplasma genitalium* in 2012; and the Blue Brain project at EPFL (Switzerland), begun in May 2005 to create the first computer simulation of the entire human brain, right down to the molecular level.

Because of the computational cost of simulation, computer experiments are used to perform inference such as uncertainty quantification

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### 10.4 DEFINITION OF COMPUTER SIMULATION

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A **simulation** is an approximate imitation of the operation of a process or system, the act of simulating first requires a model is developed. This model is a well-defined description of the simulated subject, and represents its key characteristics, such as its behaviour, functions and abstract or physical properties. The model represents the system itself, whereas the simulation represents its operation over time.

Computer simulation is defined as having the following two key features:

1. There is a computer model of a real or theoretical system that contains information on how the system behaves.
2. Experimentation can take place, i.e. changing the input to the model affects the output.

As a numerical model of a system, presented for a learner to manipulate and explore, simulations can provide a rich learning experience for the student. They can be a powerful resource for teaching: providing access to environments which may otherwise be too dangerous, or impractical due to size or time constraints; and facilitating visualisation of dynamic or complex behaviour.

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## NOTES

facilitating visualisation of dynamic or complex behaviour.” (Thomas and Milligan, 2004)

- Simulation (List Of Other Types)
- Science Simulation
- Math Simulation
- Guided Discovery Learning (An educational model for using simulations)

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### 10.5 CHARACTERISTICS OF INTERACTIVE COMPUTER SIMULATION

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These include concepts regarding:

- The structure and characteristics of the model;
- The relationship to the system that is being modeled;
- The interaction of the learner or other agents with the model. A classification of model types is presented, accompanied by a first idea on the representation of the several types of models. The classification includes the distinction between qualitative and quantitative models. Models can further be classified into dynamic and static models, determined by the time dependency of the model. The basic elements of any simulation model are the *state* of the model, describing the properties of the system that is modeled, and a set of rules determining the possible development of the model state. State space is the collection of all possible states.

In quantitative models the basic elements of the state are *variables*, which can be dependent or independent. Dependent variables are variables of which the value is determined by the independent variables. The model rules are equations, determining the development of the values of the variables. Quantitative models are classified into discrete and continuous models, depending on the structure of the state space. Qualitative models have a state space consisting of propositions about the modeled system. In this case, the model rules have a more descriptive character.

A brief discussion of the relationship between the model and the corresponding real system is given. Three types of real systems are distinguished: physical, artificial and abstract. The main criterion for a distinction between these types of systems is the possibility of constructing a model that describes the system completely (a *base model*).

The interaction of the learner with models and simulations is described by introducing the concepts of interaction and scenario. The interaction describes the sequence of operations that are performed upon the model, the scenario includes the interaction and the agents who take part in the interaction.

Classifications of instructional simulation environments (often just called: instructional (or educational) simulations) are discussed. The usefulness and features of these classifications are investigated. Many of the existing classifications do not distinguish very well between relevant aspects of simulation learning environment.

Three sections describe the relationship between the internal characteristics of simulations and the four themes introduced in de Jong (this volume): domain models, learning goals, learning processes and learner activity. Because simulation models are discussed extensively in the first section of this paper, the section on domain and simulation models gives an overview of domain aspects that are not explicitly referred to in the model. Here, an additional knowledge base, called the cognitive model will be introduced. For each type of *learning goal* the relation with the domain model or scenario is elaborated. The relationship between learning processes and learner activity and domain models is discussed by relating the possible types of learner activity with the model and scenario elements, resulting in demands for the structure of the model or scenario.

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### 10.6 IMPORTANCE OF INTERACTIVE COMPUTER SIMULATION

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- Simulation is used in many contexts, such as simulation of technology for performance optimization, safety engineering, testing, training, education, and video games. Often, computer experiments are used to study simulation models.
- Simulation is also used with scientific modeling of natural systems or human systems to gain insight into their functioning, as in economics. Simulation can be used to show the eventual real effects of alternative conditions and courses of action.
- Simulation is also used when the real system cannot be engaged, because it may not be accessible, or it may be dangerous or unacceptable to engage, or it is being designed but not yet built, or it may simply not exist.
- Key issues in simulation include the acquisition of valid source information about the relevant selection of key characteristics and behaviours, the use of simplifying approximations and

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assumptions within the simulation, and fidelity and validity of the simulation outcomes. Procedures and protocols for model verification and validation are an ongoing field of academic study, refinement, research and development in simulations technology or practice, particularly in the field of computer simulation.

### Check your Progress-I

**Note:** a) Write your answer in the space given below:

b) Compare your answer with the one given at the end of the unit

1. What is Computer Simulation?

\_\_\_\_\_

2. Definition: Computer Simulation.

\_\_\_\_\_

3. Write a note on Importance of Interactive Computer Simulation.

\_\_\_\_\_

## 10.7 INTERACTIVE COMPUTER SIMULATION

The computer has played many roles in the modern teaching laboratory including being used for pre-laboratory tutorials, interactive quizzes, molecular modeling and theoretical calculations, animations, collaborative learning, as well as a tool to speed up data collection and analysis. However, it is the interactive experimental simulations that offer a viable solution for distance learners in the sciences to meet their laboratory requirement. Often it is the specific technology and its ability to bridge physical distances that becomes the center for discussion rather than its value to enhance learning. However, research does indicate that the use of computer simulations in laboratory sciences like biology, physics, geology, and chemistry does promote learning in those disciplines. Simulations also have advantages over hands-on laboratory work such as allowing students to do more complicated and hazardous experiments, obtain reproducible results more quickly, and foster a deeper understanding of the experiments, to name a few. Disadvantages like the lack of human contact, boredom, and ability to experience experimental errors are also associated with laboratory simulations. The pedagogical benefits and limitations of computer simulations have been reviewed in detail elsewhere (Muth & Guzman, 2000).

In chemistry, the available software for simulations varies greatly in sophistication depending on the animation used and the degree of engagement and interaction with the student. Simulations can include simple graphical or numerical representations of how chemical or physical processes operate. A typical example of the latter is a simple simulation of the ideal gas laws, such as reducing the size of a

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vessel and observing that the pressure increases. Simulations can also include representations of molecular events that improve the understanding of particulate matter and stereochemistry. In contrast to simple interactive animations, more sophisticated simulations of laboratory experiments focus on trying to recreate the results of a real experiment while also duplicating some of the real-life visual and audio information for the student. The strategy here is to engage the student by making a strong impression that stimulates more senses, with the hope that material will be better understood and eventually retained longer. Simulating the operation of analytical instruments is one common subgroup of these more sophisticated simulations. However, it tends to concentrate narrowly on replicating the machine itself. The other subgroup is a more general simulation of chemistry experiments that also encompass some of the laboratory environment. Good chemistry laboratory simulations using digitized video images have been achieved through interactive CD-ROM (CDi-ROM, Smith & Jones, 1989). In the range of chemistry simulations available, this is one of the more sophisticated and forms the basis of our study.

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### 10.8 OBJECTIVE OF INTERACTIVE COMPUTER SIMULATION

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Research (Tversky, 2002) shows that simulations need to adhere to two principles to be effective teaching/learning tools:

"Congruence Principle: The structure and content of the external representation should correspond to the desired structure and content of the internal representation." For example, if you want students to be able to visualize fluvial downcutting, use a simulation that mimics that process. Animations are likely to be more effective in representing change over time than static images -- but only if they follow the apprehension principle.

"Apprehension Principle: The structure and content of the external representation should be readily and accurately perceived and comprehended." Some animations may be so complex or so fast that they overwhelm our abilities to perceive what is happening. Interactive animations -- where the user can adjust input variables -- allow us to explore the processes, so that we can more easily apprehend them.

Research also shows that students engage with simulations more like scientists -- exploring for deep understanding -- when the simulation has carefully balanced affordances and constraints built into it (Podolefsky et al., 2010):

- **Affordances:** The simulation includes visual cues to what can be manipulated, and other scaffolding for learning. For example, if

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- an input can be varied, there is a slider bar for the user to manipulate that variable. If an analogy would be helpful, it is built into the simulation.
- Constraints: Users are prevented from pursuing unproductive, distracting avenues of exploration. For example, natural phenomena are limited to realistic rates, frequencies, etc. While the user can explore the interactions of some variables, the complexity of these interactions permitted in the simulation is not unlimited.
  - Use simulations that provide structures for exploration, such as "concrete connections to the real world, representations that are not available in the real world, analogies to help students make meaning of and connect across multiple representations and phenomena, and a high level of interactivity with real-time, dynamic feedback" (Podolefsky et al., 2010).
  - Ensure that technological needs are met (How to Teach with Simulations). Test drive the simulation to make sure that you know how it works and can help students when they get stuck.
  - Be explicit about how using the simulation to answer your driving question(s) will help students meet the course learning goals, and hold each student accountable for their learning (How to Teach with Simulations). Direct connections to course learning goals and accountability can both provide motivation for student learning.
  - Provide minimal guidance, to facilitate open-ended exploration. This can take the form of one or two "driving questions," questions about the challenging underlying concepts illustrated by the simulation. Students given these open-ended conceptual questions explore simulations much the way scientists explore: posing and answering questions to themselves, driven by their own curiosity, to make sense of the phenomenon being simulated. When more guidance is given, in the form of directions to explore specific features or variables, students actually explore less, stopping as soon as they have answered the specific questions in the "guided inquiry" activity (Adams et al., 2007).
  - Use a constructivist approach, rather than guiding learners step-by-step. Ask students to make predictions, and to explain their predictions, prior to exploring the simulation to test their predictions. This approach is more effective than a prescriptive one for overcoming alternative conceptions (Windschitl and Andre, 1998). Two effective ways to accomplish this are via an interactive lecture demonstration or using cooperative learning techniques (How to Teach with Simulations).



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- Incorporate post-simulation discussion, including time for student reflection (How to Teach with Simulations). Reflection and discussion can elicit and correct student misunderstandings while reinforcing key concepts.
- There are many advantages to using simulations to teach and learn about geologic processes, including landform development:
- Students can observe processes that are otherwise unobservable. Scaled visual models allow students to "watch" processes they can't actually see in real time and space.
- Simulations can mimic interactions of (geologic) processes, thus helping students understand complex systems behavior.
- Simulations are engaging. Students can manipulate (and isolate) the input parameters to explore their effects (Perkins et al., 2006). This kind of use of simulations promotes deep learning (How to Teach with Simulations).
- Simulations allow hypothesis testing via prediction of outcomes (Jimoyiannis and Komis, 2001).
- Simulations allow students to make connections with everyday life experiences (Perkins et al., 2006).
- Simulations may include multiple representations (Jimoyiannis and Komis, 2001).
- As a result, effective use of simulations leads to improved learning outcomes (Jimoyiannis and Komis, 2001; Perkins et al., 2006), particularly when simulation outputs are visually realistic (Martinez et al., 2011).

### **Pedagogical Challenges**

No simulation can completely represent/reproduce complex, real world processes. In particular, simulations of geologic processes generally compress time and space. Teaching with simulations is therefore much like teaching with analogies.

Nonetheless, students may see a model as a full representation of the world. Instructors may need to guide students through a comparison of the simulation to the real-world processes it mimics. What are the underlying assumptions of the model? Are the parameters all given reasonable ranges? "Creating opportunities for students to validate the model, i.e. compare model predictions to observations, increases their understanding of its limits" (How to Teach with Simulations). If the model output doesn't look "realistic," students may have a hard time applying what they learn from the simulation to the real world (Martinez et al., 2011).

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Effective use of simulations can require significant preparation by the instructor, who must thoroughly understand the simulation: how it works, what it mimics well, what its assumptions and limitations are (How to Teach with Simulations).

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### **10.9 VIRTUAL SCIENCE LAB AT SCHOOL LEVEL**

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We live in an era characterized by the rapid development of technology. Computer science has invaded the educational process and is providing us with many opportunities to exploit. An additional challenge faced by STEM educators has been the integration of Inquiry Based Science Learning (IBSL) in teaching. While the use ICT has already penetrated in Inquiry Based Teaching, we have yet to create and implement STEM lesson plans that promote the development of methodological skills and competencies, investigation through experimentation, teamwork and communication among students through collaborative activities.

In recent years, Inquiry-Based Science Education (IBSE) has proved its efficacy in education by expanding on “traditional” lessons and motivating students to actively participate in science. IBSE methods and digital technologies support necessary educational innovations and can be the catalyst for change in educational patterns (in regard to its form, space, functions, services, tools, roles, procedures). Virtual laboratories are an essential digital tool. In fact, many European schools are equipped with computer classes, tablets and high-speed internet connection while using a huge variety of web-based learning applications, simulations and visualizations.

#### **10.9.1. DESCRIPTION OF VIRTUAL LABORATORIES ENVIRONMENTS**

Virtual laboratory environments can be divided into following categories:

##### **1. Simulations**

Simulations are imitations of operating systems through time, via computers. These represent a process on the basis of a model that is cheaper, faster, less risky and more affordable than the real process.

##### **2. Network applets**

The applets are experimental devices in small virtual laboratories and are quite popular in science subjects. They are small in size and easily transported and they can be used regardless of the operating system type.

### **3. Virtual labs**

Virtual labs (virtual laboratories) simulate a virtual operating system, the computer screen, Science laboratories, exploiting the potential offered by modern media technology key feature technical interaction and direct and plausible manipulation of objects and parameters.

### **4. Virtual Reality Laboratories (VRL)**

VRL workshops are computer based and highly interactive. The user becomes a participant in a “virtually real” world, in an artificial three-dimensional optical environment. These workshops are essentially an interface high level including real time three-dimensional simulations through different sensory channels.

### **5. Laboratories Controlled by Distance (Remote Labs)**

Workshops controlled remotely (remote labs, otherwise known as online labs or workbenches) include real experiments conducted from a distance with the use of telecommunications, while the user uses this technology from another location.

Most of the virtual laboratory software consists on computing applications running on the local user’s computer, for speed and security reasons. They can be operated remotely. An example are those based on applets or robotic workshops (remote labs) that can accept commands via the Internet.

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## **10.10 THE OBJECTIVES OF VIRTUAL SCIENCE LAB SYSTEM**

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The primary objective of creating the VSL was to facilitate science’s educational process by moving the whole environment from reality to virtual.

This transition includes replacing heavy equipment with graphical tools, which are easier and faster to move with drag and drop features. Also, the VSL needs technical support instead of a science technician.

Furthermore, the VSL uses technical equipment, such as computers, internet components, and specialized software, which costs much less than the equipment used in HOLs. The VSL is a web-based platform designed to introduce a safe and interactive lab environment to students in schools.

It creates a virtual learning space that enables students to conduct experiments individually or in groups interactively via the internet. It also facilitates the science teaching process by providing

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communication and cooperation tools for teachers and their students, much like any e-learning system. Furthermore, it allows teachers to add additional experiments to enhance their students' knowledge and to perform laboratory tests to observe the improvement of their students.

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### 10.11 ADVANTAGE AND LIMITATIONS OF THE VIRTUAL SCIENCE LAB

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#### 10.11.1 ADVANTAGE OF THE VIRTUAL SCIENCE LAB

Some important Advantages of virtual labs:

1. **Flexible access:**

Perhaps the most often cited benefit of any online learning is that it can be done at the student's convenience and when he or she learns best. The same is true of virtual laboratories if the experiments are on the student's own time. In some cases, a virtual lab may be used during regular class time which narrows this benefit but still allows flexibility for the teacher who is not limited by using resources within a strict timeframe.

2. **Instant feedback:**

Students can redo experiments on the spot while they are still in a critical thinking mode. All the results are recorded, making communication between teachers and students more efficient too. Experiments no longer have a "one chance" option and students can analyze what went wrong immediately and give it another shot.

3. **Top-notch equipment:**

Schools and students that use virtual labs have access to cutting-edge technology when it comes to experimentation. Companies that build and maintain virtual labs must compete with each other to stay ahead of technology progression and that raises the quality of options for students. With a virtual lab, students do not have to settle on outdated, yet expensive, equipment because a school cannot afford to replace it consistently.

4. **Lower costs:**

There is a fee associated with using virtual labs but the capital and maintenance costs are drastically reduced. Instead of one school footing the bill for resources, the cost is split among the clients of the

particular virtual lab. This allows school to provide a better learning experience for students at a fraction of the cost.

### **10.11.2 LIMITATIONS OF THE VIRTUAL SCIENCE LAB**

Virtual labs can be very useful in the teaching of Science, particularly in cases where:

- The experimental activities are to be done quickly and do not easily allow observation and safe measurement,
- The experimental process is very slow and / or complex and not compatible with the teaching time available,
- The experiments involve risks to the health and physical integrity of learners and/or
- The learning activities require modeling.

Virtual labs support IBSL in learning science:

- Laws in science arise from a detailed observation process, with clearly more chances of clarification, understanding and acceptance if regarded in detail.
- It encourages collaboration and communication between teachers and students. STEM teachers participate actively in the learning process: asking questions, trying to find answers, organizing procedures and commenting on them, helping in formulating conclusions, understanding their mistakes and highlighting any misconceptions.
- With virtual labs, students acquire a tool with which to experiment without limitations of space or time. They are available all year, as opposed to school laboratories, limited to a specific place and for a limited time.
- The use of virtual environments makes students acquire better computer skills, which can be considered skills for lifelong learning. The uses of these technologies also bring together different STEM subjects and provides with great resources for more inclusive workshops.

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### Check Your Progress-II

**Note:** a) Write your answer in the space given below:

b) Compare your answer with the one given at the end of the unit.

4. What are the Objectives of Interactive Multimedia?

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5. What are the objectives of the Virtual Science Lab?

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6. List out the Advantages of Virtual Science Lab.

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7. List out the Limitation of Virtual Science Lab.

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### 10.12 LET US SUM UP

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In this you have studied in detail about the basic concept of Computer Simulation, Interactive Computer Simulation, Virtual Science Lab. Thus the teachers can use different kinds of teaching mode to develop the skill among the learners. Also they can help students become effective learning by making them aware of the purpose of developing the skills of the technology.

### 10.13 UNIT END ACTIVITIES

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Try out any one of the Computer Simulation techniques to develop the Science Skills of your class students.

### 10.14 ANSWERS TO CHECK YOUR PROGRESS

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**1. Computer simulation** is the reproduction of the behavior of a system using a computer to simulate the outcomes of a mathematical model associated with said system. Since they allow to check the reliability of chosen mathematical models, computer simulations have become a useful tool for the mathematical modeling of many natural systems in physics (computational physics), astrophysics, climatology, chemistry, biology and manufacturing, human systems in economics, psychology, social science, health care and engineering. Simulation of a system is represented as the running of the system's model. It can be used to explore and gain new

insights into new technology and to estimate the performance of systems too complex for analytical solutions.

Computer simulations are realized by running computer programs that can be either small, running almost instantly on small devices, or large-scale programs that run for hours or days on network-based groups of computers. The scale of events being simulated by computer simulations has far exceeded anything possible (or perhaps even imaginable) using traditional paper-and-pencil mathematical modeling. Over 10 years ago, a desert-battle simulation of one force invading another involved the modeling of 66,239 tanks, trucks and other vehicles on simulated terrain around Kuwait, using multiple supercomputers in the DoD High Performance Computer Modernization Program. Other examples include a 1-billion-atom model of material deformation; 2.64-million-atom model of the complex protein-producing organelle of all living organisms, the ribosome, in 2005; a complete simulation of the life cycle of *Mycoplasma genitalium* in 2012; and the Blue Brain project at EPFL (Switzerland), begun in May 2005 to create the first computer simulation of the entire human brain, right down to the molecular level.

Because of the computational cost of simulation, computer experiments are used to perform inference such as uncertainty quantification

**2. Asimulation** is an approximate imitation of the operation of a process or system, the act of simulating first requires a model is developed. This model is a well-defined description of the simulated subject, and represents its key characteristics, such as its behaviour, functions and abstract or physical properties. The model represents the system itself, whereas the simulation represents its operation over time.

Computer simulation is defined as having the following two key features:

3. There is a computer model of a real or theoretical system that contains information on how the system behaves.
4. Experimentation can take place, i.e. changing the input to the model affects the output.

As a numerical model of a system, presented for a learner to manipulate and explore, simulations can provide a rich learning experience for the student. They can be a powerful resource for teaching: providing access to environments which may otherwise be too dangerous, or impractical due to size or time constraints; and facilitating visualisation of dynamic or complex behaviour.

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- Simulation (List Of Other Types)
- Science Simulation
- Math Simulation
- Guided Discovery Learning (An educational model for using simulations)

3.Simulation is used in many contexts, such as simulation of technology for performance optimization, safety engineering, testing, training, education, and video games. Often, computer experiments are used to study simulation models.

- Simulation is also used with scientific modeling of natural systems or human systems to gain insight into their functioning,<sup>[2]</sup> as in economics. Simulation can be used to show the eventual real effects of alternative conditions and courses of action.
- Simulation is also used when the real system cannot be engaged, because it may not be accessible, or it may be dangerous or unacceptable to engage, or it is being designed but not yet built, or it may simply not exist.<sup>[3]</sup>
- Key issues in simulation include the acquisition of valid source information about the relevant selection of key characteristics and behaviours, the use of simplifying approximations and assumptions within the simulation, and fidelity and validity of the simulation outcomes. Procedures and protocols for model verification and validation are an ongoing field of academic study, refinement, research and development in simulations technology or practice, particularly in the field of computer simulation.

4.Affordances: The simulation includes visual cues to what can be manipulated, and other scaffolding for learning. For example, if an input can be varied, there is a slider bar for the user to manipulate



that variable. If an analogy would be helpful, it is built into the simulation.

- Constraints: Users are prevented from pursuing unproductive, distracting avenues of exploration. For example, natural phenomena are limited to realistic rates, frequencies, etc. While the user can explore the interactions of some variables, the complexity of these interactions permitted in the simulation is not unlimited.
- Use simulations that provide structures for exploration, such as "concrete connections to the real world, representations that are not available in the real world, analogies to help students make meaning of and connect across multiple representations and phenomena, and a high level of interactivity with real-time, dynamic feedback" (Podolefsky et al., 2010).

5. The primary objective of creating the VSL was to facilitate science's educational process by moving the whole environment from reality to virtual.

This transition includes replacing heavy equipment with graphical tools, which are easier and faster to move with drag and drop features. Also, the VSL needs technical support instead of a science technician.

Furthermore, the VSL uses technical equipment, such as computers, internet components, and specialized software, which costs much less than the equipment used in HOLs. The VSL is a web-based platform designed to introduce a safe and interactive lab environment to students in schools.

It creates a virtual learning space that enables students to conduct experiments individually or in groups interactively via the internet. It also facilitates the science teaching process by providing communication and cooperation tools for teachers and their students, much like any e-learning system. Furthermore, it allows teachers to add additional experiments to enhance their students' knowledge and to perform laboratory tests to observe the improvement of their students.

6. Flexible access:

Instant feedback:

Top-notch equipment:

Lower costs

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7. Virtual labs can be very useful in the teaching of Science, particularly in cases where:

- The experimental activities are to be done quickly and do not easily allow observation and safe measurement,
- The experimental process is very slow and / or complex and not compatible with the teaching time available,
- The experiments involve risks to the health and physical integrity of learners and/or
- The learning activities require modeling.

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# UNIT – XI WEB BASED LEARNING

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*Web Based Learning*

## STRUCTURE

- 11.1 Introduction
- 11.2 Objective
- 11.3 Web based learning
  - 11.3.1 Concept
  - 11.3.2 Definition
- 11.4 Online learning for school learners
- 11.5 Principles of Web based learning
- 11.6 Categories of Web based learning
  - 11.6.1 Asynchronous Format
  - 11.6.2 Synchronous Format
  - 11.6.3 Small Group collaboration
- 11.7 Virtual Campus
- 11.8 Merits and limitations of Web based learning
- 11.9 Let us sum up
- 11.10 Unit – End Exercise
- 11.11 Answers to check your progress

## NOTES

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### 11.1 INTRODUCTION

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Web based learning is often called online learning or e-learning because it includes online course content. Discussion forums via email, videoconferencing, and live lectures (video streaming) are all possible through the web. Web based courses may also provide static pages such as printed course materials. One of the values of using the web to access course materials is that web pages may contain hyperlinks to other parts of the web, thus enabling access to a vast amount of web based information.

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### 11.2 OBJECTIVE

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All the end of this unit, you will be able to:

- Learn the concept of web based learning.
- Define online learning for schools learner.
- Understand the categories of web based learning, Asynchronous format, synchronous format and small group collaboration in virtual campus.

- Discuss the merit & limitation of web based learning.
- To learn the principles of web based learning.

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### 11.3 WEB BASED LEARNING

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A “virtual” learning environment (VLE) or managed learning environment (MLE) is an all in one teaching and learning software package. A VLE typically combines functions such as discussion boards, chat rooms, online assessment, tracking of students' use of the web, and course administration. VLEs act as any other learning environment in that they distribute information to learners. VLEs can, for example, enable learners to collaborate on projects and share information. However, the focus of web based courses must always be on the learner technology is not the issue, nor necessarily the answer. “Newer technologies such as computers and video conferencing are not necessarily better (or worse) for teaching or learning than older technologies . . . they are just different .The choice of technology should be driven by the needs of the learners and the context in which we are working, not by its novelty.”

#### 11.3.1 CONCEPT

Web-based learning is one way to learn, using web-based technologies or tools in a learning process. In other words, learner uses mainly computers to interact with the teacher, other students and learning material. Web-based learning consists of technology that supports traditional classroom training and online learning environments. "Pure" web- based courses are wholly based on computer and online possibilities. In this case all the communication and learning activities are done online. • 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.

#### 11.3.2 DEFINITION

Khan (1997) defines Web-Based Instruction (WBI) as: “...a hypermedia-based instructional program which utilizes the attributes and resources of the World Wide Web to create a meaningful learning environment where learning is fostered and supported.”

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### 11.4 ONLINE LEARNING FOR SCHOOL LEARNERS

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Online education takes two major forms. The first: for-credit courses where students enrolled in tertiary education take online classes offered by home or other higher education learning institutions for credit. Some well-known cases include the MIT OpenCourseWare and the Harvard Online learning.

The second form of online education consists of professional training and certification preparation. Such online learning is usually targeted at professionals or students seeking training or preparing for certification exams. Popular courses include training in foreign languages, accounting and nursing.

The maturity of education technology has also enabled online education to become more manageable and accessible than ever before. All a prospective student needs is a computer, an internet connection and some basic IT skills.

As for the loss of traditional classroom features, online education has been making up for this through its flexibility and low cost. Students have access to their “classroom” recordings whenever they want, allowing them to go over ideas and review lessons at their convenience. Some have also pointed out that far from being an inferior learning experience, the one-on-one lessons that are often part of online education have taken teacher-student interaction to a new level, where one student is getting all the attention and the interaction, and training can be so unique and valuable.

Furthermore, some argue that online education has significantly helped make education more accessible, thus achieving the aim of “education for all”, a theme that has become a global mandate since the 1990s. While a large number of countries have made significant progress in their provision of basic education to all citizens, there are still too many people – often living in remote areas – who can’t access education.

Undoubtedly, with the even wider spread of technology and deepening of the global mandate of education for all, online education’s potential to become complementary – or in some cases alternatives – to traditional education cannot be overlooked.

Instead of worrying whether or not online education can ever be as good as more traditional formats, perhaps we should instead focus on how we can use it to deliver quality education for people all over the world, particularly the poor and underserved.

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## **11.5 PRINCIPLES OF WEB BASED LEARNING**

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Needless to say, online learning is here to stay at Lehigh. Distance education programs, Blackboard successes, and Clipper online initiatives at Lehigh are considered to be just the tip of the iceberg: the stimuli for further research and online initiatives. In many ways, these initiatives have posed many pedagogical and instructional design questions.

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### A NEW KIND OF CLASSROOM

For the most part, online learning environments (OLEs) are teacher-facilitated, not stand-alone learning contexts. Teachers, as the primary content experts, can construct OLEs to include the kinds of learning experiences and communication tools that help learners to sculpt and assimilate new knowledge. Some key goals to keep in mind when constructing OLEs are:

- To center learning around the student. In the traditional classroom, time and distance are limiting factors to the learning process.
- To focus on the needs and strengths of students. As learning becomes more personalized, students will require the necessary skills and tools to engage and participate in this new kind of learning process.
- To provide just-in-time and anywhere-anytime instruction. OLEs can break the distance and time barriers by providing learning experiences outside the classroom -- anywhere and anytime. Accordingly, teachers can adjust presentation and explanations “just-in-time,” when the student needs it the most.
- To foster collaborative learning environments. Collaborative networks provide the sense of a “learning community.”
- To focus on authentic learning experiences. Web-based OLEs can provide authentic frameworks that bridge computer and classroom instruction. In this way, learning can be considered to be both an active and engaging experience, where the computer can help mediate course activities and shape the learning process by providing "learning by doing" or situated learning contexts.

### STRATEGIES FOR LEARNING

1. Make it Interactive. An OLE is different from the classic DE environment: the onus is on the student to become an active participant rather than a passive recipient of learning. An interactive learning environment encourages discovery, experimentation, and experiential (hands-on and activity based) instruction that provides multiple representations of knowledge. In this way, the learning environment stresses the interrelations and associations among knowledge and knowledge levels. Active learning is more effective than passive learning.

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2. Keep it Engaging and Motivating. Motivation can be affected by the task, learning environment, the teacher, and the student. But without motivation, there can be no learning. Shneiderman (1998) stated that "memorable educational experiences are enriching and transformational." Motivation theory argues that relevant experiences satisfy intrinsic needs or goals, encouraging effort and performance. Some of the ways that OLEs can foster motivation and increase perceptual arousal are: (1) incorporating novel, surprising, incongruous and uncertain events; (2) posing questions or problems to solve; (3) varying the elements of instruction; and (4) using concrete and familiar examples that are related to learners' *a priori* experiences. Also, presenting advanced organizers, explaining the utility of instruction, providing positive learning experiences, and supporting internal attributions for success helps sustain learner confidence and satisfaction. Learners should feel that they are, for the most part, in control of their outcomes and that their success is a direct result of the amount of effort they have put forth.

3. Put Things in Context. Learners can experience problems using knowledge and skills in everyday contexts. According to Bransford (1986), this inability to make meaningful connections results from the decontextualization of formal learning experiences: That is, the learning of facts is isolated from the contexts in which they derive meaning. Context, then, is seen as a critical environmental factor in how knowledge is assimilated, represented, negotiated, and used. (Hannafin, Land, & Oliver, 1997): How new information is meaningfully connected to prior knowledge.

4. Maintain Diversity. OLEs can support multiple modes of representation by being able to incorporate various kinds of media such as text, illustrations, animations, video, audio, and simulations. In this way, learning can take place through different sensory channels and learning is more effective when more channels are engaged in learning. Diversity also helps to keep the student moving, focused, and motivated.

5. Use Collaborative Strategies. Learners are capable of performing at higher intellectual levels when asked to work in collaborative environments. Group diversity and experience contributes positively to the learning process. Bruner (1985) argued that cooperative learning methods improve problem-solving strategies when learners are confronted with different interpretations of the given situation. Peer support makes it possible for the learner to conceptualize both external knowledge and critical thinking skills and to convert them into tools for intellectual reasoning. Collaboration involves the mutual engagement of the participants in a coordinated effort to solve the problem together. The active exchange of ideas within small groups also generates interest among learners. There is evidence that suggest cooperative teams achieve at higher levels of thought and retain information longer

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than students who work quietly as individuals. Shared learning gives students an opportunity to engage in discussion, take responsibility for their own learning, and thus become critical thinkers.

6. Reduce Cognitive Load. Cognitive load may be seen as the level of 'mental energy' required to process a given amount of information. As the amount of information to be processed increases, so does the associated cognitive load. Cognitive load theory suggests that effective instruction promotes learning by directing cognitive resources towards activities that are relevant to learning rather than to processes that are adjunct to learning. Thus, providing too much information all at once with distracting or competing information, increases complex information and further exacerbates cognitive load and associated "mental energy." Chunking information into "information bits," focusing attention to coincide with explanations, reducing information "overload," and providing appropriate scaffolding all aid in the reduction of cognitive load.

7. Provide adequate scaffolding. Supply the necessary support that a student needs to be successful. That is, as the student increases in competence, the teacher relinquishes the learning situation to the student and withdraws support. The move to less scaffolding is achieved by teaching students problem-solving strategies, fading assistance, and introducing more complex contexts--to help students distinguish essential and inessential details (Becker & Carnine, 1981). In other words, there should be a conscious attempt to foster independent and higher-order thinking.

Interactions between peers and teachers provide the kinds of scaffolding and coaching support which teachers normally bring to the traditional classroom setting. Mechanisms to support and motivate students isolated in online learning environments are considered necessary to encourage active participation, inquiry, discourse, and progress. Moreover, a social context stresses the importance of learning being germane within the cultural context of the group.

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## 11.6 CATEGORIES OF WEB BASED LEARNING

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Web-based learning is commonly referred to as eLearning or online learning. It essentially includes learning online through the courses that are offered on the net. Emails, live lectures, and videoconferencing are all possible through the net. This enables all the participants to give their views on a particular topic and then discuss them further. They also offer static pages like course materials that are printed for the benefit of all the participants. One of the main advantages of accessing pages on the web is that most of the web pages have hyperlinks that will lead you to another page and thus opens up a vast amount of information on the net.



You don't have the time to actually go to a University and attend classes. Earlier it would have been a major problem, as you wouldn't know how to manage that, but not anymore. With the several courses available online, you can actually sit at home and learn. No more of waking up early and attending classes or that irritating class mate. Now take whichever course at peace and at your convenience. A web-based course would typically include course information, timetable, notice board, curriculum map, teaching materials like articles, slides, and handouts, communication through discussion boards and email, summative and formative assessments, student management tools like statistics, records, and student tracking, and also links to external and internal websites that are very useful.

## NOTES

### Check your progress 1

1. What are the categories of web based learning?

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 What is web based learning?  
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### 11.6.1 ASYNCHRONOUS FORMAT

In asynchronous the education module is to be installed from a particular website and then we can unpack it offline on our machine. In this case there is no mutual interaction of student with teacher.

### 11.6.2 SYNCHRONOUS FORMAT

In synchronous type there is synchronization among the students and teacher on-line. This synchronous web based education provides the most emerging concept of E-learning.

### 11.6.3 SMALL GROUP COLLABORATION

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.

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## 11.7 VIRTUAL CAMPUS

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A virtual campus or e campus, refers to the online offerings of a college or university where college work is completed either partially or wholly online, often with the assistance of the teacher, professor, or teaching assistant. Many colleges and universities now offer such courses (or entire degree programs) either partially or wholly online. There are an estimated 4,500 such institutions with total enrollments approaching perhaps 2,000,000.

The majority of students using virtual campuses to obtain online degrees are adults students for three main reasons:

**Flexibility** – Adults with full-time jobs and families would find it impossible to attend daily at a traditional school setting. Online classes allow students to work at their own pace and work around their busy lives.

**Cost** – The cost of an online degree is relatively cheaper than at a traditional college setting. Obtaining your degree online eliminates costs such as classroom costs and facility upkeep costs that traditional students are required to pay because they are using the campus. However, the cheaper cost of an online degree does not diminish the value of the degree.

**Broad Choices** – Students can remain at home and have availability to degrees that may not be offered by universities or colleges nearby.

**Schools use a variety of tools for conducting classes** – typically called learning management systems (LMS) or course management systems (CMS). CMS may also refer to CONTENT Management Systems.

Some of the aspects that go under virtual campus includes various types of learning activities such as lectures, homework, discussions, readings, assignments. Classes are usually self paced using online documents and databases that might be available to them. Tests and other assignments are available online in specific programs used for online classes. Other methods used in virtual campus are live sessions, videoconferencing, discussing and sharing various applications. Individuals are able to access the materials any time they want under the teacher's control and are able to access anywhere online where they're able to access internet usage. Email is a big part of the virtual campuses and is often used before, during and after sessions. This aids individuals in exchanging information and or point them to the right direction that would be useful in increasing and understanding various methods available to them via documents and online sources.

**Check your progress 2**

1. Concept of virtual campus?

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2. List out the merits of web based learning.

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3. List out the limitation of web based learning.

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## **11.8 MERITS AND LIMITATIONS OF WEB BASED LEARNING**

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Asking an eLearning professional to point out the possible limitations of online learning is like asking Garry Kasparov to list the disadvantages of playing chess; how can you disparage a true passion of yours? However, if we need to be fair, there might be some potential limitations of online learning, when this has not been designed properly. In this article, I'll share a complete list of advantages, as well as what might go wrong with online learning in order to present a complete picture of the online learning experience.

### Top 7 Advantages Of Online Learning

#### **1. It's convenient.**

This is obviously the greatest benefit of online learning; as long as you own a computer and have an internet connection, it doesn't matter in which part of the world you are. Learners can access information from anywhere, anytime. Furthermore, distance is no longer a barrier to learning, whether academic or professional. Especially for corporate training, the ability to reach an unlimited number of employees quickly and regardless of their location has greatly benefited organizations all around the globe.

#### **2. It's flexible.**

It is simple, really; learning becomes easier when aligned with one's learning needs and preferences. Online learning allows learners to study at their own pace, whether they are students, busy adults, or employees. Assignment due dates aside, your audience is given the freedom to personally build their own learning schedule and choose where and when to learn. Speaking of "where", mobile learning offers your audience the ability to keep up with their learning wherever they are, at home, on a bus, in the park, as long as they have a mobile device with them.

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### **3. It's cost effective.**

Especially regarding corporate training, the cost effectiveness of online learning is quite impressive; no more travel and accommodation expenses for trainers and employees, reusable online content, budget cuts on training materials. Especially if your company has an online training budget, online learning is the ideal training option for you.

### **4. It can be tailored to different needs.**

Different people learn in different ways, and online learning does everything in its power to ensure that all learning needs are met. Instructional Designers and eLearning professionals create online courses that address almost all learning behaviors and accommodate all learning preferences. With online learning it doesn't matter whether your learners are visual, acoustic, or kinesthetic; there is a very wide variety of learning methods and tools that can be used to support learning while meeting all needs.

### **5. It's immediate.**

Not only learners are able to begin their online learning immediately, but they are also able to see immediate results; whether self-paced or instructor-led, online learning provides a variety of ways to offer constructive feedback to the audience. Furthermore, online learning allows for immediate access to additional online resources, which is always a bonus.

### **6. It's unrestricted.**

With online learning location is no longer a barrier; neither are culture and nationality. Translating and customizing your online courses to address different cultures in various languages makes possible for your eLearning content to travel all around the world and reach the widest possible audience. This is particularly effective for your online training program, as you can use the same training material for your globally distributed workforce and ensure that all of your employees are aligned with your company's brand, values, and vision.

### **7. Immediate updates.**

Today's online learning is better than yesterday's; and online learning of tomorrow will be better than today's. Multimedia, gamification, interactivity, constantly improved technology in general, provide a wide variety of applications and tools that not only update online learning, but also they make it more effective. The best part? You know that once you update your eLearning course, your audience will have immediate access to the updated version as soon as they click a mouse button.

## **2. Top 5 Possible Limitations Of Online Learning**

If eLearning, however, is not based on solid instructional design theories and models it may lead to the following limitations:

**1. It may be a "solo" act.**

It is true that, although online learning might be convenient and flexible, it is also a solo act. It will not be easy for all of your learners to feel comfortable when participating in online discussions and engaging more actively with their online instructors or their virtual classmates. Furthermore, some people absolutely need personal contact with their educators or trainers in order to learn successfully. Constructive feedback can be very effective, but if not given properly or in time, it might also be limited. In addition, some types of learning problems may be difficult to be addressed online, and some questions can be lost in a sea of requests and inquiries. This sometimes makes learners feel they lack support and reassurance.

**2. It may be impersonal.**

No matter how hard we try to fully transfer human communication to online platforms, no matter how natural it seems to form relationships behind computer screens, a virtual environment is just not human. Nothing can replace human contact.

**3. Too much time spent in front of a computer screen may be harmful.**

Being constantly online is the new reality, but the truth is that using a computer or a tablet all the time can cause poor vision, strain injuries, and other physical problems. Consider sending guidelines about right sitting posture, desk height, etc. along with your eLearning course; it might be very useful to your audience.

**4. It requires self-discipline.**

If your eLearning audience lacks self-discipline, it is unlikely that they will be motivated to self study. Traditional learning and training have the benefit of easily tracking both progress and falling behind; this works for many learners as well, as some people prefer their progress to be closely monitored in order to perform.

**5. Possible lack of control.**

No matter how carefully you design your eLearning course, there is no guarantee that your messages will get across. You offer your learners control over their eLearning experience and this is great, but are they going to use it effectively? There is always the risk of your learners just going through the material without paying any attention.

If your eLearning content is not built to make the most of the medium it will easily become disengaging. Furthermore, unless you know exactly what you're doing with new technologies, it is very likely that you overwhelm or distract your audience. Creating effective online learning courses requires knowledge, time, experience, talent, commitment, great communication skills, and a true passion for learning. Have you

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got all that? If the answer is yes, then be sure that the advantages of your online training, outweigh its limitations.

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## **11.9 LET US SUM UP**

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In this unit you have studied in detailed about the web based learning,online learning.we have studied in detail about the principles and various categories of web based learning.In addition to that we studied the virtual caopus and merits and limitation of web based learning.

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## **11.10 UNIT – END EXERCISE**

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Use the online and gather interaction regarding your interesting subject.

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## **11.11 ANSWERS TO CHECK YOUR PROGRESS**

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### **Check your progress 1**

Web-based learning is commonly referred to as eLearning or online learning. It essentially includes learning online through the courses that are offered on the net. Emails, live lectures, and videoconferencing are all possible through the net. This enables all the participants to give their views on a particular topic and then discuss them further. They also offer static pages like course materials that are printed for the benefit of all the participants. One of the main advantages of accessing pages on the web is that most of the web pages have hyperlinks that will lead you to another page and thus opens up a vast amount of information on the net.

2. Web-based learning is one way to learn, using web-based technologies or tools in a learning process. In other words, learner uses mainly computers to interact with the teacher, other students and learning material. Web-based learning consists of technology that supports traditional classroom training and online learning environments. "Pure" web- based courses are wholly based on computer and online possibilities. In this case all the communication and learning activities are done online. • 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.

### **Check your progress 2**

1.A virtual campus or e campus, refers to the online offerings of a college or university where college work is completed either partially or wholly online, often with the assistance of the teacher, professor, or teaching assistant. Many colleges and universities now offer such courses (or entire degree programs) either partially or wholly online. There are an estimated 4,500 such institutions with total enrollments approaching perhaps 2,000,000.

The majority of students using virtual campuses to obtain online degrees are adults students for three main reasons:

**Flexibility** – Adults with full-time jobs and families would find it impossible to attend daily at a traditional school setting. Online classes allow students to work at their own pace and work around their busy lives.

**Cost** – The cost of an online degree is relatively cheaper than at a traditional college setting. Obtaining your degree online eliminates costs such as classroom costs and facility upkeep costs that traditional students are required to pay because they are using the campus. However, the cheaper cost of an online degree does not diminish the value of the degree.

**Broad Choices** – Students can remain at home and have availability to degrees that may not be offered by universities or colleges nearby.

**Schools use a variety of tools for conducting classes** – typically called learning management systems (LMS) or course management systems (CMS). CMS may also refer to CONTENT Management Systems.

Some of the aspects that go under virtual campus includes various types of learning activities such as lectures, homework, discussions, readings, assignments. Classes are usually self paced using online documents and databases that might be available to them. Tests and other assignments are available online in specific programs used for online classes. Other methods used in virtual campus are live sessions, videoconferencing, discussing and sharing various applications. Individuals are able to access the materials any time they want under the teacher's control and are able to access anywhere online where they're able to access internet usage. Email is a big part of the virtual campuses and is often used before, during and after sessions. This aids individuals in exchanging information and or point them to the right direction that would be useful in increasing and understanding various methods available to them via documents and online sources.

1. It's convenient.

This is obviously the greatest benefit of online learning; as long as you own a computer and have an internet connection, it doesn't matter in which part of the world you are. Learners can access information from anywhere, anytime. Furthermore, distance is no longer a barrier to learning, whether academic or professional. Especially for corporate training, the ability to reach an unlimited number of employees quickly and regardless of their location has greatly benefited organizations all around the globe.

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### 2. It's flexible.

It is simple, really; learning becomes easier when aligned with one's learning needs and preferences. Online learning allows learners to study at their own pace, whether they are students, busy adults, or employees. Assignment due dates aside, your audience is given the freedom to personally build their own learning schedule and choose where and when to learn. Speaking of "where", mobile learning offers your audience the ability to keep up with their learning wherever they are, at home, on a bus, in the park, as long as they have a mobile device with them.

### 3. It's cost effective.

Especially regarding corporate training, the cost effectiveness of online learning is quite impressive; no more travel and accommodation expenses for trainers and employees, reusable online content, budget cuts on training materials. Especially if your company has an online training budget, online learning is the ideal training option for you.

### 4. It can be tailored to different needs.

Different people learn in different ways, and online learning does everything in its power to ensure that all learning needs are met. Instructional Designers and eLearning professionals create online courses that address almost all learning behaviors and accommodate all learning preferences. With online learning it doesn't matter whether your learners are visual, acoustic, or kinesthetic; there is a very wide variety of learning methods and tools that can be used to support learning while meeting all needs.

### 5. It's immediate.

Not only learners are able to begin their online learning immediately, but they are also able to see immediate results; whether self-paced or instructor-led, online learning provides a variety of ways to offer constructive feedback to the audience. Furthermore, online learning allows for immediate access to additional online resources, which is always a bonus.

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## 11.12 SUGGESTED READING/REFERENCES

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# UNIT – XII ELECTRONIC PORTFOLIOS FOR TEACHERS AND LEARNERS

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### STRUCTURES

- 12.1 Introduction
- 12.2 Objective
- 12.3 Electronic Portfolio
  - 12.3.1 Meaning
  - 12.3.2 Definition
- 12.4 Characteristic features basic equipments of creating E – portfolio
- 12.5 E-Portfolio for teachers and learners
- 12.6 Features of E-Portfolio
- 12.7 Developing an E-portfolio
- 12.8 Advantages of limitations of E-Portfolio
- 12.9 Let us Sum up
- 12.10 Unit - end Activities
- 12.11 Points for discussion
- 12.12 Answers to check your progress
- 12.13 Suggested Reading /References

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### 12.1 INTRODUCTION

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An electronic portfolio (e-portfolio) is a purposeful collection of sample student work, demonstrations, and artifacts that showcase student's learning progression, achievement, and evidence of what students can do. The collection can include essays and papers (text-based), blog, multimedia (recordings of demonstrations, interviews, presentations, etc.), graphic.

A portfolio is not a placeholder for all or random student work. In order to ensure that the portfolio process is educational and that it serves as a way to assess student learning outcomes, instructors need to be mindful about which artifacts need to be included for what purposes.

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### 12.2 OBJECTIVE

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At the end of the unit, you will be able to:

- Define the concept of electronic portfolio

- Describe the characteristic features basic equipments of creating E-portfolio
- Discuss the E-portfolio for teachers and learners
- Explain the developing process of E-portfolio
- Understand the features, advantages of limitations.

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## **12.3 ELECTRONIC PORTFOLIO**

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An electronic portfolio (also known as an eportfolio, e-portfolio, digital portfolio, or online portfolio) 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.

### **12.3.1 MEANING**

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. 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.

### **12.3.2 DEFINITION**

A portfolio is a collection of work developed across various contexts over time. The portfolio can boost learning by providing students and/or faculty with a way to organise, archive and demonstrate pieces of work. The electronic format allows faculty and other professionals to evaluate student portfolios utilising technology, which may involve the Internet, CD- ROM, video, animation or audio. A helpful starting point is to distinguish between e-portfolios as products, e-portfolios as tools or systems and the processes associated with e-portfolio development although they are intrinsically linked and in the case of product and process, interdependent.

Essentially then, an e-portfolio is a product created by learners, a collection of digital artefacts articulating learning (both formal and informal), experiences and achievements. Learners create 'presentational' e-portfolios by using e-portfolio tools or systems. As part of this production process, learners can be inherently supported to

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develop one or more key skills such as collecting, selecting, reflecting, sharing, collaborating, annotating and presenting – these can be described as e-portfolio-related processes.

Definitions of an e-portfolio tend to include the concepts of learners drawing from both informal and formal learning activities to create their e-portfolios, which are personally managed and owned by the learner, and where items can be selectively shared with other parties such as peers, teachers, assessors and employers. A video by Thanet College exemplifies some of these processes.

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### **12.4 CHARACTERISTIC FEATURES BASIC EQUIPMENTS OF CREATING E- PORTFOLIO**

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E-portfolio has been used to facilitate, document, and archive student learning. It is a learning tool for students to clarify their educational goals, integrate and solidify learning through reflection, and showcase achievement to potential employers. By having students reflect on what they learned, how they learned it, and how much they learned, they start to take control of their own learning. As Paulson and Paulson (1991) said, “portfolio is a laboratory where students construct meaning from their accumulated experience” (p. 5). As students select their representative work and reflect on what they learned, they start to make sense of their educational experiences in various courses and derive new meaning out of the process (Banta, 2003).

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### **12.5 E-PORTFOLIO FOR TEACHERS AND LEARNERS**

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E-Portfolio can also function as a tool for faculty to monitor and evaluate program effectiveness. To collectively examine student achievement for program improvement, portfolio can be a useful way to organize, sample, and assess what students gained out of the program. Portfolios enable faculty to not only observe what students know and can do, but also learn how students learn through student reflections.

Changes in medical practice and feedback from students often prompt teachers to update or alter their course. With WBL, such changes can be made quickly and easily, and avoid the expense of reprinting the course syllabus. Other faculty, and even students, can also be involved in the process of updating the course. Web-based learning products persist long after the course ends. Learners may thus return to access the tutorial as a reference when seeing patients or studying for a test, the text of a rich online discussion when writing a final paper, or the virtual patient simulator for additional practice.

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## **12.6 FEATURES OF E-PORTFOLIO**

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- **MULTIMEDIA:** Once the student work is organised, users can easily add sound, pictures, graphics and videos to the electronic portfolio
- **COMPUTER SKILLS :**Students can gain valuable computer skills, which is considered to be quite necessary in today's world, while developing and editing thier portfolios.
- **ASSESSMENT:** E-portfolios directly relate a student's work to the defined standards or criteria.E- porfolios exhibit wider dimensions of learning than just the traditional methods (paper-pencil reports or exercises). For instance, within an electronic portfolio, a student can add digital audio, video, and graphics to document evidence of learning.

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## **12.7 DEVELOPING AN E-PORTFOLIO**

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WBL facilitates assessment and documentation of educational objectives.Online assessment has the same flexibility in distance and timing as the WBL intervention, and also allows immediate customised feedback. Furthermore, in an age when documentation of learning tasks and competence is increasingly expected, WBL can serve a useful administrative purpose. Automated record-keeping can verify exactly what content learners reviewed and can also document successful completion of a summative assessment.

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## **12.8 ADVANTAGES OF LIMITATIONS OF E-PORTFOLIO**

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An electronic portfolio, (e-portfolio) is a storage area, where learners upload and submit their work and tutors and assessment personnel view and mark work. Unlike traditional paper based methods, e-portfolios provide much richer and varied ways of recording and presenting evidence. Learners can submit a range of file formats including word processed documents, spreadsheets, images, video and sound files. The content of an e-portfolio can then be shared with others. They can be searched and viewed from different perspectives and enable learners to access their work at any time. All you need to run most e-portfolio systems is a PC or laptop with internet access (preferably broadband).

### **ADVANTAGES OF E – PORTFOLIO**

Any advantages and disadvantages of WBL are contingent upon at least two conditions: the nature of the WBL intervention, and the intended setting including the prospective learners. The advantages of a pencil depend on the kind of pencil (wood or mechanical, black lead or coloured, etc) and the use to which the pencil is applied (writing a test, marking a piece of wood, drawing a poster, etc). It is also important (but unfortunately not always considered) that the WBL

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intervention must be well designed. The elements of well designed WBL are beyond the scope of this article, but have been discussed previously.<sup>2–5</sup> With these caveats, there exist numerous potential advantages of WBL.

### Distance learning, economies of scale and consistent message

Perhaps the most obvious advantage of WBL is that it overcomes physical distances. This is the cardinal feature separating WBL from other computer-assisted instructional methods, and enables WBL to facilitate the teaching of students scattered across different practice sites in the same city,<sup>6</sup> different cities,<sup>7</sup> and even different countries.<sup>8,9</sup> The result of distance independence is that learners have the opportunity to participate in the same instructional activities regardless of physical location.<sup>10</sup> For teaching settings in which faculty expertise varies across sites this can be an important advantage. Distance learning also permits the possibility of economies of scale. Once a WBL tutorial or virtual patient has been developed, class size is limited only by server capacity and bandwidth. Viewed another way, it is possible for schools to share resources and thus avoid redundancy in developing course materials.<sup>11</sup> Individual components of a course (for example, a paragraph of text, an animation, or a video clip) can be indexed and made available for use in other courses (reusable learning objects).<sup>12</sup> Note that economy of scale is less apparent in online discussion settings, where demands on faculty facilitator time usually increase with each additional learner.

### Flexible scheduling

Along with flexibility in physical location, WBL offers flexibility in timing of participation.<sup>10</sup> In contrast to lectures given at a fixed time, learners can access a WBL tutorial or virtual patient at any time day or night. Participating in an asynchronous online discussion group also offers flexibility, but it is tempered by the need to respond to communications from other group members in a timely manner and adhere to agreed schedules.

### Individualised learning

Web-based learning offers the promise of individualised learning.<sup>13</sup> Learners can be given greater control over the learning environment by allowing them to select from among multiple different learning opportunities within a given course and move at their own pace. Learners struggling to learn a topic can pursue remedial work, those interested in learning more can do so, and those already familiar with the topic can move quickly to the next. Likewise, asynchronous communication in an online discussion group allows learners to tailor participation to their needs; those desiring or requiring more time for study and reflection can use it. Another way to individualise instruction involves adaptive instruction in which the computer uses information about the learner to alter and thus optimise the learning

experience.<sup>14,15</sup> Adaptation has been suggested in response to various individual differences including baseline knowledge of the subject matter, motivation, attitudes toward computers, and learning and cognitive styles.<sup>16</sup>

### Novel instructional methods

Web-based learning facilitates several instructional methods that would be infeasible or at least difficult in traditional settings. For example, virtual patient simulators can present medical students with a wide variety of patients and medical contexts to supplement classroom learning. This provides the opportunity to ‘experience’ uncommon scenarios, facilitates the repetition (deliberate practice<sup>17</sup>) and temporal spacing (distributed practice) required for enduring learning, and allows communication of detailed performance-based feedback. Other learning exercises, such as interactive models and games, or using the internet to search for and assimilate information from multiple sources, can engage learners. Multimedia (colour, sound, video, photographs, graphics, and animations) can enrich a course in ways that would be difficult, if not impossible, using a textbook. The asynchronous nature of many online discussion groups allows time to think deeply about the issues at hand and spend time constructing a thoughtful response. This is in contrast to a face-to-face setting where the conversation may move on before a learner has had time to grasp the concepts let alone formulate a question or comment.

### **LIMITATIONS OF E – PORTFOLIO**

However, WBL is not without its disadvantages. In fact, many of these are related to the very advantages listed above – the other side of the coin, if you will.

#### **Social isolation**

Flexibility in time and location means that the learner using WBL tutorials and virtual patients is often studying alone, which over time may lead to a perception of social isolation. Online discussion groups have a distinct social organisation which differs to that of a face-to-face small group. In an era when teamwork and team learning is increasingly valued, will WBL build or detract from critical interpersonal relationships and communication skills? Alternatively, will interactions with a virtual patient satisfactorily mimic a real patient encounter, and will the associated learning transfer to the bedside?

#### **De-individualised instruction**

Despite the promise of individualised instruction noted above, it has yet to be clearly shown that these theoretical promises bear fruit as hoped. On the contrary, more often WBL fails to respond to the individual needs of the learner. Whereas a good teacher can monitor the group and adapt instruction to accommodate various learning needs, adaptive WBL interventions must be explicitly

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programmed to monitor, recognise, and respond appropriately to individual needs. This is not as easy as it sounds,<sup>14,18</sup> and only a handful of WBL interventions (for the most part outside of medical education) have done this successfully— and only at a very rudimentary level. It remains to be seen whether the potential advantage of individualised instruction can be realised,<sup>19</sup> but for the moment adaptive WBL appears to be more vision than reality, and instruction is more often predetermined than personalised.

### **Cost**

Offsetting the potential economies of scale are the large up-front costs associated with developing WBL. While it is a simple matter to convert an existing textbook, syllabus, or lecture to a web-based format, such conversions rarely if ever constitute effective instruction. In contrast, the development of an effective online tutorial or virtual patient can be very expensive – ranging from thousands to hundreds of thousands of dollars when time and opportunity costs are accounted. Also, ongoing faculty time commitments to an online discussion group can be significant.<sup>20,21</sup> Finally, each WBL experience comes at the expense of learner time that might have been devoted to other purposes. Educators often capitalise on the flexible scheduling of WBL activities without taking into account the cumulative time required to complete all assignments.

### **Technical problems**

Despite best intentions, technical problems are inevitable with virtually all instructional media (for example, running out of chalk when teaching with a blackboard). However, as instructional media become more dependent upon technology the impact of technical problems becomes greater. In the absence of chalk a good teacher could improvise and teach, but serious computer problems will completely disrupt a WBL course. Even minor problems (which in my experience are far too common) can be a serious impediment, decreasing satisfaction and course participation while increasing cognitive load,<sup>22</sup> which in turn impede learning.

### **Poor instructional design**

The quality of instructional design varies in all teaching settings. However, in WBL this is more obvious because once complete a website can be viewed and critiqued by all users. Furthermore, in contrast to a face-to-face course in which a talented instructor can teach with minimal preparation, instruction in WBL must be explicitly planned and implemented. Research shows that many – perhaps most – WBL courses have an inferior instructional design.<sup>23,24</sup> A classic example is the ‘textbook on the web’ – publishing the text of an existing syllabus or book on the internet and calling it a course. Such courses offer little if any advantage over the previous format while incurring the disadvantages listed here, and hardly qualify as ‘instruction’. While



poor instructional design is certainly not unique to WBL, the challenge of implementing effective designs on the internet and the absence of an instructor for needed clarification may make WBL more sensitive to flawed designs. Technology for technology's sake Perhaps not so much a disadvantage as a potential error, many educators and administrators are seeking out WBL and other education technologies for the sake of technology, rather than to achieve an educational goal. It is as though the technology train is leaving the station and no one wants to be left behind. Unfortunately, this has often led to poor instructional design (as noted above) or, worse yet, the use of WBL in situations in which other instructional methods or media would be more effective. For example, using WBL to teach medical interviewing may be less effective than other modalities. It is important to remember that, like chalk, PowerPoint slides, and calculators, WBL is just a tool – a powerful tool, perhaps, but one that may not be appropriate in all situations.

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### 12.9 LET US SUM UP

In this unit we have started with concept of E-portfolio and its various features basic equipments of creating E-portfolio. E-portfolios are becoming a popular alternative to traditional paper-based portfolios because they offer practitioners and peers the opportunity to review, communicate and assess portfolios in an asynchronous manner. we have seen about how to develop the E-portfolio. Finally, we have discussed about advantages and limitations of E-portfolio.

#### Check your progress 1

1. What are advantages of E-portfolio?

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### 12.10 UNIT - END ACTIVITIES

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Explain concept of E-portfolio

Describe about limitation of E-portfolio

### 12.11 POINTS FOR DISCUSSION

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Discuss the educational significance of E-portfolio

### 12.12 ANSWERS TO CHECK YOUR PROGRESS

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1. Any advantages and disadvantages of WBL are contingent upon at least two conditions: the nature of the WBL intervention, and the intended setting including the prospective learners. The advantages of a pencil depend on the kind of pencil (wood or mechanical, black lead or coloured, etc) and the use to which the pencil is applied (writing a test, marking a piece of wood, drawing a poster, etc). It is also important

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Distance learning, economies of scale and consistent message

Perhaps the most obvious advantage of WBL is that it overcomes physical distances. This is the cardinal feature separating WBL from other computer-assisted instructional methods, and enables WBL to facilitate the teaching of students scattered across different practice sites in the same city,<sup>6</sup> different cities,<sup>7</sup> and even different countries.<sup>8,9</sup> The result of distance independence is that learners have the opportunity to participate in the same instructional activities regardless of physical location.<sup>10</sup> For teaching settings in which faculty expertise varies across sites this can be an important advantage. Distance learning also permits the possibility of economies of scale. Once a WBL tutorial or virtual patient has been developed, class size is limited only by server capacity and bandwidth. Viewed another way, it is possible for schools to share resources and thus avoid redundancy in developing course materials.<sup>11</sup> Individual components of a course (for example, a paragraph of text, an animation, or a video clip) can be indexed and made available for use in other courses (reusable learning objects).<sup>12</sup> Note that economy of scale is less apparent in online discussion settings, where demands on faculty facilitator time usually increase with each additional learner.

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### 12.13 SUGGESTED READING /REFERENCES

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# UNIT-XIII CURRENT TRENDS IN ICT BASED LEARNING

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*Current Trends in CT  
Based Learning*

## STRUCTURES

- 13.1 Introduction
- 13.2 Objective
- 13.3 Virtual classroom
  - 13.3.1 Meaning
  - 13.3.2 Importance of Virtual classroom
  - 13.3.3 Role of the teacher
- 13.4 Smart classroom
  - 13.4.1 Concept
  - 13.4.2 Advantages and limitations
  - 13.4.3 Role of the teacher
- 13.5 Let us sum up
- 13.6 Unit – end Exercise
- 13.7 Points for discussion
- 13.8 Answers to check your progress
- 13.9 Suggested Reading/References

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### 13.1 INTRODUCTION

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**“Learn what you need, when you need, where you need.....”**

Education, is and has always been, a field in constant flux. Just as the world changes, so too must our classrooms, with the onset of the “technological revolution”. This is more true now than it has ever been before, the profession of teaching will change – of that, there is no doubt. It is also inarguable that much of this change will involve the emerging technologies.

The upcoming years will be a fascinating time for education. New technologies will come about rapidly to meet new problems, while attempting to untangle the old ones. Classrooms and teachers both will find their roles irreversibly changed, as will their tools. Already, we are witnessing this with many emerging technologies: iPads (and other tablet software) and flipped classrooms. Each promises to transform education in surprising and innovative ways, and is exciting in its own right. However, one technology in particular stands to have an especially affect on education in the coming years, more-so than even the others: the virtual classroom. There are many reasons for this: an increase of accessibility, the evolving needs of students and schools,

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and the power of this concept to transform classrooms. All of these factors, when taken together, promise to make virtual classrooms the most significant technology trend in education for the upcoming years.

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### **13.2 OBJECTIVE**

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At the end of the unit, you will be able to:

- Define the concept of virtual classrooms
- Explain the importance of virtual classroom
- Discuss about the smart classroom and its advantages
- Realize the role of teacher in smart classroom.

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### **13.3 VIRTUAL CLASSROOM**

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A virtual classroom is typically an online learning system where both the learners and tutors/teachers communicate to each other just like the real classroom but from different geographical locations. The system comprises of all the basic tools required to run effectively a classroom. Communication among the participants can be achieved in various ways like text chat, live video, live audio, and so on. Among the basic tools is the whiteboard, which is incredibly similar to the blackboard found in a real classroom. .

#### **13.3.1 MEANING**

A virtual classroom is an online learning environment that allows teachers and students to communicate, interact, collaborate, explain ideas.

This can break down most of the common barriers -- cost, distance and timing to synchronous learning by:

- Video conferencing ability (so teachers and students can see each other)
- Audio conferencing (so participants can hear each other)
- Real-time text chat
- Interactive online whiteboard (so users can interact on the same online page).
- Library of learning materials (essential for providing more structured lessons)
- Teacher tools and controls (just like in a physical classroom)

#### **13.3.2 IMPORTANCE OF VIRTUAL CLASSROOM**

Education has evolved a lot in the last couple of decades. In many ways this evolution towards a virtual classroom has broken the natural boundaries that once existed in the exchange of information, and has set the stage for a more personal and interactive learning experience.

Technology has changed the way we consume information and it is important that education in the workplace evolves with these new learning styles. A popular way of adapting to new learning styles is through the flexibility and convenience of virtual classrooms. Following points stress the importance of virtual classroom.

### **1. Increased Convenience:**

Without the location or time limitations of a traditional classroom setting, learners have the freedom to absorb content and engage with peers, at a time and location that they will learn best. The professional world is realizing that not every learner is the same and sitting in a classroom for hours to learn about a topic is not effective for everyone. A virtual classroom allows learners to comprehend topics on their own terms, on many different devices, anywhere there is internet.

### **2. Schedule Flexibility.**

The ease of accessibility of an online learning platform gives learners the opportunity to take a break at certain times of the work day to take a class. This allows employees to learn at various times of the day, such as during a lunch break, or on the bus to and from work. This type of flexibility is not possible with physical classrooms.

### **Knowledge Retention.**

For many, online instruction delivers a more effective learning experience because of the ability to have short, interactive modules that can be repeated if needed. These short modules also referred to as micro learning, help learners find what they need quickly, and help break up learning to make it more manageable and memorable.

### **Immediate Feedback.**

If the virtual classroom is being used for compliance, or another type of learning topic that requires a test of knowledge, learners can get immediate feedback on how well they comprehended the information. In traditional classrooms, feedback could take weeks to disperse, and by that time, the feedback won't be as potent to the learner. In a virtual classroom, administrators also see an added advantage of being able to track these knowledge tests for their records.

### **Increased Participation & Engagement.**

It may seem like there would be more opportunities for participation and engagement in traditional classrooms setting, but this is not necessarily true. There are many ways to interact in virtual classrooms through chat and rating features, as well as social learning. The interactive comment and share features help learners engage and connect. It also allows learners who may not be as comfortable with interacting in-person an opportunity to contribute. Features like the rating and comment features also allows administrators to determine

## **NOTES**

the quality of their content and adjust accordingly to ensure the most effective learning experience.

**Check your progress 1**

1. write about the importance of virtual classroom?  
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**13. 3.3 ROLE OF THE TEACHER**

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Teaching in a conventional learning environment is different from teaching online. Here is the role of the teacher in the online classroom:

**A proper guide**

An online teacher needs to play the role of guiding students through one or more online learning experiences. After all, different online learners prefer different learning styles and modes. So, online teachers need to change their mode of teaching accordingly to provide personalized education.

Such learning experiences are usually designed and planned long before the course starts. This way the teacher can devote more time to guiding the students and less time to prepare lessons. The teacher makes sure to channelize the focus of learners toward key concepts and ideas.

**Motivator**

It is not hidden that online learners need to remain motivated throughout their online course. Online learning is hard work. Studying online can feel isolating and discouraging without a proper dose of motivation and encouragement. Thus, an effective online teacher needs to make good efforts to communicate specific encouraging messages to individual learners.

Most importantly, they need to provide constructive feedback. The teacher needs to find a feasible way to promote positive messages along with necessary criticism. Maintaining overall positive morale in the class is very important. They cannot be harsh or lose their cool at the time of providing negative feedback. Pointing out the weak areas of any student, they should educate the student as to how they can better himself in that area. There are times when the learner may fall into negative comments about themselves. At such times, the cheerleader needs to find ways to listen well. They should help the student overcome their fears or worries by providing relevant solutions.

**Role model**

This is an essential role of the online teacher. There are many people who focus on the role of the teacher as a role model. This is

necessary. A teacher is no God. However, they can be massive support systems for students, especially online students. Most importantly, they need to help the online learners develop high levels of confidence. They need to remain positive no matter what. No matter how much stress a student is going through, they need to bring him back to light and help him focus back on his subjects of interest. Usually, applied projects and papers work well for this. It usually gives the teacher an opportunity to be a good mentor.

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### **Individual Mirror**

Providing feedback is an important duty of online teachers. For instance, online teachers at an accredited online school in Cambodia have provided genuine feedbacks in a timely fashion so as to contribute to the academic as well as personal development of a child. When online learners get proper feedback, it helps them to get better and work on their weaknesses and identify their actual strengths. They strive to get closer to meeting their learning objectives. Thus, the online teachers act as mirrors, showing the students their actual selves.

### **Co-learner**

Online teachers need to be good learners themselves. This is because the online teaching techniques change pretty often. So, they need to train themselves first before taking any online classes. Thus, they need to be lifelong learners. They can model that learning for their students in multiple ways in the virtual classroom. The teacher can be an active participant in online discussions. They need to share what they are learning about the subject. They might also have to complete all or parts of some assignments, sharing their work with the students. This clearly forms a healthy and nurturing online learning community.

### **Effective communicator**

Teacher-to-student and student-to-student communication play a vital role in an online learning environment. Often students are asked to complete an Orientation before starting their online course. This session usually stresses the importance of ongoing communication with the instructor. It also provides tips for communicating effectively online. In fact, the first activity in an online course is to demonstrate communication with the teacher. It is required for online students to email the teachers, share information about themselves and bring questions forward. Usually, instructors make use of this activity to guarantee that students know how to contact them to ask questions. This helps in building an engaging community of the online classroom.

Online students are taught that communication is the key to student success. The online teachers are trained in various techniques for maintaining student engagement in the learning process at all costs. Thus, teachers are trained to be effective communicators. It is truly

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required since communication in an online learning environment needs to be really effective and strategic to bring out the best version of every student. Apart from the above qualities, there are certain other roles an online teacher might have to play.

### **Good Collaborators:**

They need to be good collaborators. Online students need to be given the opportunities to collaborate on assignments and projects. The collaborative activities help online students strengthen the online learning community.

### **Creative and innovative:**

Also, online teachers need to be creative and innovative. They need to come up with effective ideas to facilitate online school students further. Online instructors make sure to promote creativity in much the same way as classroom teachers do. They offer their students different options when it comes to assignments and projects and bringing fresh ideas to the table. There are plenty of multi-media options at the time of demonstrating knowledge.

Online teachers usually bring forth fun interactive presentations for class projects. After all, the online teacher knows that the engaged learner is the successful learner.

Thus, being highly valued for their subject areas, the virtual instructors need to be valued for the fostering of the students. After all, they gather skills needed for success in this new age of learning. Online teachers need to be reliable and lead their students forward in life towards college and career.

Online teachers need to teach various life skills to their students as well. They can incorporate many such fun activities to teach the importance of self-discipline, sense of responsibility and ownership to children. Thus, online teachers need to be all-rounders!

### **Conclusion:**

The Virtual Classroom transcends the boundaries of location, time and space providing a flexible learning environment for all. With the advent of Virtual Classroom learning could be made more engaging, more informative and more memorable. It is an option for enhancing education.

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## **13.4 SMART CLASSROOM**

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Quality education is an essential requisite in today 's competitive environment. Technology has affected us in every aspect. The smart classes is a modernized method of education in Indian education scenario which provides quality education to students by helping them in better concept formation, concept elaboration, improvement in reading skills and academic achievement.



“Smart school and smart class” is an innovative concept in education. Now a day’s we are living in the age of internet, so our education system is also going to be online. In this environment e learning and online education is the need of this time. Use of internet in schools and education is not only a dream, but it is the necessity of the time.

### **13.4.1 CONCEPT**

Smart Classrooms are technology enhanced classrooms that foster opportunities for teaching and learning by integrating learning technology. In a smart class there will be computers, projectors, internet connectivity and other multimedia devices such as home theater etc. The role of a teacher may be modified in such new environment. In a smart class students may use internet and this activity can change the old thinking about the students and the learning theory.

### **13.4.2 ADVANTAGES AND LIMITATIONS**

Following are few advantages of smart classroom:

#### **Flexibility in learning:**

A lot can happen over a smart board. Children can study in different forms of media. They get illustrations via photos, maps, graphs, regular and animated videos. Different minds have different preferences so they learn according to it.

#### **Advanced teaching and learning experience:**

Advanced technology not only enhances the learning experience but also gives an interesting platform to the teachers. Information is easy to grab with visual effects and dynamic perspective.

#### **Connects well with more interaction:**

Smart classes provide an interactive atmosphere which results in more transparency between teachers and students. This helps in establishing a connection, so that students can easily express through touching, writing and drawing.

#### **Easy Maintenance:**

As all the tools of smart classes are electronic, they are easy and neat to use. Digitalized pen or tool is being used instead of marker and chalks. They just need good surveillance and have very low maintenance.

#### **Access to online resources:**

The best part of smart classes is that, here everything is synchronized. Essential gadgets and projectors are synchronized among themselves and they all are again connected to internet. So, at every step, availability of solutions is high with the help of web.

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### **Environment friendly:**

Emphasizing more on e-learning, we not only get dynamic information but also are stepping towards green learning. Here, everybody is compatible with notebooks and tablets. Hence, the use of paper is almost negligible. Phenomenon like writing with pen or pencil, photocopying and printouts are rarely seen.

### **Upgraded integration:**

Various technologies can be integrated for a better learning experience. For instance, microscopes, document cameras, video cameras can be integrated with the white boards. And mikes and speakers are integrated with satellite for live classes.

### **Pace of growth:**

Every individual's capacity to grow is different from the other, so the pace of growth is also different with regard to different students. E-learning gives separate profile to all the students so they can maintain their own speed of growth.

### **Repetition:**

Everyone has different grasping power. Some students take time to understand and comprehend studies. It might be the case that they apprehend things for the third and fourth time. So, encrypted data is essential as it can be repeated till it gets into the mind.

### **Using different tools:**

Through technology aided classroom learning, a child gets the opportunity to learn new things using various tools. Mind mapping, using 3D techniques becomes highly effective when used in a smart class.

Every good thing has something to be concerned about. Smart classes might be the best gift to the society as it deals with the base pillar. Education is undoubtedly said as the base pillar because it not only literate people but also gives a vision in life. Life without a vision is like a racing track without a map, where you are just driving fast to finish the race. There is no fun in that as it does not deal with the concerns of the race.

### **Limitations of Smart Classroom**

#### **Highly cost effective:**

There are concerns among various schools about the pace of changing technology. After every few months new programming language, new software is being developed. For getting to know these and upgrade oneself, the schools need to hire an up-to-date person. In this modern world of cut-throat competition this is hard to find.

### **Cumbersome up gradation:**

Moreover, upgraded technology requires upgraded equipment. This task is highly pocket-pinching. It is not possible every time to upgrade according to the needs of the hour. Manpower is also needed to maintain the whole infrastructure. Moreover, the more there are students, the more a school needs internet bandwidth. All these processes become a bit hard to manage and expensive.

### **Handling issues by parents:**

Many a time parents face problem in handling the schoolwork because of technology. Familiarity becomes an issue. The last generations are comparatively slow in catching new technology and get upgraded with that.

### **Diversions:**

Guardians as well as teachers feel that taking smartphones and other gadgets in school becomes a major source of distraction for the students. Internet connectivity adds to its woes, with social messaging apps playing the part of the culprit. It even becomes impossible to understand that whether a child is using the gadget for educational purpose or otherwise. Filtered browsing is an option but it is difficult if the gadget is personally owned by the child.

### **Interactions and social issues:**

The social dynamics gets altered in a smart class. There is no face to face that is real time interaction among the peers in tech-driven classroom. Social interaction forms an integral part of human society. Without it, human morals and ethos become hard to develop. There is a need to inculcate these values among the students.

### **Dependency on technology:**

Technology makes a person highly dependent. And when it comes to students, it acts as a crutch. Everything comes in handy, a child need not to bother much about completing any task. Hence the problem solving capacity of the child decelerates.

### **Actual learning process:**

Research says that smart class lowers the test standardization scores. It is found that many pupils lack the basic knowledge of Math and English while competing for creativeness in a tech-driven class. A smart class also does not ensure that whether a child is improving in his or her smartness or creativity. It becomes quite mechanical while working on and with a gadget in a particular direction.

### **Lessening human values:**

Teaching a child using technology lowers the importance of a teacher. The child becomes used to the theory that it is the computer or the gadget that is teaching, the teacher is a mere medium.

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### **Efficient infrastructure:**

To set up a smart class, it is highly crucial that the institution has enough facility to carry on with the project. Technology requires long term investment, both monetary and mental as well.

### **Understanding :**

There is no doubt that an understanding between two human being is much more than a machine and its user. After all manmade machines, machines did not made man.

### **13.4.3 ROLE OF THE TEACHER**

Generally teachers retained many of their traditional roles (e.g. class leader or director, lecturer, information giver, discussion leader). They also negotiated multiple new roles in smart classrooms that utilised innovative technology-supported practices. The new teacher roles identified were: instructional designer; trainer; collaborator; student; silent partner; team coordinator; advisor; and monitoring and assessment specialist.

**“Instructional designer”** is one of the more common new roles taken on by teachers. Much like the “self-learner” role adopted by students, teachers in this role found themselves designing, planning and organising their classrooms in order to effectively use and integrate technology into their lessons. “The instruction designer takes into account all of the resources available to meet the variety of needs his/her students have and implements well-designed activities to address those needs.”

The role of **“trainer”**. “Trainers” give individual instruction to enable skilled development. This training or mentoring was accomplished through modelling the use of multimedia and technology, and helping the students see how they might use software tools to accomplish unique learning tasks.

The **“collaborator”** refers to a variety of activities teachers undertake to work with their colleagues to improve their instruction.”. These activities included informal sharing with colleagues and team teaching. They also included collaborating, sharing and learning with the students as equals.

**“Team co-ordinator”** - the focus of this role was on the active assignment of individual students to project or portfolio teams. In addition to opening up opportunities for collaborative and social learning activities, teachers who assumed the “team co-ordinator” role created opportunities for peer tutoring, apprenticeship modelling, and support between students with mixed ability levels.

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The role of “**enabling advisor**” refers to those teachers who gives assistance, advice, suggestions or pose questions in a way that enable students to find the information they needed to complete particular tasks. “Teachers who give so much autonomy to their students are thereby declaring their belief in a radically different theory of knowledge, one that entails far more work for them as well as their students A common term used sometimes to describe this role is the term ‘**facilitator**’.”

The “**mentoring and assessment specialist**” refers to the new role where teachers and students alike mentored and monitored performance and attempted to assess and improve that performance.

### Conclusions:

**Smart Classrooms increase the interest of the students in studies. Students tend to learn more.** The structure and arrangement of traditional classroom space does not go with changes happened in educational agents, methodology and social context. Smart classrooms rethink learning space and learners’ expectations about what this space, along with resources and methodologies, should be like.

The Smart classroom is a one-stop resource for students needing research, technology, or writing help. The usage of this new technology must be encouraged in the current education system. The Smart classroom provide the students as well as teacher to learn through a new techniques and too in a different and interesting manner.

It is fair to say that both students and adults have become more and more technologically inclined. Students adapt quickly to new technologies, just as they will be expected to in the professional world. Cameras, remotes, and wireless devices are all common technologies that result in more engaged learning for students and adaptation to a variety of learning styles. In the near future, classrooms will too have to adapt accordingly and upgrade themselves. There is no stopping that.

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## 13.5 LET US SUM UP

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In this unit we have started about concept of virtual classroom and its importance. A virtual classroom enables students to access quality teachers anywhere on the planet so long as they both have a reliable internet connection. We have analyse the role of the teacher in virtual and smart classroom. We have concluded with advantages of smart classroom.

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## 13.6 UNIT – END EXERCISE

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Differentiate between virtual and smart classrooms

Write about smartclassroom.

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### 13.7 POINTS FOR DISCUSSION

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Discuss about various features of smart classroom.

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### 13.8 ANSWERS TO CHECK YOUR PROGRESS

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Education has evolved a lot in the last couple of decades. In many ways this evolution towards a virtual classroom has broken the natural boundaries that once existed in the exchange of information, and has set the stage for a more personal and interactive learning experience.

Technology has changed the way we consume information and it is important that education in the workplace evolves with these new learning styles. A popular way of adapting to new learning styles is through the flexibility and convenience of virtual classrooms. Following points stress the importance of virtual classroom.

#### **1. Increased Convenience:**

Without the location or time limitations of a traditional classroom setting, learners have the freedom to absorb content and engage with peers, at a time and location that they will learn best. The professional world is realizing that not every learner is the same and sitting in a classroom for hours to learn about a topic is not effective for everyone. A virtual classroom allows learners to comprehend topics on their own terms, on many different devices, anywhere there is internet.

#### **2. Schedule Flexibility.**

The ease of accessibility of an online learning platform gives learners the opportunity to take a break at certain times of the work day to take a class. This allows employees to learn at various times of the day, such as during a lunch break, or on the bus to and from work. This type of flexibility is not possible with physical classrooms.

#### **Knowledge Retention.**

For many, online instruction delivers a more effective learning experience because of the ability to have short, interactive modules that can be repeated if needed. These short modules also referred to as micro learning, help learners find what they need quickly, and help break up learning to make it more manageable and memorable.

#### **Immediate Feedback.**

If the virtual classroom is being used for compliance, or another type of learning topic that requires a test of knowledge, learners can get immediate feedback on how well they comprehended the information. In traditional classrooms, feedback could take weeks to disperse, and by that time, the feedback won't be as potent to the learner. In a virtual classroom, administrators also see an added advantage of being able to track these knowledge tests for their records.

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## 13.9 SUGGESTED READING/REFERENCES

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- **THE CONCEPT OF SMART CLASSROOM,** Dr. V.K.Maheshwari, M.A (Socio, Phil) B.Sc. M. Ed, Ph.D., Former Principal, K.L.D.A.V. (P.G) College, Roorkee, India
- <https://www.learncube.com> “Virtual Classroom”
- <https://www.knowledgeanywhere.com/resources/article-detail/5-advantages-of-the-virtual-classroom> – Sarah Johnson, Oct.18, 2017

*Current Trends in CT  
Based Learning*

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## UNIT XIV - BLOG BASED LEARNING

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### STRUCTURES

- 14.1 Introduction
- 14.2 Objective
- 14.3 Blogs
  - 14.3.1 Concept
  - 14.3.2 Advantages and limitations
- 14.4 Online learning resources
- 14.5 E-Books
- 14.6 E-Library
- 14.7 MOOC (Massive open online courses)
- 14.8 Let us sum up
- 14.9 Unit-end Exercise
- 14.10 Points for discussion
- 14.11 Answers to check your progress
- 14.12 Suggested Reading/References

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### 14.1 INTRODUCTION

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A 'Blog' is a shortened form of the words Web log. A website on which one person or group puts new information regularly, often every day.

A blog is a web site like any other, but it is intended to offer an opinion on something or stories about what is happening with the author.

The difference between a standard web site and a blog is the way that stories are 'posted' on to the site. A Blog uses a web based application to publish the story being written. Another feature of many blogs is the ability of visitors to add comments to the stories.

In the world of blogging there are organizations that have bloggers employed and then there are individual bloggers. Here are some education blogs from both types that have proved most useful in dispelling myths, providing staff development, and offering relevant resources for classroom use.

These are rock-solid and trusted education blogs that continue to be sources of inspiration for us all as educators from all walks of life. You'll find organizations dedicated to talking about modern teaching



and learning, as well as educators from the trenches who put vision into practice every day. Edutopia has a reputation as the hub for progressive education. They highlight schools' best practices for making learning engaging and relevant in a global society.

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## 14.2 OBJECTIVE

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At the end of the unit, you will be able to:

- Define the concept of Blog and its advantages
- Discuss the E-Books and E-library
- Analyse the MOOC

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## 14.3 BLOG

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A blog (shortening of “weblog”) is an online journal or informational website displaying information in the reverse chronological order, with latest posts appearing first. It is a platform where a writer or even a group of writers share their views on an individual subject.

### 14.3.1 CONCEPT

A **blog** is a publication mechanism, like a journal or bulletin. Blogs can promote open dialogue and encourage community building in which both the bloggers and commenter’s exchange opinions, ideas, and attitudes. Teachers can use a blog to publish instructional materials that the students can access to and where the students can make comments. Teachers can also let students set up their own blogs for a particular subject or for several subjects and then assign tasks to students.

The tasks should be done using blogs (i.e., publishing articles and sharing them with other students). While the students develop their own blogs, teachers can observe and monitor the students' progress, and identify the learning needs that have not been considered (e.g., students may directly or indirectly express their doubts on blogs). As the information on students' blogs are growing, teachers need to classify, summaries and evaluate different students' blogs and then publish the teachers' opinions, directions, and feedback on their own blogs or on class blogs. By doing this, teachers are actually putting students to the right tracks, because if you just let students publish whatever they like, the use of blog could be out of control, and the relevance between the blog and the content being taught and learning will be reduced.

### 14.3.2 ADVANTAGES AND LIMITATIONS

#### ADVANTAGES OF BLOGS:

- Enables you to write down your thoughts on anything that interests you.
- Very quick and easy to set up, don’t need much technical knowledge

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- Easy and quick to update or add new posts
- People can leave comments on your blog
- If you want to read other people’s blogs there are literally millions to choose from

**LIMITATIONS OF BLOGS:**

- Whatever you publish is available for everyone to see. If you write a post in anger you might regret it later.
- Personal blogs may be biased or contain inaccurate information.
- Blogs can be time consuming. Finding time to write regular updates can become a chore.
- People may leave rude or inappropriate comments.
- There are many very dull blogs around. You may have to look at many before you find some worth reading.

**Check your progress 1**

1. Describe the concept of Blog?

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2. Write a short note on E-Books.

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**14.4 ONLINE LEARNING RESOURCES**

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In general, Web pages and documents on the Internet that provide useful information. While an online resource is typically data and educational in nature, any support software available online can also be considered a resource.

The idea of open educational resources (OER) has numerous working definitions. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge. Material resources. Both the availability and quality of materials can be barriers to a quality education. In many countries there are insufficient basic materials such as blackboards and chalk, textbooks, teacher support materials, student workbooks, and supplementary learning aids.

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**14.5 E-BOOKS**

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An e-book is a book in electronic format. It is downloaded to a computer, PC, Mac, laptop, PDA or any other kind of computer, and is read on the screen. It can have numbered pages, table of contents, pictures and graphics, exactly like a printed book. It is very simple and easy to purchase and download e-books through the Internet. It is exactly like purchasing any other product. The only difference is that

after payment you will either be directed to a download page or receive the download link in an email. All you have to do is click on the link and the e-book will automatically download to your computer, to a folder of your own choice.

E-books are basically text, images, and even audio/video packaged into a single electronic file. For example, if you type a document in MS Word (or Open Office Writer), then save that document, that is already an e-book.

As you can see, you may already have been involved in e-book publishing without your quite knowing about it. While an e-book can exist in different formats (i.e., PDF, EXE-compiled HTML pages, PDA format), and the most used format is epub, and people usually need to convert pdf to epub format for reading. E-books usually share similar advantages and disadvantages. Then, let us learn what is the advantages and disadvantages of Electronic Books .

### **ADVANTAGES OF e-BOOKS**

**Access.** E-books are more easily accessible since any number of users can access the same book simultaneously and at any location provided that the user has the appropriate access codes. Therefore, geographical access would no more be a problem. Furthermore, search facilities are enhanced since required books and/or information within the books can be searched electronically within seconds.

- 1. Cost.** In this case, cost refers to maintenance cost and cost in terms of personnel. E-books need not be maintained because they are not subject to wear and tear as is the case of books in printed form. E-books further allow the reduction of manpower in terms of shelving and circulation since e-books need not be shelved physically and/or circulated manually to potential users.
- 2. Space.** E-books are especially useful for libraries with limited space since e-books do not require any space on shelves.
- 3. Preservation.** E-books do not require any maintenance since they do not undergo any wear and tear. Therefore, e-books do not need to be preserved under specified conditions as is the case with printed books.
- 4. Multimedia format.** Unlike your usual printed books, e-books can contain not only text and images, but also audio and even video. This way, if the reader isn't the type of person who likes to read paragraphs of text, he or she can choose to listen to the audio version. If your e-books are of pdf formats and you want to read it as a text format, then you can convert pdf to text. It is east for e-books. Some e-books even have flash applications that allow the reader to "interact" with the contents (i.e., drag images around using the mouse). This is useful for kinesthetic learners.

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5. **Searchable.** A number of e-books sport a Search button, which allows you to quickly jump to the page containing the word you're interested in. Ever try opening a dictionary (the printed one)? Try an electronic version and marvel at the speed of the search feature.
6. **No shipping cost.** Since we're dealing with electronic files, you can simply download them from the web. There's no need to ship any physical product halfway around the globe, and you won't have to wait as long as you normally would when ordering books from, say, Amazon.

### DISADVANTAGES OF e-BOOKS

1. **Not convenient to read.** Who wants to sit in front of a computer or screen for hours just reading your e-book, right? Aside from gaining weight, sitting for prolonged periods of time can cause muscle strain, backache, and even an elevated cholesterol level.
2. **Printing cost.** It's painful to read off a screen, and some people prefer to read text on paper. If you distribute an e-book, your customers will most likely print it. And if your e-book is quite long, the printing cost will be shouldered by your readers. It is the same to dwgautocad users, your customers may prefer to read your graphic by printing it out, but dwg format is not compatible on many printers, but pdf format can. thus, you need to convert dwg to pdf. A printed book, on the other hand, is already bound and ready to take anywhere.
3. **Piracy.** In the printed book world, people who want to "share" your book will photocopy it, and then send it to their friends. With e-books, your file can be easily emailed to someone living thousands of miles away. It can even be placed in a public server for anyone to download. With paper books, you can easily read even while standing (inside the elevator, for example). That's not the case with e-books.

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## 14.6 E-LIBRARY

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### e-LIBRARY

A website that makes books and other reading material available to users. e-library provides all their resources and are accessible online only, they have no physical address. All you need is an internet connection, and by clicking on a web link, you have full access from anywhere in the world. You can either download a book on your laptop, ipod, ipad etc or read an article online on your phone!

#### Advantages of e-library

- e-library is the easiest to use the available online research tool.

- Standards searching help the educators to integrate the technology into the curriculum, by increasing the technology literacy.
- Students can use the search by topic feature to retrieve a manageable amount of quality content, quickly and easily.
- Public libraries need to offer an easy —to-use research solution to patrons.
- Point-and-click functionality ensures all the users finding the information they need.
- Reference desk gives the integrated access to a dictionary, encyclopedia, almanacs, and much more.
- Visually impaired people are no longer disabled in searching and surfing information on the digital library.

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### 14.7 MOOC (Massive open online courses)

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#### MOOC (Massive Open Online Course)

A massive open online course (MOOC) is an online course that has open access and interactive participation by means of the Web. MOOCs provide participants with course materials that are normally used in a conventional education setting - such as examples, lectures, videos, study materials and problem sets. Apart from this, MOOCs offer interactive user forums, which are extremely useful in building a community for students, TAs, and professors. Generally, MOOCs do not charge tuition fees.

MOOCs are further divided into two categories – cMOOCs and xMOOCs.

1. **cMOOCs** are MOOCs that allow for dynamic development of study material. That is, instead of having a pre-planned set of reading materials and courseware, the material will be developed through online discussions and collaborations among learners taking the course across the globe.
2. **xMOOCs**, on the other hand, believe in the conventional approach where the courses are well-structured with pre-selected reading and reference materials.

#### ADVANTAGES OF MOOC:

(1) MOOC creates the opportunity for **sharing ideas & knowledge** and also helps improving lifelong learning skills by providing **easy access to global resources**.

(2) It **improves cross cultural relationships** which leads to **collaboration between institution educators and learners** locally and internationally.

(3) It gives an **idea where I stand in the course** in the current world as large number of students all over the globe would have registered for

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the same course on the same common platform and participate in the activities and discussion in the study group.

(4) **MOOC enhances active learning.** Research shows that students learn more through active learning (i.e. when they have assignments or discussion on an issue) rather than through listening to lectures. Students listen to lectures more attentively if they have been given a problem or task to solve before the lecture. In this regard the structure that most MOOCs have – short lectures alternating with assignments and quizzes – seems to be ideal. Of course, one could also do this in a classroom, but it would be more difficult to ensure that all students participate: some might need longer to assimilate the content of the lecture, and prefer to listen to it again before doing the assignment [2]. Peer-to-peer contact facilitated by MOOC can also trigger effective active learning.

(5) **MOOC encourages flipping the classroom.** Teacher-student contact time usually used for lectures could be used differently, e.g. for discussions, experiments, project and group-work, working with peers etc. Students watch lectures online at home and interact with faculty regarding their doubts while in class. It has been strongly advocated and demonstrated by Salman Khan, founder of the Khan Academy, in the context of school teaching. Teachers get time to work with students on an individual basis.

(6) **Knowledge sharing in Discussion Forum** helps reflective and global learners along with active and sequential learners. Reflective learners who are not able to share ideas inside the physical classroom can put their ideas in discussion forum and get the view points of others. Global learners who feel themselves lost in the beginning can share their diverse ideas on the forum and can get other's suggestions to find their solution. To know about different types of learners follow the post "Different Learning Styles".

(7) **"No exam fever"** encourages deep approach of learning against the surface & strategic approach of learning. To know more about different approach of learning follow the post "Different strategies of learning".

(8) **Peer evaluation** provides the opportunity to learn via grading others. Because it is the best way to learn when you teach or grade someone else.

(9) MOOC provides the opportunity to **learn from world class universities and from renowned instructors** without being a student of the respective university while sitting in the any part of the world.

(10) MOOC opens up the facility to get free of cost **"statement of accomplishment"** signed by the instructor of the course, which someone completes in all respect according to the requirement of the subject. There are provision to earn the **verified certificates** with university logo and instructor signature on the payment of the course

fee. Anyone can show these certificates at the **time of job applications** also. The employer can go to the corresponding MOOC provider database to get the information regarding the candidate. Some universities also started allowing to **fulfill credit requirements of a degree** from the MOOC courses.

#### **DIS-ADVANTAGES OF MOOC:**

(1) MOOC provides all the video lectures and slides along with all related reading resources. This gives the students **scope for not going through the lectures gradually but whole lectures in a single day** which does not lead to deep understanding of the concepts.

(2) **Real time question answering** is also not possible while going through the lectures.

(3) Technical courses needing **physical hands-on practical exposures** (eg. Civil, Mechanical, Electrical etc.) are quite tough to be delivered through MOOC.

(4) There is no opportunity for effective assessment methods like **Q&A in classroom, surprise quizzes and presentations**.

(5) **No proper evaluation methods** are there as automatic machine assessments and evaluations are not effective. **Peer evaluation** sometimes lead to discouragement among students which lead them to dropout from the course.

(6) MOOC style of education will **gradually kill the care, empathy and respect** involved between teacher and students in a physical classroom. It only increases the virtual social community.

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### **14.8 LET US SUM UP**

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In this unit we have focused about the concept, advantages and limitation of Blog. Detailed discussion going on about online learning resources. Then we have discussed the E-Books and E-library. Finally, we concluded with massive open online course.

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### **14.9 UNIT-END EXERCISE**

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Point out the advantages of Blog

Explain about MOOC.

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### **14.10 POINTS FOR DISCUSSION**

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Discuss about online learning resources

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### **14.11 ANSWERS TO CHECK YOUR PROGRESS**

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1. A **blog** is a publication mechanism, like a journal or bulletin. Blogs can promote open dialogue and encourage community building in which both the bloggers and commenter's exchange opinions, ideas, and attitudes. Teachers can use a blog to publish instructional materials

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that the students can access to and where the students can make comments. Teachers can also let students set up their own blogs for a particular subject or for several subjects and then assign tasks to students.

2. An e-book is a book in electronic format. It is downloaded to a computer, PC, Mac, laptop, PDA or any other kind of computer, and is read on the screen. It can have numbered pages, table of contents, pictures and graphics, exactly like a printed book. It is very simple and easy to purchase and download e-books through the Internet. It is exactly like purchasing any other product. The only difference is that after payment you will either be directed to a download page or receive the download link in an email. All you have to do is click on the link and the e-book will automatically download to your computer, to a folder of your own choice.

E-books are basically text, images, and even audio/video packaged into a single electronic file. For example, if you type a document in MS Word (or Open Office Writer), then save that document, that is already an e-book.

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### **14.12 SUGGESTED READING/REFERENCES**

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- [http://www.teach-ict.com/gcse\\_new/being\\_online/blogs/miniweb/pg2.html](http://www.teach-ict.com/gcse_new/being_online/blogs/miniweb/pg2.html)
- <https://blogs.siliconindia.com/alice303/Advantages-and-Disadvantages-of-Electronic-Books-bid-XLT89Yeh32634297.html>
- [https://en.wikipedia.org/wiki/Massive\\_open\\_online\\_course](https://en.wikipedia.org/wiki/Massive_open_online_course)
- <https://www.flickr.com/photos/mathplourde/8620174342/sizes/l/in/photostream>
- Michael Gaebel, “MOOC: Massive Open Online Courses – January 2014”, EUA Occasional Papers.