M.A. (Education)
Semester- Fourth

Course Code- EDUCC 112
Credit- 06

INFORMATION AND COMMUNICATION TECHNOLOGIES
(ICT) IN EDUCATION

Units: 1 to 20

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Course Code: EDUCC 112

Contents

"FOURTH SEMESTER"

Course Code: EDUCC 112

Course Title: INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT) IN EDUCATION

Credits 4 (Marks = 100 (70 + 30))

Course Objectives:

To enable the learners to;

- Understand the concept and role of ICT in construction of Knowledge.
- Acquire knowledge and understanding about National Policy on ICT in School Education.
- Identify the challenges in integration of ICT in school education.
- Understand computer fundamentals.
- Apply different Hardware Technologies in Modern Educational Practices.
- Familiarize with the new trends in ICT.
- Apply different e-resources for educational purposes.

INSTRUCTIONS FOR THE PAPER SETTER AND CANDIDATES

The question paper for ESE will carry a total of 70 marks and consist of five sections: A, B, C, D & E. Section A will consist of 6 objective type questions (MCQ, True/False, Completion type) carrying one mark each and 4 short answer type questions carrying 2 marks each which will cover the entire syllabus uniformly. Sections B, C, D & E will have two long answer type questions from the respective Units 1, 2, 3 & 4 of the syllabus & carry 14 marks each. The long answer type questions may contain subparts carrying different marks. The marks for each sub-part and required word limit will be shown against it. Section A of the question paper will be compulsory and the candidates are required to attempt one question (and/or its sub-parts) each from the sections B, C, D and E of the question paper. Answers to short questions should be completed in around 80 to 100 words each. Answers to long answer type question should be completed in around 800 words.

UNIT-1 Introduction to ICT 1 Credit

- Concept of ICT: Meaning & Characteristics;
- Role of Information Technology in Construction of Knowledge,
- National Policy on ICT in School Education;
- Challenges in Integrating ICT in School Education; Communication

UNIT-2 Communication 1 Credit

- Concepts and Process of Communication, Principles of Communication,

- Modes and Barriers of Communication.
- Models of Communication.
- Classroom Communication (Verbal and Non-Verbal).

UNIT 3: Technology for Classroom Instruction 1 Credit

- Components, Working and Uses of Over Head Projector (OHP), Movie Projector, Liquid Crystal Display (LCD) Projector, Digital Liquid Display (DLP) Projector.
- Components, Working and Uses of Computers in Teaching-Learning Process.
- Educational Applications of Audio-Video Recording Instruments and Closed-Circuit Television (CCTV)

UNIT-4: New Trends in ICT 1 Credit

- Virtual Classroom - Concept, Elements, Advantages and Limitations
- Smart Classroom-Concept, Elements, Advantages and Limitations
- EDUSAT-Concept, Elements, Advantages and Limitations
- Online Learning Resources: e-Library, Websites, Apps, and Web 2.0 Technology.

Sessional Work / Activities

Marks = 5 (under CCA Component)

A candidate is required to undertake any one of the following activities and submit a detailed report to the concerned teacher/PCP Coordinator. The activity will carry 5 marks:

1. Visit an institution having interactive white board, learn its features and functioning and prepare a report.
2. Prepare a PowerPoint presentation for secondary school students on any topic of your choice.
3. Plan and Prepare an ICT integrated presentation for secondary level.
4. Preparation of two transparencies for teaching the secondary school subject with the help of OHP.
5. Any other activity/activities that the concerned course teacher may think appropriate can be allotted during PCP to the Candidates.

Suggested Readings

- Barton, R. (2004). Teaching Secondary Science with ICT. McGraw-Hill International
- Bhaskara Rao, Digumarti (2013): Vidya - Samachara Sankethika Sastram (ICT in Education). Guntur: master minds, Sri Nagarjuna Publishers.
- Denis, Kim, Sen and Morin (2000). Information Technology - The Breaking Wave, New Delhi: Tata McGraw-Hill Publishing Co. Ltd.
- Department of School Education and Literacy, MHRD (2012). National Policy on Information and Communication Technology (ICT) In School Education. New Delhi
- Imison, T. & Taylor, P.H. (2001). Managing ICT in the Secondary Schools. Heinemann: Oxford.
- Kumar, KL (2000). Educational Technology. New Delhi: New Age International Pvt. Ltd.
- Mangal, S.K. & Uma Mangal (2009). Essentials of Educational Technology. New Delhi: PHI Learning Pvt. Ltd.
- Norton, P. (2000), Introduction to Computers, New Delhi: Tata McGraw-Hill Publications.
- Shukla, Satish S. (2005). Basics of Information Technology for Teacher Trainees. Ahmedabad: Varishan Prakashan.
- Sutherland, R., Robertson, S. and Peter John. (2009). Improving Classroom Learning with ICT, New York: Routledge

Unit-1

ICT MEANING, CHARACTERISTICS, ROLEOF ICT INCONSTRUCTIONOF KNOWLEDGE

Structure:

1.1 Introduction:

The pace of the society in which we live requires more flexible ways of learning and adapted to changes. Formal, non-formal, informal and invisible learning are living today in an expanded education and in a virtual space through the network. The Information and Communication Technologies are more than ever living in our society and they are important parts of the education. At Primary and Secondary Education, students start to use them in class, but the reality is that now a days almost every student goes to school with a wide range of technological skills. Schooling and teaching are changing with this new context. For example, students and teachers should have technological skills because they use them in their classroom and in their curricula. ICT have some characteristics that make them an essential tool in our daily life and for instance in our schools.

1.2 Learning Objectives:

After reading this chapter the students will be able to know about:

- Meaning and Characteristics of Information and communication Technology (ICT)
- Role of informational technology in the construction of knowledge

1.3 Meaning and Characteristics of Information and Communication Technology (ICT)

ICT (information and communications technology or technologies) is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning. ICTs are often spoken of in a particular context. such as ICTs in education, health care, or libraries. The term is somewhat more common outside of the United States. Worldwide research has shown that ICT can lead to improved student learning and better teaching methods. A report made by the National Institute of Multimedia Education in Japan, proved that an increase in student exposure to educational ICT through curriculum integration has a significant and positive impact on student achievement, especially in terms of "Knowledge-Comprehension". "Practical skill" and "Presentation skill" in subject areas such as mathematics, science, and social study. However, you can see that there are many education technology solutions provided in the world which may cause confusion among educators about how to choose the right ICT solution. Let's have a look at the advantages and disadvantages of ICT tools for education and discover what kind of education ICT solution is suitable for your school needs. The pace of the society in which we live requires more flexible ways of learning and adapted to changes. Formal, non-formal, informal and invisible learning are living today in an expanded education and in a virtual space through the network. The Information and Communication Technologies are more than ever living in our society and they are important parts of the education. At Primary and Secondary Education, students start to use them in class, but the reality is that nowadays almost every student goes to school with a wide range of technological skills. Schooling and teaching are changing with this new context. For example, students and teachers should have technological skills because they use them in their classroom and in their curricula, ICT have some characteristics that make them an essential tool in our daily life and for instance in our schools. Also, it is very important to know that ICT are not only about computers and the internet, but also about a big number of different tools such as mobile phone, tablets, etc. New Technologies have changed the way we communicate and the way we live and work. For this reason, ICT in Education is an approach that makes the school and the society closer. In this article we will focus on the role and different kinds of ICT in education and in the main characteristic that nowadays technologies have,

Advantages of ICT Tools in Education:

1 Through ICT, images can easily be used in teaching and improving the retentive memory of students.

2. Through ICT, teachers can easily explain complex instructions and ensure students' comprehension.

3. Through ICT, teachers are able to create interactive classes and make the lessons more enjoyable, which could improve student attendance and concentration.

Disadvantages of ICT Tools in Education:

1. Setting up the devices can be very troublesome.

2. Too expensive to afford

3. Hard for teachers to use with a lack of experience using ICT tools.

Self- Check Exercise-1:

Q-1 What do you mean by ICT?

1.4. Characteristics ICTs:

Laudon and Laudon (2010) state that the most important drive behind globalization has been the explosion in Information and Communication Technologies (ICT) sectors. For these authors the main ICT's characteristics are:

1. **Mobile Learning.**New advances in hardware and software are making mobile "smart Phones" indispensable tools.

2. **Cloud computing.** The implications of this trend for education systems are huge; they will make cheaper information appliances available which do not require the processing power or size of the PC.

3. **One-to-One computing.** The trend in classrooms around the world is to provide an information appliance to every learner and create learning environments that assume universal access to the technology.

4. **Ubiquitous learning.** School systems around the world are developing the ability to provide learning opportunities to students "anytime, anywhere".

5. **Gaming.** The phenomenal success of games with a focus on active participation, built in incentives and interaction suggests that current educational methods are not falling short and that educational games could more effectively attract the interest and attention of learners.

6. **Personalized learning.** Education systems are increasingly investigating the use of technology to better understand a student's knowledge base from prior learning and to tailor teaching to both address learning gaps as well as learning styles.

7. **Redefinition of learning spaces.** Schools around the world are re-thinking the most appropriate learning environments to foster collaborative, cross-disciplinary, students centered learning.

8. **Teacher-generated open content.** OECD school systems are increasingly empowering teachers and networks of teachers to both identify and create the learning resources that they find most effective in the classroom. Many online texts allow teachers to edit, add to, or otherwise customize material for their own purposes, so that their

students receive a tailored copy that exactly suits the style and pace of the course.

9. **Smart portfolio assessment.** The collection, management, sorting, and retrieving of data related to learning will help teachers to better understand learning gaps and customize content and pedagogical approaches.

10. **Teacher managers/mentors.** The role of the teacher in the classroom is being transformed from that of the font of knowledge to an instructional manager helping to guide students through individualized learning pathways.

Self-Check Exercise-2:

Q-1: What do you mean by one to one computing?

1.5. Role of informational technology in the construction of knowledge:

If there is one truism that has emerged in the relatively brief history of ICT use in education, it is this: It is not the technology but how you use it! Put another way: "How you use technology is more important than if you use it at all...[and] unless our thinking about schooling changes along with the continuing expansion of [ICTS] in the classroom then our technology investment will fail to live up to its potential.

Technology then should not drive education; rather, educational goals and needs, and careful economics, must drive technology use. Only in this way can educational institutions in developing countries effectively and equitably address the key needs of the population, to help the population as a whole respond to new challenges and opportunities created by an increasingly global economy. ICTs, therefore, cannot by themselves resolve educational problems in the developing world, as such problems are rooted in well entrenched issues of poverty, social inequality, and uneven development. What ICTs as educational tools can do, if they are used prudently, is enable developing countries to expand access to and raise the quality of education. Prudence requires careful consideration of the interacting issues that underpin ICT use in the school-policy and politics, infrastructure development, human capacity, language and content, culture, equity, cost, and not least, curriculum and pedagogy.

Self-Check Exercise-3

Q-1. What is important in ICT supported teaching learning strategies?

a) Animation Techniques

b) Assessment Plans

c) Clear Objectives

d) Clear Instructions

Q-2. New Technologies have changed the way we communicate and the way we live and work. Yes/No

Q-3. New advances in hardware and software are making mobile "smart Phones" …… tools.

1.6 Summary:

Through pedagogical research and empirical observation, the National Institute for Public Education is making every effort to track the current situation of computer science training and strongly supports the application of ICT in school environments. Its research and development activities will be harmonizedwith both the educational strategy of the European Union in the field of ICT and the Hungarian information-society-training program. Important tasks are to identify and popularize positive results along with the most adaptable pedagogical practices, to research the criteria and effects of the ICT learning process, and to improve professional-methodological materials. An IT development strategy has been developed to achieve these goals. ICT can play a significant role in equalizing opportunities for marginalized groups and communities. But the paradox is that for those groups that are unable to cross the technology divide, ICT is yet another means to further marginalize them. Education has a major role to play in resolving this problem. Thus, unless ICT becomes part of both the delivery and content of education, the disadvantage will deepen and development will suffer.

But the failure to use ICT is itself a result of the digital and knowledge divides that exist, and their causes are deeply embedded in the complex historical and socio-cultural context of the country. Fortunately, with the Vision 2030 goals, the Kenyan government has begun to implement strategies that will address these paradoxes.

1.7 Glossary:

Empirical- Based on experiments and practical experience, not an idea

Encompassing-Completely encloses or surrounds something else

Harmonization- The act of making different people, plans, situations, etc. suitable for each other, or the result of this

1.8 Answers to Self-Check Exercise:

Self-Check Exercise-1

Ans-1: ICT (information and communications technology or technologies) is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning.

Self-Check Exercise-2

Ans-1: The trend in classrooms around the world is to provide an information appliance to every learner and create learning environments that assume universal access to the technology.

Self-Check Exercise-3

Ans-1. Clear Instructions

Ans-2. Yes

Ans-3. Indispensable

1.9 References and Suggested Readings:

(1) Ilona Bánfi, Marta Körös-Mikis: National Policies and Practices on ICT in Education in Hungary ed. T. Plomp, R. Anderson, N. Law and A. Quale.

(2) Andrea Karpati: Oktatasi szoftverek minosegi vizsgalata [A Quality Survey of Educational Software] In: Uj Pedagogiai Szemle, 2000. Vol. 3. pp. 77-81

(3) Erika Bondor. Az informatika-szamitastechnika kerettanterveben [Informatics and Computer Science in the Framework Curriculum] Background for observational research, 2002. http://www.oki.hu

(4) Krisztina Dan, Zsuzsa Varga: Az iskolai konyvtar mint informacios kozpont [The School Library as a Centre of Information] In: Iskola-Informatika-Innovacio. Ed. Marta Koros Mikis, OKI, Budapest 2003-12-08

(5) Marta Koros Mikis: Az informatika helyzete es fejlesztesi feladatai [The Situation of Informatics and Tasks for Development] In: Új Pedagogiai Szemle, June 2002, Vol. LII. no. 6, pp. 35-49

1.10 Terminal Questions:

1. What do you mean by ICT? What are the characteristics of ICT in education?
2. Discuss the role of ICT in the construction of knowledge.

Unit-2

NATIONAL POLICY ON ICT IN SCHOOL EDUCATION

Structure:

2.1 Introduction:

Teachers participate in selection and critical evaluation of digital content and resources. They encourage to develop their own digital resources, sharing them with colleagues through the digital repositories. In schools equipped with EDUSAT terminals, DTH or other media devices, relevant activities will be planned and incorporated into the time schedule of the school. Initially the teachers may use the computer lab for teaching-learning but progressively more classrooms will be equipped with appropriate ICTs, making way for ICT Enabled classes

Formal, non-formal, informal and invisible learning are living today in an expanded education and in a virtual space through the network. The Information and Communication Technologies are more than ever living in our society and they are important parts of the education. Schooling and teaching are changing with this new context. For example, students and teachers should have technological skills because they use them in their classroom and in their curricula. ICT have some characteristics that make them an essential tool in our daily life and for instance in our schools.

2.2 Learning Objectives:

After reading this chapter the students will be able to know in detail about:

- National Policy on ICT in School Education

2.3 National Policy on ICT in School Education:

Information and Communication Technologies are defined as all devices, tools, content. resources, forums, and services, digital and those that can be converted into or delivered through digital forms, which can be deployed for realizing the goals of teaching learning enhancing access to and reach of resources, building of capacities, as well as management of the educational system.

These will not only include hardware devices connected to computers, and software applications, but also interactive digital content, internet and other satellite communication devices, radio and television services, web-based content repositories, interactive forums, learning management systems, and management information systems. These will also include processes for digitization, deployment and management of content, development and deployment of platforms and processes for capacity development, and creation of forums for interaction and exchange.

2.3.1 Information and Communication Technology in School Education:

Challenges and Issues:

Challenges before the Education System in India

Concerns of reach and access to education continue to attract widespread attention of all segments of society. Following sustained initiatives spread over many decades, the country can today boast of perhaps one of the largest ever schooling systems. With increased throughput, and ever-increasing numbers of students aspiring for higher education, concerns of equity in education and issues of quality have also begun to attract attention. The challenge of developing alternate modes of education, continuing education, teacher capacity building, and information systems for efficient management of the school system are being addressed. With Information and Communication technologies becoming more accessible, reliable and mature, the prospect of leveraging ICT for education is becoming increasingly feasible.

2.3.2 Information and Communication Technologies in Schools:

Information and Communication Technologies have enabled the convergence of a wide array of technology based and technology mediated resources for teaching learning. It has therefore become possible to employ ICT as an omnibus support system for education. The potential of ICT to respond to the various challenges the Indian education system poses are:

1. ICT can be beneficially leveraged to disseminate information about and catalyze adaptation, adoption, translation and distribution of sparse educational resources distributed across various media and forms. This will help promote its widespread availability and extensive use.
2. There is an urgent need to digitize and make available educational audio and video resources, which exist in different languages, media standards and formats.
3. Given the scarcity of print resources as well as web content in Indian languages, ICT can be very gainfully employed for digitizing and disseminating existing print resources like books, documents,

handouts, charts and posters, which have been used extensively in the school system, in order to enhance its reach and use.

4. ICT can address teacher capacity building, ongoing teacher support and strengthen the school system's ability to manage and improve efficiencies, which have been difficult to address so far due to the size of the school system and the limited reach of conventional methods of training and support.

5. Using computers and the Internet as mere information delivery devices grossly underutilizes its power and capabilities. There is an urgent need to develop and deploy a large variety of applications, software tools, media and interactive devices in order to promote creative, aesthetic, analytical and problem-solving abilities and sensitivities in students and teachers.

Self-Check Exercise-1

Q-1: Discuss the strength of ICT.

2.3.3 ICT Literacy and Competency Enhancement:

The policy defines ICT Literacy in terms of levels of competence. Based on the stage of schooling at which a student or teacher is introduced to ICT, they may progress to different levels. These levels are suggestive and adaptations must be made to suit local conditions. The levels do not correspond to specific classes (e.g., sixth or seventh standard) and time duration must also be locally determined. Also, these levels must be revised periodically to keep pace with changing technology.

2.3.4 ICT enabled teaching-learning processes:

ICT enabled teaching-learning encompasses a variety of techniques, tools, content and resources aimed at improving the quality and efficiency of the teaching learning process. Ranging from projecting media to support a lesson, to multimedia self-learning modules, to simulations to virtual learning environments, there are a variety of options available to the teacher to utilize various ICT tools for effective pedagogy. Each such device or strategy also involves changes in the classroom environment, and its bearing on effectiveness. Availability of a wide range of such teaching-learning materials will catalyze transformation of classrooms into ICT Enabled classrooms. Teachers will participate in selection and critical evaluation of digital content and resources. They will also be encouraged to develop their own digital resources, sharing them with colleagues through the digital repositories. In schools equipped with EDUSAT terminals, DTH or other media devices, relevant activities will be planned and incorporated into the time schedule of the school. Initially the teachers may use the computer lab for teaching-learning but progressively more classrooms will be equipped with appropriate ICTs, making way for ICT Enabled classes

2.3.5 Elective Courses at the Higher Secondary level

States will initiate the process of launching/creating courses in different areas of ICT for the higher secondary stage. The courses will factor in the requirements of students of different streams, including academic and vocational streams (see 8.2). Courses will be modular in design to enable students to select appropriate software applications based on current needs of higher education and job prospects. Courses

will be revised frequently to keep pace with emerging trends in ICT. A Post Graduate teacher with appropriate qualifications to teach these courses will be appointed.

An ICT Lab attendant/technical assistant with appropriate qualifications will be appointed to manage the ICT/Multimedia Resource lab.

2.3.6 ICT for Skill Development

(vocational and job-oriented areas of general education)

Job oriented courses in ICT will be developed and established for students of the vocational stream at the higher secondary level by linking them with the need of ICT enabled industries/establishment in the neighborhood. The scope of these courses would be a broad-based ICT literacy. It will not be limited to ICT based occupations, but will inform and enhance productivities in a wide range of other occupations (for example, accounting, office automation, office communication, data handling and data processing, desktop publishing, graphics and designing, music and video, etc.). This will also include courses on cyber security.

The courses will be modular and students will be provided a wide range of choices, catering to a variety of job options, hardware and software platforms, tools and resources, Appropriate mechanisms to counsel students in selecting career paths and courses will be developed simultaneously. The courses will be in conformity with the National Vocational Education Qualifications Framework (NVEQF). The courses will be frequently revised and updated in order to maintain relevancy to changing requirements of the job market and emerging trends in technology. Hence it will also be imperative to conduct such courses in close liaison with industry.

The institutions offering Vocational courses will be required to integrate ICTS in their teaching-learning process.

2.3.7 ICT for Children with Special Needs

Use of ICT will catalyze the cause and achieve the goals of inclusive education in schools.

ICT software and tools to facilitate access to persons with disabilities, like screen readers, Braille printers, etc. will be part of the ICT infrastructure in all schools.

Special care will be taken to ensure appropriate ICT access to students and teachers with special needs.

All teachers will be sensitized to issues related to students with special needs and the potential of ICT to address them. All capacity building programmes will include components of ICT enabled inclusive education.

All web-based interfaces developed for the programme including digital repositories, management information systems, etc. will conform to international guidelines for accessibility.

Accessibility norms will be adopted as per the world wide web consortium, W3C guidelines to enable the content to be accessed by children with special needs. Web based digital repositories with W3C compliance will address the lack of availability of resources for persons with disabilities. Digital content and resources,

for the exclusive use of persons with disabilities, talking books for example, will also be developed and deployed.

The absence of appropriate vocabulary for different subject areas in the different Indian languages and the unfamiliarity of the cultural context can make digital communication and resources inaccessible to students and teachers across the country. Efforts will be initiated to develop appropriate word lists and dictionaries in Indian languages and wide spread translations encouraged.

2.3.8 ICT for Open and Distance Learning:

Open and Distance Learning with the use of ICT opens out alternate possibilities for students who have dropped out, cannot continue formal education or are students of the system of education. Existing formal systems of Education will be strengthened with ICT based instruction available in Open and Distance Learning Systems so as to cater to the needs of such learners.

Present Open Schooling systems (e.g., National or State level Open Schools) will be strengthened by harnessing ICTs innovatively. Access to e-books, digital learning resources, Digital Repositories (with relevant learning resources) etc. will be developed by these institutions as student support services. This will also be used for online capacity building for open and distance teacher training.

2.3.9 ICT for School Management

Automated and ICT managed school States will adopt or adapt an e-governance and automated school administration programme for schools, build capacities for its implementation and deploy school-based Management Information Systems (MIS). These MIS will be integrated with the proposed state wide web based School Education Management Information System.

A school wide local area network enables automation of a variety of processes.

Beginning with library automation, locally cached offline access to internet resources, office automation, maintenance of records, student tracking, resource planning, using the existing ICT infrastructure will increase efficiencies. At the same time, savings in cost, time and effort will also accrue. The school wide local area network will be used to facilitate this automation.

2.3.10 ICT Infrastructure

There will be two types of Infrastructure:

- Core ICT Infrastructure
- Enabling Infrastructure

Self-Check Exercise-2

Q-1: Discuss types of ICT infrastructure.

Hardware

The States will establish state of the art, appropriate, cost effective and adequate ICT and other enabling infrastructure in all secondary schools.

Based on the size of the school, needs of the ICT programme and time-sharing possibilities, States will define an optimum ICT infrastructure in each school. Not more than two students will work at a computer access point at a given time. At least one printer, scanner, projector, digital camera, audio recorders and such other devices will be part of the infrastructure.

Each school will be equipped with at least one computer laboratory with at least 10 networked computer access points to begin with. Each laboratory will have a maximum of 20 access points, accommodating 40 students at a time. The ratio of total number of access points to the population of the school will be regulated to ensure optimal access to all students and teachers,

In composite schools, exclusive laboratories with appropriate hardware and software will be provided for the secondary as well as higher secondary classes.

In addition, at least one classroom will be equipped with appropriate audio-visual facilities to support an ICT enabled teaching-learning.

Appropriate hardware for Satellite terminals will be provided to selected schools in a progressive manner.

Computer access points with internet connectivity will be provided at the library, teachers' common room and the school head's office to realize the proposed objectives of automated school management and professional development activities.

2.3.11 Network and Connectivity

All computers in the school will be part of a single local area network to enable optimum sharing of resources. In addition to the laboratory, internet connections will also be provided at the library, teachers' common room and the school head's office.

Each school will be serviced with broadband connectivity capable of receiving streaming audio and video, a range of digital learning resources and interactive programmes. The number of computers given internet connectivity will be governed by the available bandwidth, in order to ensure adequate speeds. A mechanism to have offline access to internet content will be set.

Teachers and students will be educated on issues related to the safe use of internet Firewalls and other security measures will be implemented to guard the school network against cyber-attacks and misuse of the ICT facilities. Appropriate guidelines for network security will be developed.

An EDUSAT network will be planned at each state with interactive terminals (SIT) and receive only terminals (ROT)

2.3.12 Software

A software environment favouring a pedagogy of learning which promotes active learning. participatory and collaborative practices and sharing of knowledge is essential to nurture a creative society. Free and Open-Source Software - operating system and software applications will be preferred in order to expand the range of learning, creation and sharing.

A wide variety of software applications and tools, going well beyond an office suite is required to meet the demands of a broad-based ICT literacy and ICT enabled

teaching learning programme. Graphics and animation, desktop publishing, web designing databases, and programming tools have the potential of increasing the range of skills and conceptual knowledge of the students and teachers. A judicious mix of software applications will be introduced in schools.

Creation and widespread dissemination of software compilations, including specialised software for different subjects, simulations, virtual laboratories, modelling and problem-solving applications will be encouraged. These will be distinct from multimedia packages and digital learning resources.

Enabling Infrastructure

The enabling infrastructure required to efficiently maintain the ICT facility will be defined, established and maintained.

Regular and regulated supply of electricity, appropriate electrical fixtures, adequate power backup and support, including alternate sources of energy, where needed, will be ensured. Students and teachers will also be trained in the safe use of electrical outlets and fittings.

Physical facilities like an adequately large room, appropriate lighting and ventilation, durable and economic furniture suitable for optimisation of space and long hours of working will be established. Alternate layouts and arrangements facilitating interactions amongst students and with the teacher will be encouraged.

Adequate safety precautions and rules for use will be established. Each laboratory will be equipped with a portable fire extinguisher and students and teachers trained in its use. A fire drill will also be implemented.

All the equipment and resources will be secured from theft and damage. They will also be covered under an appropriate insurance policy against theft and damage.

2.3.13 Digital Resources

Digital Content and Resources

The state shall endeavor to provide universal, equitable, open and free access to ICT and ICT enabled tools and resources to all students and teachers. All digital learning' resources and software resources will conform to the National Policy on Open Standards of the Government of India (http://egovstandards.gov.in).

Given the diversity of the country's educational, linguistic and social situation, there exists a need for a wide variety of digital content and resources for different subjects, curriculum, ages/grade levels and languages. Unicode fonts will be used to ensure universal access, compatibility and amenability to transliteration and translation.

2.3.14 Development of Content

Use of interactive ICT tools for teaching and learning, e.g., virtual laboratories will be promoted. The development of digital learning resources in the form of e-books, animations, lessons, exercises, interactive games, models and, simulations, videos, presentation slides, plain text materials, graphics, or any combinations of the above, will be encouraged. Use of digital resources should be harmonized with the requirements of the curriculum and supplement it.

The proposed web based digital repositories will host a variety of digital content, appropriate to the needs of different levels of students and teachers.

2.3.15. Sharing and Dissemination of Digital Content

Widespread sharing and dissemination of digital content will promote infusion of ICT into classroom practice. Suitable open standards for interoperability, web-based sharing and appropriate norms for free access will be defined to catalyze use of digital content and resources.

Collections of digital content and resources will be deployed on web based digital repositories, which will be universally accessible. Private Public partnership projects for the same could be encouraged. State level and National level repositories will be developed and maintained. Emphasis will be placed on multi lingual digital learning resources development in State Regional Languages with facilities for translation to other languages so as to optimize time, effort and cost. Content Delivery Networks will be developed to enable transmission of content from multiple locations.

National level organizations like Central Institute of Educational Technology (CIET), National Council of Educational Research and Training (NCERT). Indira Gandhi National Open University (IGNOU) and State level organizations like State Institutes of Educational Technology (SIETs) will play a proactive role in developing and sharing of digital content and its source code to support wide scale adaptations.

They will also support the capacity building activities of teachers in digital content development and usage.

Content developed by state funded projects and programmes will be deployed along with source code under appropriate licensing norms (like the creative commons) to facilitate open and free access to these resources. This will also help avoid duplication of efforts in different States.

Digital content, software applications and resources developed by private individuals, agencies or groups to be used in the school system will be subject to validation for accuracy of content and pedagogical suitability by organizations like NCERT, SCERT, and Boards of Secondary Education. A mechanism for procurement along with source code and rights will be evolved.

Teachers and students will be oriented to prevailing copyright regimes, different types of restrictions on reuse of content and the need to respect copyright.

Teachers and students will also be educated about alternate forms of licenses like the creative commons and encouraged to use them.

Self Check Exercise-3

Q-1: Discuss the advantage of sharing the digital content.

2.3.16 Role of School Library

The library in the school will search, collate and categorise digital resources and make them available to the teachers and students. For instance, the school library will develop lists of web resources or advisories for ICT usage or teaching learning of different subjects. The school library will be automated for facilitating access to a variety of digital resources. An automated library with internet access will catalyze the use of digital resources in all class rooms.

2.3.17 Capacity Building

Capacity building of In-service Teachers Capacity building of teachers will be the key to the widespread infusion of ICT enabled practices in the school system. A phased programme of capacity building will be planned. In service training of teachers will comprise of Induction Training as well as Refresher Courses. The induction trainings will be impacted by the Regional Institutes of Education of the NCERT, State Councils of Educational Research and Training (SCERTS) or such other institutions of the Central and State Governments and will preferably be completed before the commencement of the academic year.

The refresher trainings will be carried out every year to enable teachers to share and keep abreast of the latest trends in ICT based teaching learning processes. The induction training will be followed by teacher's evaluation to ensure that the minimum competency is achieved.

2.3.18 Capacity building through Pre-service Teacher Education

Teacher educators will be suitably oriented and trained to use ICT in their service teacher training programmes. They will also be expected to enable perseveres to be sensitized to and practice the use of ICT.

All pre-service teacher education programmes will have a compulsory ICT component The existing curricula for pre-service teacher's training will be revised for including appropriate and relevant applications of ICT. All teacher trainees passing out of teacher education programmes will obtain adequate levels of competency in ICT and ICT enabled education (see 4.2 above). This proficiency will gradually form a part of the eligibility criteria for teacher appointments.

2.3.19 Capacity building of School Heads

School heads will play an important role in establishment and optimal utilization of ICT and ICT enabled education practices in the school. All school heads will undergo appropriate orientation in ICT and ICT enabled education training programmes. This will also help them in building up digital resources for the school

School heads will also be trained in processes leading to automation of administration management and monitoring of the school system and will play a proactive role in the implementation of School Education Management Information System (SEMIS).

2.3.20 Capacity building of State/District Education Department Personnel

States/Districts Education Department personnel at all levels will be oriented to infuse ICT into their work. They will also be oriented to various aspects related to the ICT implementation at the school level, SEMIS and sustenance of the ICT infrastructure.

School clusters encompassing neighborhood schools will be established for sharing and learning from each other aiming to hasten the process of integration of ICT into all aspects of the school system.

2.3.21 Implementing and Managing the Policy

Programme Monitoring and Evaluation Group (PMEG) Programme Monitoring and Evaluation Group (PMEG) of the Department of School Education & Literacy, Ministry of HRD, Government of India, will be tasked with the overall responsibility of guiding the implementation of the ICT programme in schools across the country. The PMEG may set up task groups and invite institutions or established professionals

with substantial expertise in that sector to develop norms, specifications, guidelines, evaluation reports white papers etc. to guide the States in implementing the ICT programme.

2.3.22 Inter-ministerial Group

An Inter-Ministerial Group consisting of members from the Ministry of HRD, Ministry of Communications and Information Technology, Ministry of Information and Broadcasting, Department of Space, Department of Science & Technology, Ministry of Power, Ministry of New and Renewable Energy, Ministry of Labour and Ministry of Rural Development and such other Ministries dealing with issues related to education, will be set up and tasked with the responsibility of guiding technological choices and specifying cost effective and optimum infrastructure and connectivity.

2.3.23 National and State level Agencies

National and State level agencies, like the National Council of Educational Research and Training, the Central Institute of Educational Technology, the National Institute of Open Schooling, the State Councils of Educational Research and Training, the State Institutes of Educational Technology or any other public educational agency designated by the State will develop curriculum, resources, and undertake capacity building programmes, which will serve as models for adaptation and implementation across the system. These activities will not be outsourced.

2.3.24 Role of the States

The States will have a twofold task:

- Define norms, standards, guidelines and frameworks to implement the policy in an effective manner
- Facilitate and monitor the implementation of the policy in an effective manner These tasks will include:
- A programme of action, an appropriate road map and a feasible time line
- Guidelines based on national standards and norms for Infrastructure, implementation processes at various levels, capacity building programmes, monitoring and evaluation criteria, targets, etc.
- Framework for development, selection, evaluation, deployment in repositories, and use of digital content
- Facilitation of wide spread participation of all stake holders, including community and private partners in various aspects of the ICT programme implementation of the policy in an effective manner
- Development, deployment and maintenance of infrastructure and digital repositories
- Development and phased implementation of an appropriate capacity building framework
- Mobilization of resources Including from private and community sources

- Development of an appropriate legal and regulatory framework
- Monitor and evaluate the implementation

These actions will be in conformity with Guidelines issued by the Central Government.

2.3.25 Programme of Action

The States will draw up a Programme of action to inform and guide various aspects of the ICT programme, viz., development of infrastructure, management of the programme, development of digital resources, capacity building, monitoring and evaluation of the programme.

2.3.26 Advisory Group

The States Department of Education will spearhead an advisory group to guide the implementation of the ICT programme, its monitoring and evaluation. The advisory group, will consist of the concerned Departments, a reputed engineering Institute of the State, University Departments, etc. taking into consideration the variety of technical, educational, financial and administrative tasks involved.

2.3.27 Norms, Standards and Procedures

In order to ensure uniform and high standards of ICT, optimum utilization and cost-effective implementations, States will adapt standards and norms suggested by the inter-ministerial group at the national level for all aspects of the ICT implementation, in particular the technology mix, specifications of equipment, selection of software and connectivity, selection and deployment of digital resources and capacity building programmes.

2.3.28 Models for ICT Infrastructure

Build, Own, Operate and Transfer (BOOT) models for ICT infrastructure may be used to maximize coverage of the programme in schools in the shortest possible time. Different combinations of services like equipment only and equipment + manpower will be tried out and appropriate combination, based on feasibility and cost effectiveness, adopted by the States. Based on prevailing depreciation and obsolescence norms, the State may also choose to use a Build, own and operate (BOO) model to avoid out of date/obsolete equipment in schools.

Self Check Exercise-4

Q-1: Discuss the models of ICT Infrastructure-

2.3.29 Regulatory Measures

Access to the Internet enhances the risk of inappropriate content reaching children and privacy and identity of individuals. Evolving appropriate advisories for regulating access, monitoring internet activity and education Including privacy and security of students and teachers will be taken up at the instance of the Advisory Group. Heads of schools and teachers will be trained in appropriate security and regulatory measures.

2.3.30 Incentives

The States will draw up an appropriate incentive scheme for teachers, students and schools to recognize, showcase and promote initiative and talent. Easy loan schemes for procuring ICT equipment and resources, awards, professional

support packages, and a variety of similar incentives, will be considered. States will also explore the possibility of partnerships and sponsorships with Government and Private agencies like Banks, Corporations and Charitable Institutions.

Self- Check Exercise-5

Q-1 What are the objectives of ICT in the education system?

a) Expanding access to all levels of education
b) Enhancing lifelong learning
c) Improving the quality of education
d) All of the above

Q-2 The purpose of ICT use in education is to:

a) Attract Students
b) Make teaching interesting
c) Optimize learning outcomes
d) Promote technology culture in teaching

Q-3 ICT can address teacher capacity building, ongoing teacher support and strengthen the school system's ability to manage and improve efficiencies. **Yes/No**

Q-4 States/Districts Education Department personnel at all levels will be oriented to infuse…… into their work.

2.4 Summary:

Concerns of reach and access to education continue to attract widespread attention of all segments of society. Following sustained initiatives spread over many decades, the country can today boast of perhaps one of the largest ever schooling systems. Formal, non-formal, informal and invisible learning are living today in an expanded education and in a virtual space through the network.ICT enabled teaching-learning encompasses a variety of techniques, tools, content and resources aimed at improving the quality and efficiency of the teaching learning process. Ranging from projecting media to support a lesson, to multimedia self-learning modules, to simulations to virtual learning environments, there are a variety of options available to the teacher to utilize various ICT tools for effective pedagogy. Job oriented courses in ICT will be developed and established for students of the vocational stream at the higher secondary level by linking them with the need of ICT enabled industries/establishment in the neighborhood. The scope of these courses would be a broad-based ICT literacy. It will not be limited to ICT based occupations, but will inform and enhance productivities in a wide range of other occupations (for example, accounting, office automation, office communication, data handling and data processing, desktop publishing, graphics and designing, music and video, etc.). This will also include courses on cyber security.

2.5: Glossary:

Encompasses: Completely encloses or surrounds something else

Dissemination: To spread abroad as though sowing seed

Cyber security: The practice of protecting systems, networks, and programs from digital attacks

2.6- Answers to Self -Check Exercise:

Self -Check Exercise-1

Q-1: ICT can be beneficially leveraged to disseminate information about and catalyze adaptation, adoption, translation and distribution of sparse educational resources distributed across various media and forms. This will help promote its widespread availability and extensive use.

Self -Check Exercise-2

Q-1: There will be two types of Infrastructure:

Core ICT Infrastructure

Enabling Infrastructure

Self -Check Exercise-3

Q-1: Widespread sharing and dissemination of digital content will promote infusion of ICT into classroom practice. Suitable open standards for interoperability, web-based sharing and appropriate norms for free access will be defined to catalyze use of digital content and resources.

Self -Check Exercise-4

Q-1: Build, Own, Operate and Transfer (BOOT) models for ICT infrastructure may be used to maximize coverage of the programme in schools in the shortest possible time. Different combinations of services like equipment only and equipment + manpower will be tried out and appropriate combination, based on feasibility and cost effectiveness, adopted by the States. Based on prevailing depreciation and obsolescence norms, the State may also choose to use a Build, own and operate (BOO) model to avoid out of date/obsolete equipment in schools.

Self -Check Exercise-5

Q-1 All of the above

Q-2 Optimize learning outcomes

Q-3 Yes

Q-4 ICT

2.7 References and Suggested Readings:

(1) Ilona Bánfi, Marta Körös-Mikis: National Policies and Practices on ICT in Education in Hungary ed. T. Plomp, R. Anderson, N. Law and A. Quale.

(2) Andrea Karpati: Oktatasi szoftverek minosegi vizsgalata [A Quality Survey of Educational Software] In: Uj Pedagogiai Szemle, 2000. Vol. 3. pp. 77-81

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2.8 Terminal Questions:

1. What are the characteristics of ICT in education?
2. Discuss National Policy on ICT in school education.
3. Discuss the role of states in the implementation of ICT policy in school education.
4. Write a note on Capacity building through Pre-service Teacher Education.

Unit-3

CHALLENGES IN INTEGRATING ICTS IN EDUCATION

Structure:

3.1 Introduction:

A country's educational technology infrastructure sits on top of the national telecommunications and information infrastructure. The pace of the society in which we live requires more flexible ways of learning and adapted to changes. At Primary and Secondary Education, students start to use them in class, but the reality is that now a days almost every student goes to school with a wide range of technological skills. Schooling and teaching are changing with this new context. For example, students and teachers should have technological skills because they use them in their classroom and in their curricula. ICT have some characteristics that make them an essential tool in our daily life and for instance in our schools. Policymakers should also look at the ubiquity of different types of ICT in the country in general, and in the educational system (at all levels) in particular. For instance, a basic requirement for computer-based or online learning is access to computers in schools, communities, and households, as well as affordable Internet service. Teacher anxiety over being replaced by technology or losing their authority in the classroom as the learning process becomes more learner-centered-an acknowledged barrier to ICT adoption-can be alleviated only if teachers have a keen understanding and appreciation of their changing role.

3.2 Learning Objectives:

After reading this chapter the students will be able to know about:

Infrastructure-related challenges in ICT-enhanced education

Challenges with respect to capacity-building

3.3 Challenges in Integrating ICTs in Education:

Although valuable lessons may be learned from best practices around the world, there is no one formula for determining the optimal level of ICT integration in the educational system. Significant challenges that policymakers and planners, educators, education administrators, and other stakeholders need to consider include educational policy and planning, infrastructure, language and content, capacity building, and financing.

3.3.1 Infrastructure-related challenges in ICT-enhanced education:

A country's educational technology infrastructure sits on top of the national telecommunications and information infrastructure. Before any ICT-based programme is launched, and planners must carefully consider the following:

- In the first place, are appropriate rooms or buildings available to house the technology? In countries where there are many old school buildings, extensive retrofitting to ensure proper electrical wiring, heating/cooling and ventilation, and safety and security would be needed.
- Another basic requirement is the availability of electricity and telephony. In countries large areas are still without a reliable supply of electricity and the nearest telephones are miles away. Experience in some countries in Africa point to wireless technologies (such as VSAT or Very Small Aperture Terminal) as possible levers for leapfrogging. Although this is currently an extremely costly approach, other developing countries with very poor telecommunications Infrastructure should study this option.
- Policymakers should also look at the ubiquity of different types of ICT in the country in general, and in the educational system (at all levels) in particular. For instance, a basic requirement for computer-based or online learning is access to computers in schools, communities, and households, as well as affordable Internet service.

In general, ICT use in education should follow use in society, not lead it. Education programs that use cutting-edge technologies rarely achieve long term success:

> It is cheaper, and easier, to introduce a form of technology into education, and keep it working, where education is riding on the back of large-scale developments by governments or the private sector. Television works for education when it follows rather than precedes television for entertainment; computers in schools can be maintained once commercial and private use has expanded to the point where there is an established service industry.

Self Check Exercise-1

Q-1: What is the basic requirement for infrastructure in ICT education?

3.3.2 Challenges with respect to capacity-building:

Various competencies must be developed throughout the educational system for ICT integration to be successful.

Teachers:

Teacher professional development should have five foci: 1) skills with particular applications; 2) integration into existing curricula; 3) curricular changes related to the use of IT (including changes in instructional design); 4) changes in teacher role 5) underpinning educational theories. Ideally, these should be addressed in pre-service teacher training and built on and enhanced in-service. In some countries, like Singapore, Malaysia, and the United Kingdom, teaching accreditation requirements include training in ICT use. ICTs are swiftly evolving technologies, however, and so even the most ICT fluent teachers need to continuously upgrade their skills and keep abreast of the latest developments and best practices.

While the first focus-skills with particular applications-is self-evident, the four other foci are of equal, if not ultimately greater, importance. Research on the use of ICTs in different educational settings over the years invariably identify as a barrier to success the inability of teachers to understand why they should use ICTs and how exactly they can use ICTs to help them teach better. Unfortunately, most teacher professional development in ICTs is heavy on "teaching the tools and light on "using the tools to teach."

Teacher anxiety over being replaced by technology or losing their authority in the classroom as the learning process becomes more learner-centered-an acknowledged barrier to ICT adoption-can be alleviated only if teachers have a keen understanding and appreciation of their changing role.

Self Check Exercise-2

Q-1: What is necessary for teacher's professional development?

Education administrators:

Leadership plays a key role in ICT integration in education. Many teacher- or student- initiated ICT projects have been undermined by lack of support from above. For ICT integration programs to be effective and sustainable, administrators themselves must be competent in the use of the technology, and they must have a broad understanding of the technical, curricular, administrative, financial, and social dimensions of ICT use in education.

Technical support specialists:

Whether provided by in-school staff or external service providers, or both, technical support specialists are essential to the continued viability of ICT use in a given school. While the technical support requirements of an institution depend ultimately on what and how technology is deployed and used, general competencies that are required would be in the installation, operation, and maintenance of technical equipment (including software) network administration, and network security. Without on-site technical support, much time and money may be lost due to technical breakdowns.

In the Philippines, for example, one of the major obstacles to optimizing computer use in high schools has been the lack of timely technical support. In some extreme cases involving schools in remote areas, disabled computers take months to be repaired since no technician is available in the immediate vicinity and so the computers have to be sent to the nearest city hundreds of kilometers away.

Content developers:

Content development is a critical area that is too often overlooked. The bulk of existing ICT-based educational material is likely to be in English (see section on language and content below) or of little relevance to education in developing countries (especially at the primary and secondary levels). There is a need to develop original educational content (eg, radio programs, interactive multimedia learning materials on CD-ROM or DVD, Web- to digital media. These are tasks for which content development specialists such as instructional designers, scriptwriters, audio and video production specialists, programmers, multimedia course authors, and web-developers are needed. Like technical support specialists, content developers are highly skilled professionals and are not, with the exception of instructional designers, historically employed by primary and secondary schools. Many universities with distance education programs, and those who otherwise make use of ICTs, have dedicated technical support and content development units.

What challenges need to be addressed in the areas of language and content?

English is the dominant language of the Internet. An estimated 80% of online content is in English. A large proportion of the educational software produced in the world market is in English. For developing countries in the Asia-Pacific where English language proficiency is not high, especially outside metropolitan areas, this represents a serious barrier to maximizing the educational benefits of the World Wide Web.

Even in countries where English is a second language (such as Singapore, Malaysia, the Philippines, and India) it is imperative that teaching and learning materials that match national curriculum requirements and have locally meaningful content, preferably in the local languages, be developed. (See Box 6.) This would ensure that the Web is a genuinely multicultural space and that peoples of different cultures have an equal stake and voice in the global communities of learning and practice online. Particularly vulnerable to exclusion of this sort are isolated, rural populations, cultural minorities, and women in general. Thus attention must be paid to their special needs.

In Web-based learning, technical standardization of content has also become a pressing issue. Standardization allows different applications to share content and learning systems. Specifications in content, structure, and test formats are proposed so that interoperability may exist between different management systems, resulting in some cost-efficiencies. Standards must be general enough to support all kinds of learning systems and content. Worth mentioning are initiatives conducted by the Instructional Management System (IMS), the Advanced Distributed Learning /Shareable Courseware Object Reference Model (ADL/SCORM) initiative, the Aviation Industry Computer Based Training Committee (AICC), and the European ARIADNE project, since some of the standards they have proposed are already being widely applied.

The ease by which Web-based educational content can be stored, transmitted, duplicated, and modified has also raised concerns about the protection of intellectual property rights. For instance, is intellectual, property rights violated when lectures broadcast over the television or on the Web incorporate pre-existing materials, or when students record educational broadcast on tape for later viewing?

While schools and universities may already have agreements that expressly authorize the use of certain materials for classroom purposes, these agreements

may not be broad enough to accommodate telecommunications transmission, videotape recording, or the distribution of course-related materials beyond the classroom setting.

One of the greatest challenges in ICT use in education is balancing educational goals with economic realities. ICTS in education programs require large capital investments and developing countries need to be prudent in making decisions about what models of ICT use will be introduced and to be conscious of maintaining economies of scale. Ultimately it is an issue of whether the value added of ICT use offsets the cost, relative to the cost of alternatives. Put another way, is ICT-based learning the most effective strategy for achieving the desired educational goals, and if so what is the modality and scale of implementation that can be supported given existing financial, human and other resources?

Self Check Exercise-3

Q-1: What challenges need to be addressed in the areas of language and content?

Q-2 Which of the following is not correct about ICT?

a) ICT is a modern teaching aid

b) Using of ICT in teaching reduces the physical labour a teacher

c) ICT is a substitute for a teacher

d) ICT in teaching facilitate learning

Q-3 Education programs that use cutting-edge technologies rarely achieve long term success. **Yes/No**

Q-4 Various competencies must be developed throughout the educational system for ……. integration to be successful.

3.4 Summary:

In Web-based learning, technical standardization of content has also become a pressing issue. Standardization allows different applications to share content and learning systems. An IT development strategy has been developed to achieve these goals. ICT can play a significant role in equalizing opportunities for marginalized groups and communities. But the paradox is that for those groups that are unable to cross the technology divide, ICT is yet another means to further marginalize them. Education has a major role to play in resolving this problem. Even in countries where English is a second language (such as Singapore, Malaysia, the Philippines, and India) it is imperative that teaching and learning materials that match national curriculum requirements and have locally meaningful content, preferably in the local languages, be developed. Thus, unless ICT becomes part of both the delivery and content of education, the disadvantage will deepen and development will suffer. Ultimately it is an issue of whether the value added of ICT use offsets the cost, relative to the cost of alternatives. In some countries, like Singapore, Malaysia, and the United Kingdom, teaching accreditation requirements include training in ICT use. ICTs are swiftly evolving technologies, however, and so even the most ICT fluent teachers need to continuously upgrade their skills and keep abreast of the latest developments and best practices.

3.5 Glossary:

Marginalized: To treat a person, group, etc. in a way that makes them feel that they are not important and have no power

Accreditation: Official approval given by an organization when somebody achieves a certain standard

Standardization: The process of developing, promoting and possibly mandating standards-based and compatible technologies and processes within an industry

3.6 Answers to Self-Check Exercise:

Self-Check Exercise-1

Q-1: The basic requirement is the availability of electricity and telephony. In countries large areas are still without a reliable supply of electricity and the nearest telephones are miles away. Experience in some countries in Africa point to wireless technologies (such as VSAT or Very Small Aperture Terminal) as possible levers for leapfrogging. Although this is currently an extremely costly approach, other developing countries with very poor telecommunications Infrastructure should study this option.

Self-Check Exercise-2

Q-1: Teacher professional development should have five foci: 1) skills with particular applications; 2) integration into existing curricula; 3) curricular changes related to the use of IT (including changes in instructional design); 4) changes in teacher role 5) underpinning educational theories. Ideally, these should be addressed in pre-service teacher training and built on and enhanced in-service.

Self-Check Exercise-3

Q-1: English is the dominant language of the Internet. An estimated 80% of online content is in English. A large proportion of the educational software produced in the world market is in English. For developing countries in the Asia-Pacific where English language proficiency is not high, especially outside metropolitan areas, this represents a serious barrier to maximizing the educational benefits of the World Wide Web.

Q-2 ICT is a substitute for a teacher

Q-3 Yes

Q-4 ICT

3.7 References and Suggested Readings:

(1) Ilona Bánfi, Marta Körös-Mikis: National Policies and Practices on ICT in Education in Hungary ed. T. Plomp, R. Anderson, N. Law and A. Quale.

(2) Andrea Karpati: Oktatasi szoftverek minosegi vizsgalata [A Quality Survey of Educational Software] In: Uj Pedagogiai Szemle, 2000. Vol. 3. pp. 77-81

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3.8 Terminal Questions:

1. Discuss the characteristics of National Policy on ICT in school education.

2. What are the challenges in integrating ICT in school education?

3. Discuss the role of states to improve the infrastructural facilities in schools for the successful implementation of ICT in school education.

Unit-4
COMMUNICATION
MEANING, TYPES OF COMMUNICATION

STRUCTURE:

4.1 Introduction:

It's nearly impossible to go through a day without the use of communication. Communication is sending and receiving information between two or more people. The person sending the message is referred to as the sender, while the person receiving the information is called the receiver. The information conveyed can include facts, ideas, concepts, opinions, beliefs, attitudes, instructions and even emotions. We can't preserve and spread knowledge without a way to communicate it.

In the business context, managers can't manage employees without the ability to communicate. Businesses can't market if they can't communicate effectively to their target customers. And buyers can't buy without the ability to communicate with sellers. We use non-linguistic symbols such as traffic lights, road signs, railway signals to convey information relating to the movements of vehicles and trains. We also use telegraphic code for quick transmission of messages and secret codes for communication defense and other highly confidential information. To face communication noise, redundancy and acknowledgement must often be used. Acknowledgements are messages from the addressee informing the originator that his/her communication has been received and is understood. Message repetition and feedback about message received are necessary in the presence of noise to reduce the probability of misunderstanding.

4.2 Learning Objectives:

Following this lesson, you'll be able to:

- Define communication
- Identify examples of the types of information that is conveyed in communication
- Describe different types of communication
- Explain the importance of communication

4.3 Meaning of Communication:

People exchange their feelings, experiences and thoughts through verbal and non-verbal communication. All interpersonal relationships depend upon the effectiveness of such communication. Communication is all the more important in teaching-learning process. When teacher teaches, he communicates with students. He plans, "What to communicate and "how to communicate." Good teacher having mastery over the subject-matter but poor at communication skill cannot be called a good teacher. It is his excellence of the skill that he is able to change the attitude of the students. Good class-room climate or motivation of the students is possible through the effective communication of the teacher. Hence the teacher should practice for good communication. Some background in communication like concept of communication, process of the communication, principle of communication, barriers in communication and methods to overcome the barriers will facilitate the teacher to practice for the effective communication. In a slightly more complex form a sender and a receiver are linked reciprocally. This second attitude of communication, referred to as the constitutive model or constructionist view, focuses on how an individual communicates as the determining factor of the way the message will be interpreted. Communication is viewed as a conduit; a passage in which information travels from one individual to another and this information becomes separate from the communication itself. A particular instance of communication is called a speech act. The sender's personal filters and the receiver's personal filters may vary depending upon different regional traditions, cultures, or gender; which may alter the intended meaning of message contents. In the presence of "communication noise" on the transmission channel (air, in this case), reception and decoding of content may be faulty, and thus the speech act may not achieve the desired effect. One problem with this encode-transmit-receive-decode model is that the processes of encoding and decoding imply that the sender and receiver each possess something that functions as a codebook, and that these two code books are, at the very least, similar if not identical.

Self-Check Exercise1

Q-1: What do you mean by communication?

Q-2: Discuss the views of miller regarding communication**.**

4.4 Types of Communication

Methods of communication vary, and you are almost certainly familiar with all of them. Let's take a look at some of the primary methods.

- Verbal communication is simply sending a message through a spoken language that is understood by both the sender and receiver of the message. Examples of verbal communications include face-to-face talking, listening to a lecture or seminar, and listening to a television

program. In fact, if you are listening to this lesson, you are engaged in a verbal form of communication.

- Written communication is sending a message by the use of symbols that are understood by both the sender and receiver of the message. If you are reading the transcript of this lesson, you are engaged in written communication.
- Body language is a form of nonverbal communication that can be used to send a message. You can often tell if your boss is pleased or upset simply by looking at his facial expressions, posture and gestures. For example, a flushed face may mean embarrassment; a clinched fist may indicate anger, and the rolling of one's eyes may signal disbelief or annoyance.

Self-Check Exercise-2

Q-1 The Connotational aspect of a message in communication is-

a) Literal
b) Expressive
c) Unambiguous
d) Numerical

Q-2 Another term used for interpersonal Communication is-

a) Group Communication
b) Face-to-face communication
c) Dyadic Communication
d) Traditional Communication

4.5 Summary:

Let's review what we've learned. Communication is the act of one or more person’s conveying information to someone else. The content of the communication can be facts ideas, concepts, opinions, attitudes and emotions. Types of communication methods include verbal communication, written communication and body language Communication is very important because it's the only way we can effectively work together on anything Communication to a great extent is influenced by culture and variables. Understanding cultural aspects of communication refers to having knowledge of different cultures in order to effectively with cross culture people. The communication process is made up of four key components. Those components include encoding, medium of transmission, decoding, and feedback. There are also two other factors in the process, and those two factors are present in the form of the sender and the receiver.

4.6 Answers to Self -Check Exercise:

Self -Check Exercise-1

Ans-1: The word communication is derived from the Latin word Communis' which means to share', 'give and take', 'togetherness', or 'common". In a sense, communication is having common experience with the other people.

Ans-2: According to Miller: "communication has at its central interest those behavioral situations in which a source transmits a message to: (a) receiver (b) with conscious intent to affect behavior better."

Self -Check Exercise-2

Ans-1 Expressive

Ans-2 Dyadic Communication

4.7 Glossary:

Globalization: It is a term used to describe how trade and technology have made the world in to a more concerned and interdependent place

Transforming: To change somebody /something completely, especially in a way which improves him/her/it

Communis: means to share'

4.8 References and Suggested Readings:

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6. Bateson, Gregory (1960) Steps to an Ecology of Mind
7. "Communication". The office of superintendent of Public Instruction Washington

4.9 Terminal Questions:

1. What do you mean by communication? What are the types and importance of communication?

2. Discuss the types of communication with examples.

Unit-5

CONCEPT AND PROCESS OF EFFECTIVE COMMUNICATION

STRUCTURE:

5.1 Introduction: The importance of communication cannot be overstated. Our ability to communicate with one another effectively is one of the primary reasons civilizations can exist. We can't effectively work together towards a common task or goal if we can't communicate. The communication process is made up of four key components. Those components include encoding, medium of transmission, decoding, and feedback. There are also two other factors in the process, and those two factors are present in the form of the sender and the receiver. The communication process begins with the sender and ends with the receiver.

The sender is an individual, group, or organization who initiates the communication. This source is initially responsible for the success of the message. The sender's experiences, attitudes, knowledge, skill, perceptions, and culture influence the message. "The written words, spoken words, and nonverbal language selected are paramount in ensuring the receiver interprets the message as intended by the sender" (Burnett & Dollar, 1989). All communication begins with the sender.

The first step the sender is faced with involves the encoding process. In order to convey meaning, the sender must begin encoding, which means translating information into a message in the form of symbols that represent ideas or concepts. This process translates the ideas or concepts into the coded message that will be communicated. The symbols can take on numerous forms such as, languages, words, or gestures. These symbols are used to encode ideas into messages that others can understand.

5.2 Learning Objectives: Following this lesson, you'll be able to:

- Define communication
- Identify examples of the types of information that is conveyed in communication
- Concept of Communication
- Process of Effective Communication
- Explain the importance of communication

5.3 Concept of Communication-

Literal or Derivate Meaning- The word communication is derived from the Latin word Communis' which means to share', 'give and take', 'togetherness', or 'common". In a sense, communication is having common experience with the other people.

Edgar Dele's view (1969)- Edgar Dale, the Newton of audio-visual aid and instrumental technology writes, "Communication is the sharing of ideas and feelings a mood of mutuality." Any media through which the communication is achieved can be termed as communication media.

Brooker's view- "communication is anything that conveys meaning that carries a message from one person to another."

Hortman's view- "communication is the control of behavior through descriptive and reinforcing stimuli."

Miller's view- "communication has at its central interest those behavioral situations in which a source transmits a message to: (a) receiver (b) with conscious intent to affect behavior better."

It can be concluded that communication is basically the process of sharing thoughts ideas, feelings, experiences, information, sentiments etc, with others through some mutually agreeable or known media. Communication is a two-way process involving feedback and interaction between the two or more persons which encourages give and take. It is difficult to provide children with actual first hand experiences. Some substitute experience must be evolved and used to enable the children to understand and conceptualize their world. This is the essence of communication as an integral part of teaching.

Self-Check Exercise-1

Q-1: Discuss the Brooker's view for communication.

Q-2 What do you mean by communication media?

5.4 Process of Effective Communication:

Communication is a two-way process involving interaction between the two or more persons. It is a purposeful process, interactive process, intentional or unintentional process, continuous process, contextual process relational process and digital and analogical process based upon symmetry and punctuation of dialogue.

The basic communication model involves an information or interpretative process in which message, information or reaction to information travels from initiator to the receiver through communication channel. The following steps are involved in the process of communication.

Sender or source: The communication process begins with the source of sender who has an important message to communicate. The source is the communication of message and may be one individual or several individuals working together. Sender or source technically known as encoder is a person or a thing or event which provides verbal or non-verbal cues to which some one responds. In the process of communication sender must have correct information and transmit accurately at optimum speed. The person who communicates well has the following characteristics:

i A person of confidence

ii A person of proper knowledge of subject-matter

iii A person with new information

iv A person with clear concepts in his mind

v A person who knows the strategies of communication

vi A person who correlates with life

vii A person who motivates well

viii A person who uses the language well known to the learner

ix A person who has a loud voice

x A person who has a socially acceptable pronunciation

xi A person who speaks by keeping the social background of the learners in view.

xii A person who gives well selected and graded material

xiii A person who understand the learner and his aim

xiv A person who can use stimulus variation easily

xv A person who uses meaningful non-verbal behavior, gesture.

Message or signal: Whatever the sender wants to communicate is called the message. The message is the stimulus which the sender transmits to the receiver. The message or signal may be designed for a single person or group or people. There are verbal or non-verbal cues to which someone can respond. Cues include words, figures, gestures etc. massage can be spoken or written words, gestures, movements etc. they cannot have meaning apart from the persons involved in sending and receiving process. Our messages must be stronger than the noise background. The noise may be due to the fact that some people are talking where we are to give the message. We should be able to overcome the noise by conveying the message loudly. Sometimes the emotional factors threaten and the message may be wrongly conveyed. This should also be checked by monitoring it well.

Encoding: -Encoding is the process of transforming the intended message into symbols. Encoding can be fairly simple, such as in a canteen ordering a

plate of sandwich and a milk shake. On the other occasions encoding can be extremely difficult such as finding the right words to explain why a student's performance is inadequate.

Medium or channel: - The medium or channel is the means by which a message travels from a source to a receiver. It is the means used to convey the message. The channels are senses or perception including visual (sight), auditory (hearing) tactile (touch), gustatory (taste) and olfactory (smell). The primary channel for interpersonal involves face-to-face exchange between the two individuals. Some of the major mass media channels used in education include:

i. Radio

ii. Television

iii. Films

iv. Newspapers

v. Magazines

vi. Books

vii. CCTV (closed circuit television)

viii. Video cassettes

ix. SITE (satellite instruction television)

x. INSAT (Indian National Satellite) program

xi. Tape slide presentation

xii. Multimedia package

Receiver or decoder: The receiver of decoder is the person who receives the message and has the responsibility of decoding it. He interprets the message. In fact, he is to receive the encoded intended message of the source of communication, understand or interpret the message and to react or to produce a desired response. In this way, receiver like a far end pole is equally important for the flow of the current of communication between him and the communicator or the sender of the message. The communication can remain operative only if he is interested and possesses required competency to decode, understand and effectively respond to the communicated message. The person who can receive well in the process of communication has the following characteristics:

i. Desire or willing to receive information

ii. Concentration and alertness while receiving information

iii. Zeal, enthusiasm, curiosity and need for maintaining the chain of communication

iv. Makes efforts to receive

v. Capability of grasping

vi. Good language

vii. Respect for the person who gives the information in the classroom

viii. Capacity of receiving and retaining information

ix. Ability to summarize whatever is said

x. Ability to reason out and differentiate between right and wrong

xi. Ability to reflect speaker's feelings

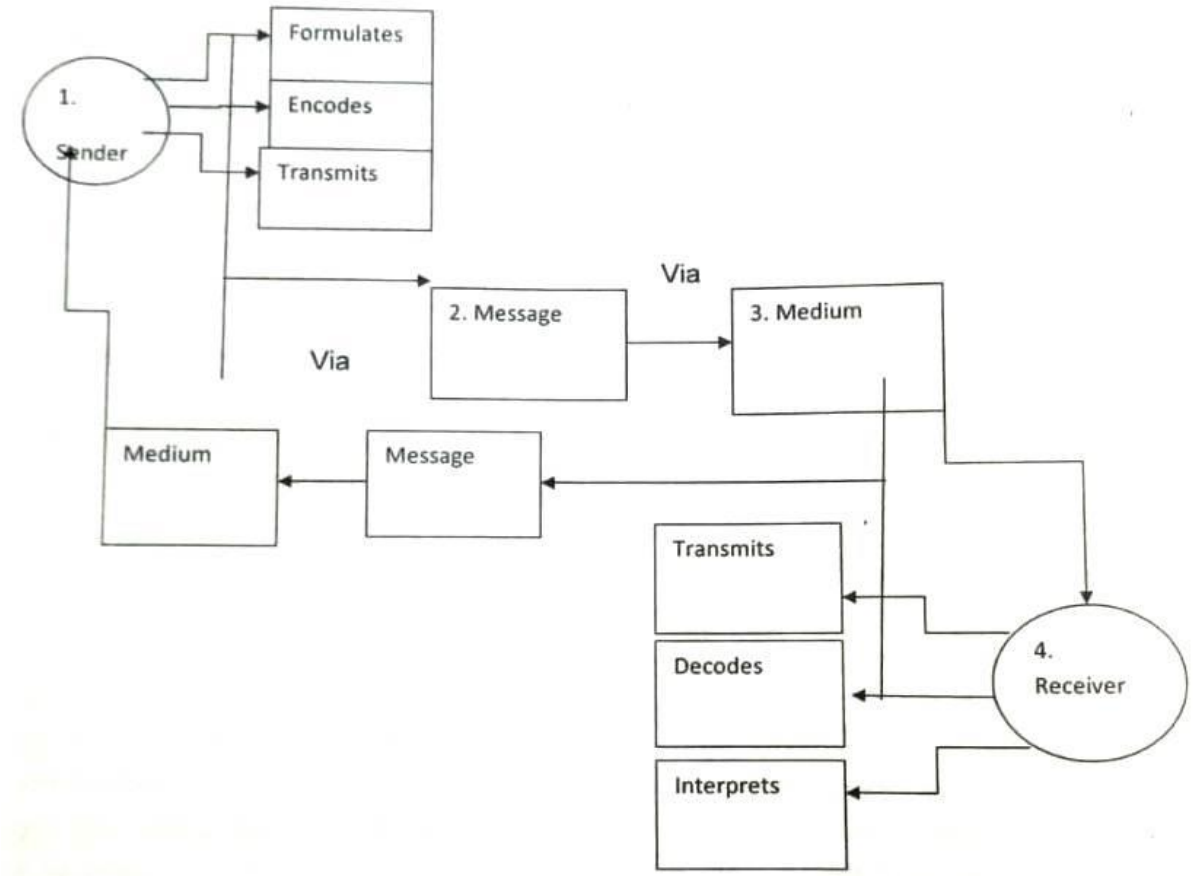
xii. Ability to ask questions

xiii. Ability to give immediate feedback and ability to receive feedback in different situations of communication process.

Decoding: Decoding is the process by which the symbols are interpreted by the receiver. Although some complex messages require an actual translation, in most cases decoding is simply the interpretation of the message by the receiver.

Feedback or response material: - Feedback from the receiver to the sender is actually another message in the indication the effectiveness of the communication. Feedback is the response a receiver gives to the sender as a result of sender's signals, in the encoded form transmitted back by the receiver, to the communicated message after its proper decoding, interpretation and understanding in order to maintain the flow of communication between him and the sender. The effectiveness in the flow of the communication is dependent much upon the quality and the effectiveness of the contents of the response. The quality of communication as a two-way process may be properly maintained through proper feedback from the receiver and its subsequent follow up on the part of the sender.

Facilitators and barriers: - Facilitators and barriers of communication influence the quality and the effectiveness of the process of communication. Variables which help the path of communication are known as facilitators and variables which obstruct the path of communication are framed as barriers of the communication. Whereas the presence of congenial, physical, psychological and environmental conditions and facilities available for the effective communication facilitates and help in providing desirable effectiveness to the communication system.



Steps in the process of Communication

Self-Check Exercise-2

Q-1: What do you mean by Encoding?

Q-2 The communication process begins with the source of sender who has an important message to communicate. **True/False**

Q-3 Encoding is the process of ……the intended message into symbols.

5.5 Summary: Cultural aspects of communication are of great relevance in today's world which is now a global village, thanks to globalization. Cultural aspects of communication are the cultural differences which influences communication across borders. Words sounding the same but having different meaning can convey a different meaning altogether. Hence the communicator must ensure that the receiver receives the same meaning. It is better if such words are avoided by using alternatives whenever possible. The communication process is the perfect guide toward achieving effective communication. When followed properly, the process can usually assure that the sender's message will be understood by the receiver. Although the communication process seems simple, it in essence is not. Certain barriers present themselves throughout the process. Those barriers are factors that have a negative impact on the communication process. Some common barriers

include the use of an inappropriate medium (channel), incorrect grammar, inflammatory words, words that conflict with body language, and technical jargon. Noise is also another common barrier. Noise can occur during any stage of the process. Noise essentially is anything that distorts a message by interfering with the communication process. Noise can take many forms, including a radio playing in the background, another person trying to enter your conversation, and any other distractions that prevent the receiver from paying attention.

5.6 Glossary:

Transforming: To change somebody /something completely, especially in a way which improves him/her/it

Subsequent: Coming later or after

Decoding: Decoding is the process by which the symbols are interpreted by the receiver.

5.7 Answers to Self -Check Exercise:

Self -Check Exercise-1

Ans-1 "communication is anything that conveys meaning that carries a message from one person to another."

Ans-2 Any media through which the communication is achieved can be termed as communication media.

Self -Check Exercise-2

Ans-1 Encoding is the process of transforming the intended message into symbols. Encoding can be fairly simple, such as in a canteen ordering a plate of sandwich and a milk shake.

Ans-2 True

Ans-3 Transforming

5.8 References and Suggested Readings:

1. Harper, Douglas. "Communication", Online Etymology Dictionary Retrieved 2013-06-23.
2. "Types of Body Language". Www.simplybodylanguage.com. Retrieved 2016-02-08.
3. A Mehrabian, A. (1972) Nonverbal communication. Transaction Publishers.
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5. Xin Li. "Complexity Theory-the Holy Grail of 21st Century Lane Dept of CSEE, West Virginia University.
6. Bateson, Gregory (1960) Steps to an Ecology of Mind

5.9 Terminal Questions:

1. Discuss the concept of communication with its definitions. Also discuss the process of effective communication.
2. Discuss the steps of communication with suitable diagram.

Unit-6
COMMUNICATION
PRINCIPLES OF COMMUNICATION

STRUCTURE:

6.1 Introduction:

The information conveyed can include facts, ideas, concepts, opinions, beliefs, attitudes, instructions and even emotions. The importance of communication cannot be overstated. It's nearly impossible to go through a day without the use of communication. Communication is sending and receiving information between two or more people. The person sending the message is referred to as the sender, while the person receiving the information is called the receiver. Our ability to communicate with one another effectively is one of the primary reasons civilizations can exist. We can't effectively work together towards a common task or goal if we can't communicate. We can't preserve and spread knowledge without a way to communicate it. The techniques of dividing the subject-matter into units and sub-units facilitate the teaching-learning process. Without proper division teaching (communication) may remain indifferent, incoherent, confused and pose problem for the learner so far comprehensiveness is concerned.

. We use non-linguistic symbols such as traffic lights, road signs, railway signals to convey information relating to the movements of vehicles and trains. We also use telegraphic code for quick transmission of messages and secret codes for communication defense and other highly confidential information. To face communication noise, redundancy and acknowledgement must often be used. Acknowledgements are messages from the addressee informing the originator that his/her communication has been received and is understood. It is said that half the battle is won if the students are truly motivated. Motivation is the petrol that drives the mental engine. The teacher as well as the students should be ready and remain motivated throughout the process of communication

6.2 Learning Objectives:

Following this lesson, you'll be able to:

Define communication

Explain the principles of communication

6.3 Principles of Effective Communication:

1. **Principle of competency:** The teacher (sender) and students (receiver) should be competent and efficient in terms of communicating and receiving the desired Information (message). He should have clarity of concepts, unity of thoughts and mastery over the language. Required communication skills are needed for effective communication. The teacher must be imbibed with sufficient knowledge coupled with skills and application components for effective communication.
2. **Principle of suitability of content:** Contents of communication should be carefully selected. Selection of the teaching material should be based upon 1. The instructional objectives 2 The teacher's ability to impart knowledge and 3 The learner's capacity to digest the subject-matter.
3. **Principle of division of content:** After selecting the subject-matter of the teaching. it becomes useful to present the subject-matter into convenient and meaningful units in order to make it better understandable. The techniques of dividing the subject-matter into units and sub-units facilitate the teaching-learning process. Without proper division teaching (communication) may remain indifferent, incoherent, confused and pose problem for the learner so far comprehensiveness is concerned. Hence subject-matter arranged and selected should be carefully graded or selected according to the pupil's level of achievement.
4. **Principle of focus:** The communicator (teacher) can communicate (teach) well, if he keeps in mind the main focus of his communication. It keeps the teacher and his teaching in the main track.
5. **Principle of effective strategies:** Successful teaching demands effective strategies, media and channel (both verbal and non-verbal). Therefore, maximum care should be taken to choose an appropriate strategy, device and instructional material for teaching (communicating) a particular topic/subject. They all vary with the variance in goals and purposes, pupils and teaching-learning (communication) environment. As far as possible, the use of multimedia should be preferred to the single or restricted use of the media or channel of communication for better results of communication.
6. **Principle of feedback and reinforcement:** Principle of feedback and reinforcement results in effective learning (communication). A pupil repeats responses that are reinforced and discontinue responses that are not reinforced. Positive reinforcement and feedbacks may work wonder in the field of teaching- learning. If a teacher gets desired feedback from his students in terms of the quality of the effectiveness

of his teaching, it will definitely boost up his morale and give desired direction to his further efforts in the two-way communication process.

7. **Principle of readiness and motivation:** It is said that half the battle is won if the students are truly motivated. Motivation is the petrol that drives the mental engine. The teacher as well as the students should be ready and remain motivated throughout the process of communication. Lack of interest, zeal and enthusiasm may affect adversely the process and the product of education. Teacher should pre- plan his lesson and then go to the class i.e., he should be ready before going to the class. Readiness includes presentation and the capability of motivating the students. This solves the problem of teaching like confusion, mental tension and he can proceed with his lesson easily and comfortably. The receivers of the information (students) in the process of communication can pick up quickly and accurately if they are properly motivated. Hence the teacher should properly motivate the students by creating interesting learning situations.

8. **Principle of sharing and interaction:** Effective communication depends upon the sharing of thoughts, ideas, feelings and experiences and mutual interaction between the source of communication (teacher) and the receiver (students). The greater the interaction, the more will be the involvement and participation of the students in the teaching-learning communication process. It will definitely improve the process of communication.

9. **Principle of pupil-centeredness:** Pupil-centeredness is the base for the effective communication. Communication should be pupil-centered, in accordance with needs, interest, abilities, mental levels and aspirations of receivers. If the teacher considers himself superior and keeps himself at a higher pedestal of life, he will not be able to communicate effectively.

10. **Principle of sympathy and kindness:** Sympathy and kind attitude of the teacher is very essential for effective class-room communication. Effective class-room communication cannot take place in a situation that lacks sympathy and kindness to the students. The teacher should be sympathetic and kind to the students in order to communicate them properly.

11. **Principle of co-operation:** Effective communication is a co-operative affair between the teacher and the students. If there is no co-operation, there may not be good communication. Hence the teacher should plan his teaching to give the pupils abundant opportunity for the co-operation in organization, management, participation in discussion and other class-room activities.

12. **Principle of mutual understanding:** The better is the understanding between the teacher and the pupils, the more effective may be the communication. Communication will be more fruitful if he understands the social background and other individual differences among the students. On the other hand, if the students have rapport with the

teacher, they will be able to receive well the matter communicated to them by the teacher.

13. **Principle of conductive environment and proper control:** Conductive environment and proper control facilitate effective communication process. Teaching-learning communication can proceed effectively in an ideal social and physical environment. Room temperature, lights, ventilation, cleanliness, seating arrangements is the factors that influence the physical environment. Teacher-principal, teacher-teacher, principal-teacher, and pupil-teacher relationship, group dynamics, class-room interaction, discipline and tone of the school are the factors that influence the social environment of the class-room. All these factors significantly influence the teaching-learning communication. Therefore, care should be taken for their proper arrangement and control.

14. **Principle of facilitators and barriers of communication:** Facilitators are helpful in effective communication whereas barriers adversely affect communication. Hence learning situation and environment should be so organized as to eliminate barriers of communication as far as possible.

Self Check Exercise –1

Q-1: What do you mean by principle of competency?

Q-2

In a classroom delayed feedback can happen due to:

a) Use of technology

b) Expanded communication

c) Semantic noise

d) Participatory environment

Q-3 Communication should be pupil-centered. **True/False**

6.4 Summary:

Let's review what we've learned. If we exercise simple practices to improve our communication skill, we can become effective communicators. Understanding cultural aspects of communication refers to having knowledge of different cultures in order to effectively with cross culture people. Cultural aspects of communication are of great relevance in today's world which is now a global village, thanks to globalization. Cultural aspects of communication are the cultural differences which influences communication across borders.Poorly explained or misunderstood messages can also result in confusion. However, research in communication has shown that confusion can lend legitimacy to research when persuasion fails.Another barrier to communication occurs when the students begin day-dream. If the class-room communication is not interesting to them the students begin to indulge thoughts about pleasant or interesting experiences which they had earlier or which they have later on.To avoid excessive

verbalism, the teacher may use a variety of instructional materials like charts, diagrams, specimens, models, tape recorders, sound films, video-cassettes and many others which use the best of the communication techniques to transmit the subject content. Words sounding the same but having different meaning can convey a different meaning altogether. Hence the communicator must ensure that the receiver receives the same meaning. It is better if such words are avoided by using alternatives whenever possible.

6.5 Glossary-

Instruction: An order that tells you what to do or how to do something

Dissatisfaction: The feeling of not being satisfied

Motivation: A process of including and stimulating an individual to act in certain manner

6.6 Answers to Self -Check Exercise-

Self -Check Exercise-1

Ans-1: The teacher (sender) and students (receiver) should be competent and efficient in terms of communicating and receiving the desired Information (message). He should have clarity of concepts, unity of thoughts and mastery over the language. Required communication skills are needed for effective communication. The teacher must be imbibed with sufficient knowledge coupled with skills and application components for effective communication.

Ans-2: Semantic noise

Ans-3: True

6.7 References and Suggested Readings:

1. Harper, Douglas. "Communication", Online Etymology Dictionary Retrieved 2013-06-23.
2. "Types of Body Language". Www.simplybodylanguage.com. Retrieved 2016-02-08.
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6. Bateson, Gregory (1960) Steps to an Ecology of Mind
7. "Communication". The office of superintendent of Public Instruction Washington

6.8 Terminal Questions:

1. What do you mean by communication? What are the principles of effective communication?
2. Discuss in detail the principle of pupil centeredness.

Unit-7

COMMUNICATION

BARRIERS OF COMMUNICATION

STRUCTURE:

7.1 Introduction: The word Communication (derived from the Latin 'Communicare' it means 'to share') is the act of sharing ideas, emotions, and feelings between two or more people. We are aware of the need for and importance of communication as it is a general phenomenon. Nowadays communication is playing a vital role in every walk of an individual. Wherever life exists, communication also exists. A communication barrier is a disconnect that prevents a message from being received as intended. In some cases, the message may not reach its intended audience at all or may reach only part of the audience. In other cases, the message may be fragmented or poorly translated, or simply may have taken on a different meaning. You might be familiar with common physical barriers or language barriers, but in business communication, many of these barriers and biases are more nuanced. Communication is defined as the act of expressing our views to others through the use of signs, expressions, symbols, spoken words**,** or any activity to reach a common understanding. We can communicate with a person or a group of persons. But, barriers can affect the message quality reaching the receiver. Sometimes the message sent may not be interpreted correctly by the receiver. Here, we will also discuss the steps to overcome the barriers of communication. Communication barriers can have a significant impact on people's personal and professional lives. This is particularly evident now when people around the globe have been facing social distancing restrictions. When we are limited to communicating using digital tools and technologies, communication barriers have an even bigger impact. However, digital means of communication are here, and they are here to stay.

7.2 Learning Objectives:

Following this lesson, you'll be able to:

Define communication

Explain the Barriers of communication

7.3 Barriers to Communication:

Barriers to effective communication can retard or distort the message and intention of the message being conveyed which may result in failure of the communication process or an effect that is undesirable. These include filtering, selective perception, information overload, emotions, language, silence, communication apprehension, gender differences and political correctness

This also includes a lack of expressing "knowledge-appropriate communication, which occurs when a person uses ambiguous or complex legal words, medical jargon, or descriptions of a situation or environment that is not understood by the recipient.

1. **Out-of-school interference in the form of commercial and entertainment media:** Out-of-school communication media like the commercial cinema or the commercial programs in radio and television are more interesting and varied than the class-room communication. That is why sometimes students cut classes and go to a cinema theatre to see a commercially prepared film. The commercially prepared film communicates to them in a more interesting way than in the class- room teacher. Similarly sometimes the students read themselves in the class-room stories and novels from commercial magazines when they are supposed to be reading their textbooks. Hence we are bound to make classroom communication as interesting and as varied as the commercial and entertainment media.

2. **Excessive verbalism:** In the most of our class-room excessive by the teacher goes on in the name of teaching. He explains a lot orally. When a student says that he does not understand, the teacher explains more. The words come out from the teacher's mouth in endless succession. This is known as excessive verbalism. But many pupils do not have adequate language proficiency to learn from this excessive verbalism. Hence it interferes with effective class-room communication. To avoid excessive verbalism, the teacher may use a variety of instructional materials like charts, diagrams, specimens, models, tape recorders, sound films, video-cassettes and many others which use the best of the communication techniques to transmit the subject content.

3. **Referent confusion:** No teacher can ever be entirely sure that the words he chooses to describe an idea or a process will convey adequate meaning to every one of his students. It is logical that the greater the abstractness or remoteness of the subject described, the less the similarity there will be between the meaning the teacher intends and the understanding achieved by the pupils.

4. **Day-dreaming:** Another barrier to communication occurs when the students begin day-dream. If the class-room communication is not interesting to them the students begin to indulge thoughts about pleasant or interesting experiences which they had earlier or which they have later on. Thus, when the teacher goes on explaining the causes of delinquency, some of the students may be thinking about the film they saw yesterday or about the lunch which they will eat that

afternoon. If class-room communication is interesting, then the students may not indulge in day-dreaming.

5. **Limited perception:** We receive through or senses organs a great deal more than we actually perceive. For example, one may see hundreds of things in a shop window-display. But he may actually perceive only one or two things at a time. Similarly, the teacher may be saying a lot. But the students may understand only a part of it. This is called limited perception. If proper listening and viewing techniques are made part of the learning situation, the pupils can observe more of information and understand it.

6. **Physical discomfort:** If the students are subjected to physical discomforts, they cannot concentrate their attention on the teacher's communication. For example, very inconvenient chairs and desks, poor lighting, lack of fresh air etc., make the students very uncomfortable. In the situation their attention will be distracted. Then naturally most of the teacher communication will be lost on them. Hence it becomes necessary to make the class-room environment as comfortable as possible to the students.

7. **Noise:** Noise and such other distractions of the adjoining areas of the class-room have an adverse effect on the communication process. If a teacher is teaching and the adjoining class is making a noise because the teacher of that class is on leave it will disturb the communication process of the teacher who is teaching. Sometime the classrooms are near the road and the vehicles create a lot of noise. The noise of the vehicles will have negative effective on the communication process.

8. **Ridiculing behavior of the teacher:** If teacher is in the habit of passing sarcastic remarks or ridiculing the students, may be slow learners, not make sarcastic remarks or ridicule the students.

9. **Attitudinal barriers-** Attitudinal barriers come about as a result of problems with staff in an organization. These may be brought about, for example, by such factors. as poor management, lack of consultation with employees, personality conflicts which can result in people delaying or refusing to communicate, the personal attitudes of individual employees which may be due to lack of motivation or dissatisfaction at work, brought about by insufficient training to enable them to carry out particular tasks, or simply resistance to change due to entrenched attitudes and ideas.

10. **Ambiguity of words/phrases-** Words sounding the same but having different meaning can convey a different meaning altogether. Hence the communicator must ensure that the receiver receives the same meaning. It is better if such words are avoided by using alternatives whenever possible.

11. **Individual linguistic ability-** The use of jargon, difficult or inappropriate words in communication can prevent the recipients from understanding the message. Poorly explained or misunderstood messages can also result in confusion. However, research in

communication has shown that confusion can lend legitimacy to research when persuasion fails.

12. **Physiological barriers-** These may result from individuals' personal discomfort, caused-for example-by ill health, poor eyesight or hearing difficulties.

13. **Bypassing-**These happens when the communicators (sender and the receiver) do not attach the same symbolic meanings to their words. It is when the sender is expressing a thought or a word but the receiver takes it in a different meaning. For example-ASAP, Rest room

14. **Fear of being criticized-** This is a major factor that prevents good communication. If we exercise simple practices to improve our communication skill, we can become effective communicators. For example, read an article from the newspaper or collect some news from the television and present it in front of the mirror. This will not only boost your confidence, but also improve your language and vocabulary.

Self -Check Exercise-1

Q-1: What is excessive verbalism?

Q-2 Which one of the following is excluded from the list of communication barriers?

a) Physical

b) Semantic

c) Philosophical

d) Psychological

Q-3 The teacher (sender) and students (receiver) should be ……in terms of communicating and receiving the desired Information (message).

7.4 Summary: What exactly gets in the way of effective communication? Many factors can impact our own messages and the way we perceive others' communication. Some of the factors that lead to the most common communication barriers stem from different cultures and language differences. Others are more semantic in nature, stemming from small misperceptions in body language, facial expressions, or nonverbal communication. Now, add in generative AI, which introduces new issues related to effective communication, and thankfully, a host of new ways to overcome existing barriers. Let's examine each of the major barriers to effective communication—what they are, what to look out for, and ways to overcome them. Addressing these barriers requires proactive efforts to foster a communication-forward work culture. This involves not only providing appropriate training and resources but also investing in the right communication tools and channels.

7.5 Glossary-

ASAP - As soon as possible

Endless succession: It is very large or lasts for a very long time, and it seems as if it will never stop.

Personal discomfort: Unpleasant emotions or feelings a person experiences when overwhelmed, which can severely affect daily life.

Overwhelmed: Too much or almost too much, for them to manage

7.6 Answers to Self -Check Exercise-

Self -Check Exercise-1

Ans-1: In the most of our class-room excessive by the teacher goes on in the name of teaching. He explains a lot orally. When a student says that he does not understand, the teacher explains more. The words come out from the teacher's mouth in endless succession. This is known as excessive verbalism.

Ans-2: Philosophical

Ans-3: Competent and efficient

7.7 References and Suggested Readings:

1. Harper, Douglas. "Communication", Online Etymology Dictionary Retrieved 2013-06-23.
2. "Types of Body Language". Www.simplybodylanguage.com. Retrieved 2016-02-08.
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5. Xin Li. "Complexity Theory-the Holy Grail of 21st Century Lane Dept of CSEE, West Virginia University.
6. Bateson, Gregory (1960) Steps to an Ecology of Mind

7.8 Terminal Questions:

1. Describe in detail the barriers of communication.
2. Discuss the concept of communication with its definitions. Also discuss the process of effective communication.
3. Differentiate between Attitudinal barrier and psychological barrier

Unit-8

COMMUNICATION

TYPES OF CLASS-ROOM COMMUNICATION

STRUCTURE:

8.1 Introduction:

Communication means sharing or exchanging information, news, ideas, etc. with someone. The most common medium of communication is language. Besides, there are other several means of communication available to us. We use non-linguistic symbols such as traffic lights, road signs, railway signals to convey information relating to the movements of vehicles and trains. We also use telegraphic code for quick transmission of messages and secret codes for communication defense and other highly confidential information. Communication is established not only between human beings but also between non-human beings. Today we find the most advanced and civilization way of communication, but it was available even during the primitive age of civilization, definitely in some other from. Business communication is used for a wide variety of activities including, but not limited to: strategic communications planning, media relations, public relations (which can include social media, broadcast and written communications, and more), brand management, reputation management, speech-writing, customer-client relations, and internal/employee communications. Family communication is the study of the communication perspective in a broadly defined family, with intimacy and trusting relationship. The main goal of family communication is to understand the interactions of family and the pattern of behaviors of family members in different circumstances. Open and honest communication creates an atmosphere that allows family members to express their differences as well as love and admiration for one another. It also helps to understand the feelings of one another.

8.2 Learning Objectives:

Following this lesson, you'll be able to:

- Types of Class-room Communication

8.3 Types of Class-room Communication:

Teaching may be considered as a sort of communication. The teacher is supposed to communicate new ideas, information, attitudes, behavior, skills etc., to the students. Teacher's communication will be fruitful only when students receive, and understand it and learn from it. Here the teacher is the sender of the communication and the students are the receivers of the communication. Only when the students understand and the communication, they will respond to it in the appropriate way. This response may be in the form of an answer to a question put by the teacher. This response may be in any other form also, for example attitude change or behavior change etc.

If the learning is to be effective it should be ensured that the communication process travels along channels, clear of any interference. To do this the teacher should know what the barriers to classroom communication are. All communication process aims at making the content of communication comprehensible by students. Communication can be broadly classified into two categories: 1. Verbal communication 2. Non-Verbal Communication.

1. **Verbal communication-** Verbal communication refers to the messages sent or received verbally. It means conveyance of the message, information, instructions, and directions through the words spoken. It requires the knowledge of the language. There has to be a common language for such communication. For example, a person not knowing Gujarati cannot communicate with a person who knows Gujarati only. Verbal communication is the spoken conveying of message. Human language can be defined as a system of symbols (sometimes known as lexemes) and the grammars (rules) by which the symbols are manipulated. The word "language" also refers to common properties of languages. Language learning normally occurs most intensively during human childhood. Most of the thousands of human languages use patterns of sound or gesture for symbols which enable communication with others around them. Languages tend to share certain properties, although there are exceptions. There is no defined line between a language and a dialect. Constructed languages such as Esperanto, programming languages, and various mathematical formalism is not necessarily restricted to the properties shared by human languages.

Verbal communication takes place in the following ways:

Oral communication (speaking and listening)- Oral communication takes place through talks, lectures, conversations, discussions, storytelling, narration, telephonic conversation, radio broadcast and recordings. In this type of communication one person speaks and the other person understands it by listening to him. For example, in a classroom, the teacher speaks and the students listen and understand. Similarly listening to a talk over the radio or in the tape recorder and understanding it, also comes under this category. Oral

communication depends on pitch, loudness of the voice, pronunciation, language used and rate of speaking.

Visual communication (visualizing-observing)- Visual communication takes place through pictures, posters, charts, maps, slides, films strips etc. in this type of communication the sender encodes his thoughts, ideas etc, into some pictures, posters, charts, maps, slides, film strips or other visual symbols. The receiver observes the pictures or the other visual symbols and understands the thoughts, ideas or messages communicated through them. For example, we observe the various traffic signals and symbols and understand that what they indicate. Visual communication makes the listener attentive and communication interesting.

Oral-Visual communication (speaking-visualizing)- Sometimes the communication may be sent through speaking and visualizing-both occurring simultaneously. The receiver may listen and observe at the same time to understand the communication. For example, when we watch the television or see a sound film we understand and both the spoken words and the visual. This kind of communication is very effective.

Written communication- written communication takes place through books, letter, pamphlets, booklets, newspapers, magazines etc. in this type of communication the sender may write the words of sentences on something. The words and sentences that he writes are read by the receiver and understood. The reading always need not be performed through the eyes. For example, in the Braille system of writing, raised dots are used. The blind person touches these dots and understands the message or the information conveyed through them.

2. Non-Verbal communication- According to Smith, "Non-verbal communication is defined as the area of study which includes all essentially non-linguistic phenomena which influence the process of human interaction." Non-verbal communication is behavior that conveys meanings without words. It can be symbolic, non-symbolic, spontaneous or managed, expressive, transmitting emotions or informative transmitting facts. Non-verbal communication operates through facial expressions, eye-contact, body postures, gestures, touch, conversational silences and human adornment such as clothing. Teacher's non- verbal behavior is his movements in the class, the gestures that he uses at different occasions, his pausing for a while or for some time, the use of a pointer to indicate something on the blackboard, map or a chart etc. a good teacher uses the past experiences and cultural background for using apparent gesture. Non-verbal communication also takes place through auto-sensory methods. Non-verbal communication is generally used for giving strength and effectiveness to the verbal communication. Nonverbal communication describes the process of conveying meaning in the form of non-word messages. Examples of nonverbal communication include haptic communication, chromatic communication, gestures, body language, facial expressions, eye contact, and how one dresses. Nonverbal communication also relates to intent of a message. Examples of intent are voluntary, intentional movements like shaking a hand or winking, as well as involuntary, such as sweating. Speech also contains nonverbal elements

known as paralanguage, e.g., rhythm, intonation, tempo, and stress. There may even be a pheromone component. Research has shown that up to 55% of human communication may occur through non-verbal facial expressions, and a further 38% through para-language. It affects communication most at the subconscious level and establishes trust. Likewise, written texts include nonverbal elements such as handwriting style, spatial arrangement of words and the use of emoticons to convey emotion.

Some of the important modes of non-verbal communication are briefly stated as under:

Facial expression: Facial expression is considered as one of the important modes of non-verbal communication. A person's feelings, emotions and thoughts are often revealed in his facial expression. Facial expression is regarded as an index of emotional and thinking behavior. Charles Darwin who made scientific study of the facial expressions observed that facial expressions seem to have universal meaning. Everywhere people used the same facial expressions to convey the same emotions, with very little variations. According to him people in every society convey at least six basic emotions: anger, happiness, sadness, disgust, fear and surprise through the similar expressions. For example, people all over the world turn the corners of their mouth up when they are happy and draw them down when they are sad. When one is perturbed, his face gives the identity of the level of his anxiety and stress. As much of the language of the facial expression is almost similar and universal to all around the world, we can easily conclude that one is happy, sad, disgusted, fearful, surprised, jealous or showing love, affection or hatred.

Eye-contact (language of the eye): Eye to eye contact forms the very basis of effective communication. Language of the eye may be considered as common and universal to almost all cultures and societies of the world. Often, we interpret high amount of the eye contact as a sign of friendliness and liking. Eye contact is useful in regulating two-way conversation. When one focuses one's eyes for conversation. It is kind of signal to the speaker to start or stop speaking. The teacher at times, looks directly at some particular student to imply that it is his turn to speak. Similarly, when a student looks away from the teacher it may imply that he does not want to speak up. The eye movements of the teacher may encourage or discourage a student in giving response or participating actively in teaching-learning process. Similarly, by reading through eye movements, the teacher can know whether a student is showing interest in one or the other classroom activities. When one turns his eyes, it means that he wants to avoid us or is not interested in our friendship or conversation. Similarly, a person can communicate his emotion of love, lust, affection, joy, fear, anger, jealousy, heartedness etc. through the eye language. Idioms and phrases showing movements and actions of the eyes like 'Aankhe Bichhana' (□□□□ □□□□□□), 'Aankhe Dikhana' (□□□□□□□□□□) etc. easily provide valid testimonial of the role of eye language in communication.

Body language- In addition to the facial expressions and eye language, our body has an impressive and effective language of communicating our

feelings, thoughts and actions, the body language includes various types of gestures, postures and physical movements of various parts of the body. In our day-to-day conversation, we are all quite habitual to make use of body language for the communication. We convey the feelings of respect to our elders by touching their feet, welcome through joining our hands or say good-bye by raising or shaking our right hand. Feelings and emotions of love, affection, joy, sadness, fear, anger, anxiety and heartedness etc. are expressed through the various actions and movements of the parts of body. For example, when you observe that a person is continuously changing posture, biting his nails and shaking his head, it would be easy for you to infer that he is nervous or tense. Similarly, clenching fits usually indicate anger, shrugging of shoulders convey ignorance or helplessness, covering face of embarrassment and so on. If someone, with whom we are conversing, faces us directly and leans forward, this is usually a sign of liking and close relationship. Body language can be effectively used by the teachers and pupils in the classroom for healthy classroom interaction in various types of teaching-learning situations. With the use of appropriate body language, teachers may add effectiveness to their explanations, expositions and demonstration skills.

Vocal cues- Many of the vocal cues and sound systems prove effective in communicating one's feelings, thoughts and actions. For instance, when we are talking, explain, narrating something to some person and he is responding simply by uttering the sound 'hunh-hunh' it gives feedback to the other person that he is paying attention and expressing his agreement to the message communicated to him. Contrarily, when the listener nods his head and neck or utters negative sounds it means his disagreement to the conveyed message. When a person is making the pleasant sound through whistling or humming it means that he is in a happy and pleasant mood. It should be noted that meaning of the vocal cues and sound symbols depend on the tone, volume, context and situation and also on the person towards whom these are directed. For example, whistling may be silence can be considered as an important mode of communicating one's feelings and thoughts. For instance, in certain cases silence is taken as consent or agreement.

Code language- Different type of we thought and organized code languages can be used for the desired communication among the shared group members. You can also mix vocal cues and sound symbols with the body language for having a code language to communicate. The code language in any form must be well understood, used and interpreted by its users. Some children and adolescents talk to each other in their own code languages. Detective and security agencies operating all over the world effectively use various types of well thought and organized code languages in exchanging meaningful and secret information.

Self Check Exercise-1

Q-1: What do you mean by verbal communication?

Q-2: What do you mean by written communication?

Q-**3**: What do you mean by code language?

Q-4: A student greets his teacher with “Good Morning”. Here the channel of communication is:

a) The effect
b) The source
c) The speech
d) The intent

8.4 Summary:

Communication is social interaction where at least two interacting agents share a common set of signs and a common set of semiotic rules. This commonly held rule in some sense ignores auto communication including intrapersonal communication via diaries or self-talk both secondary phenomena that followed the primary acquisition of communicative competences within social Interactions. In simple terms, interpersonal communication is the communication between one person and another (or others). It is often referred to as face-to-face communication between two (or more) people. Both verbal and nonverbal communication or body language play a part in how one person understands another. In verbal interpersonal communication there are two types of messages being sent: a content message and a relational message. The sender was the part of a telephone a person spoke into, the channel was the telephone itself, and the receiver was the part of the phone where one could hear the other person. Communication is not a tool used only by humans, plants and animals, but it is also used by microorganisms like bacteria. The process is called quorum sensing. Communication is observed within the plant organism, Le. within plant cells and between plant cells, between plants of the same or related species, and between plants and non-plant organisms, especially in the root zone. Plant roots communicate with rhizome bacteria, fungi, and insects within the soil. These interactions are governed by syntactic, pragmatic, and semantic rules, and are possible because of the decentralized "nervous system" of plants. Western conversational interaction is typically "dyadic", between two particular people, where eye contact is important and the speaker controls the interaction; and "contained" in a relatively short, defined time frame. Communication to a great extent is influenced by culture and cultural variables. Understanding cultural aspects of communication refers to having knowledge of different cultures in order to communicate effectively with cross culture people.

8.5 Glossary:

Transmitted: To send or forward, as to a recipient or destination, dispatch; convey

Dyadic: It is a group of two people, the smallest possible social group.

Interpersonal: Relating to relationships or communication between people

8.6 Answers to Self-Check Exercise-1

Ans-1: Verbal communication refers to the messages sent or received verbally. It means conveyance of the message, information, instructions, and directions through the words spoken. It requires the knowledge of the language.

Ans-2: written communication takes place through books, letter, pamphlets, booklets, newspapers, magazines etc. in this type of communication the sender may write the words of sentences on something.

Ans-3: It is a programming language with a system of notation for writing computer programmes.

Two

Ans-4 The speech

8.7 References and Suggested Readings

1. Danesi Marcel (2009) Dictionary of Media and Communications ME Starpe. Armonk, New York
2. Chairman of the Joint Chiefs of Staff US Army (2012) Information Operations Joint Publication 3-13. Joint Doctrine Support Division, 118 Lake View Parkway Suffolk, http://www.dtic.mil/doctrine/hew_pubsjp313.pdf
3. Tumar, L. H. & West RL (2013) Perspectives on family communication Boston, MA: McGraw-Hill
4. Trenholm. Sarah Jensen, Arthur (2013) Interpersonal Communication Seventh Edition. New York: Oxford University Press. pp. 360-361.
5. Essentials of Educational Technology-J.S. Walia

8.8 Terminal Questions

- What do you mean by communication? Discuss in detail classroom communication
- Explain in detail the modes of communication.
- Write a short note on Alogrithms communication strategy.
- Write the main features of written communication strategy.

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Unit-9

COMMUNICATION
MODES OF COMMUNICATION

STRUCTURE:

9.1 Introduction: Communication is the process of sharing information between individuals using a set of common rules, behaviours, symbols, and signs. Thus, there are five modes of communication: Interpretative Communication Presentational Communication Interpersonal Communication Verbal Communication Non-Verbal Communication. Modes of communication are essentially the method though which a communication takes place, be it verbally through speech or non-verbally through reading, writing, or listening. Communication is an important aspect of human society and it is used in some way during almost every form of social interaction. There are three modes of communication known as interpretive communication, presentational communication, and interpersonal communication. Interpretive communications involve information being received and interpreted by a receiving party without any additional information provided by the speaker, while presentational communications do not allow the speaker to interact with their audience or obtain feedback at all; both are forms of one-way communication. Interpersonal communications are a two-way form of communication that takes place most regularly through simple conversation with other people. The term "mode" generally relates to how something is done or experienced. In reference to communications, a mode of communication refers to the way by which a communication is expressed by the sender or the way a communication is processed by the receiver. Modes of communication are essentially the method though which a communication takes place, be it verbally through speech or non-verbally through reading, writing, or listening. Communication is an important aspect of human society and it is used in some way during almost every form of social interaction. There are many different ways to communicate,

such as through speech, body language, facial expressions, and other physical gestures and movements. Communication can be better understood through the study of modes, or the way in which something is done or how something is experienced. Modes of communication can appear in three main forms that will be discussed later in this lesson.

9.2 Learning Objectives:

Following this lesson, you'll be able to:

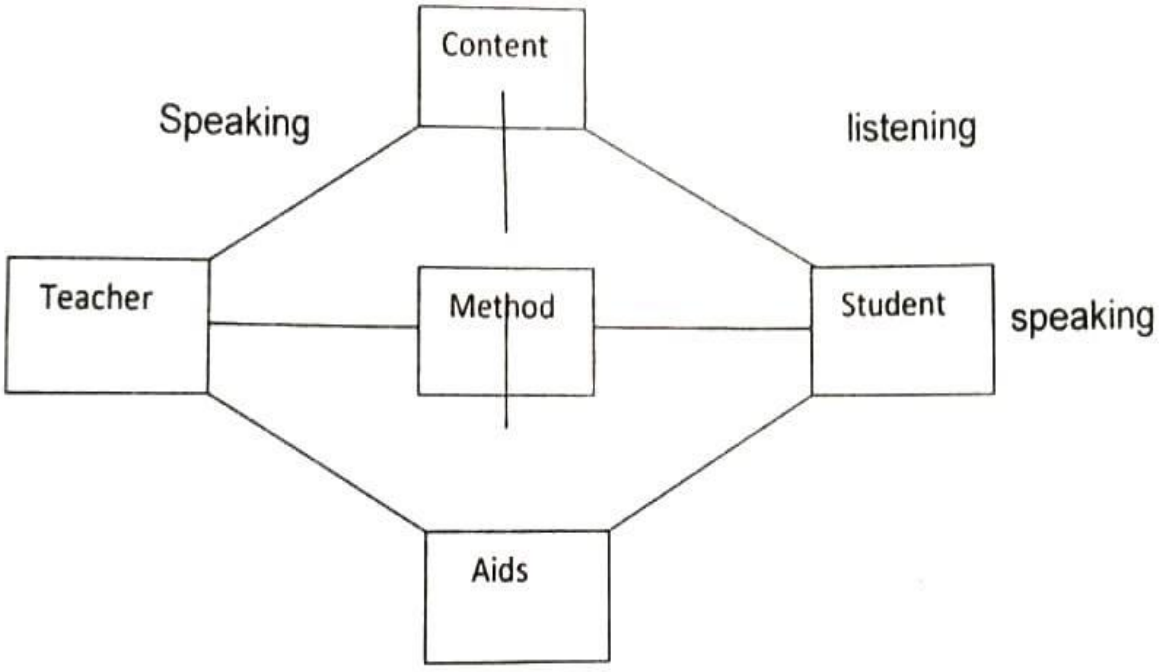
Describe the Modes of communication.

9.3 Modes of Communication:

Two modes of communication are used in teaching process:

1. Oral communication
2. Written communication

1. Oral communication- It implies speaking and listening communication channel. There is largely oral or verbal interaction in class-room teaching. This is based upon audio- lingual method. The teacher has to speak orally and students have to listen to the oral communication. It requires content first and expression on the part of the teacher and students listen the expression first than the theme or the content.



Teacher and student interaction

(Audio-lingual method)

Oral communication strategy is classified into two sub-categories:

(A). Continuous prose oral communication strategy: It is the most simple, useful and general strategy of communication. This strategy is helpful in achieving the knowledge and comprehension objectives. Various facts and information can be imparted to the pupils by this strategy. Without this simple and easy. Programmed instruction is the example of continuous prose.

(B). Heuristic oral communication strategy: Polya and Dunker used this communication strategy for solving problems. It makes use of trial-and-error method or heuristic process. It is an experimental method. In it discovery is made on the basis of alertness. This strategy is effectively used for the problem-solving learning but sometime wrong solutions are accepted. Not only has this by using this strategy, identification of limitations also become difficult.

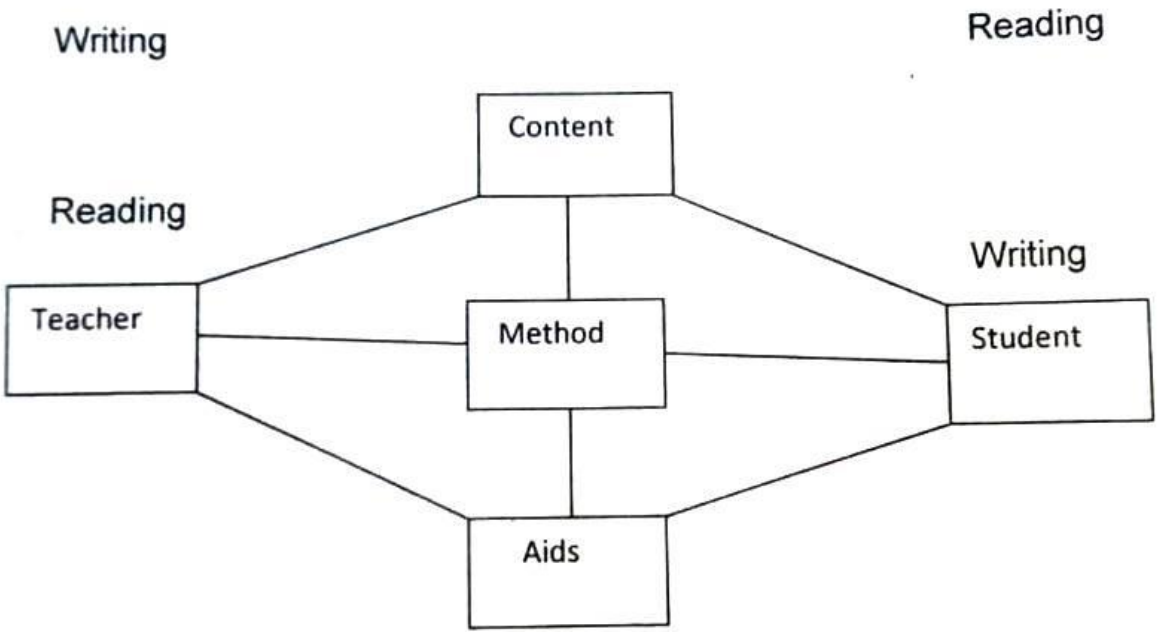
3. Written communication strategy: Whereas the oral communication does not ensure the solution of the problem, written communication ensures the correct solution of the problem. Written communication is based upon the cognitive mode of method of teaching. Over time the forms of and ideas about communication have evolved through the continuing progression of technology. Advances include communications psychology and media psychology, an emerging field of study.

The progression of written communication can be divided into three "information communication revolutions":

1. Written communication first emerged through the use of pictographs. The pictograms were made in stone; hence written communication was not yet mobile. Pictograms began to develop standardized and simplified forms.
2. The next step occurred when writing began to appear on paper, papyrus, clay, wax, and other media with common shared writing systems, leading to adaptable alphabets. Communication became mobile.
3. The final stage is characterized by the transfer of information through controlled waves of electromagnetic radiation (ie., radio, microwave, infrared) and other electronic signals.

Communication is thus a process by which meaning is assigned and conveyed in an attempt to create shared understanding. Gregory Bateson called it "the replication of tautologies in the universe. This process, which requires a vast repertoire of skills in interpersonal processing, listening, observing, speaking, questioning, analyzing, gestures, and evaluating enables collaboration and cooperation.

An interaction between teacher and student takes place through reading and writing activities as shown in the following diagram:



Teacher and taught interaction

(Cognitive code method)

It is classified in two sub-categories:

1. **Algorithms written communication strategy:** This strategy was developed by Wason and Jones in the London University. "Algorithms" is a word from Arabian language. This communication is used in mathematics. The strategy can be used easily and effectively by student, trainees and teachers in solving the problems. It is an economical and the task becomes easy to handle. The following are the main objectives of this strategy:
    1. Chain learning
    2. Reasoning abilities
    3. Diagnosis and remediation
    4. Realizing objectives
2. **Decision table written communication strategy:**Decision tables are also called as logic tables. This strategy was developed by Grad in 1961 and now it is used in computer-associated instruction. Packer and Davies have suggested its use in teaching process as a communication strategy. Decision tables are used in problem solving, question-answer and information. When the students compare their answers with the correct answers and they find them correct, they feel pleasure. It provides them reinforcement. The wrong responses are used to diagnose the student's weaknesses. Hence, decision tables are more useful as compared to continuous prose and algorithms. When these decision tables can help to establish cause and affect relationships by defining the problems, between the directions and tasks on one side, these are also successful in interpreting completely each event. This avoids any fear of error. Since the decision tables prove useful in expressing complex rule successfully therefore, in

modem age these should be used as a teaching strategy. This strategy has the following characteristics:

(a.) Minimum errors

(b.) because-effect relationship

(c) Use in computer-assisted instruction

(d.) Use in teaching process

(e.) Improvement

(f.) Sources of errors

(g) Reducing the complexity

Self-Check-Exercise-1

Q-1: How many modes of communication are used in communication process?

Q-2 Gregory Bateson's view about communication

Q-3 It is predictable to start the classroom communication with:

a) Listening commands

b) Anecdotes

c) Unrelated questions

d) Casual comments

Q-4 "Non-verbal communication is defined as the area of study which includes all essentially non-linguistic phenomena which influence the process of human interaction."
True/False

Q-5 Decision tables are also called as ……. tables.

9.4 Summary:

. In verbal interpersonal communication there are two types of messages being sent: a content message and a relational message. The sender was the part of a telephone a person spoke into, the channel was the telephone itself, and the receiver was the part of the phone where one could hear the other person. Communication is not a tool used only by humans, plants and animals, but it is also used by microorganisms like bacteria. Understanding cultural aspects of communication refers to having knowledge of different cultures in order to communicate effectively with cross culture people. As briefly described, communications can take place in a number of ways, including through verbal and non-verbal means. Verbal communications occur when two or more individuals speak to each other, whether it be formally or informally, face-to-face or virtually, or via telephone or video chat. There are many important considerations to be made when expressing communications verbally, which include the complexity of words, tone of voice, and coexistence with non-verbal forms of communication that take place at the same time. Writing can sometimes also be considered a form of verbal communication because it requires the knowledge and use of speech, but written communications are often grouped separately. While it is easy to think of

communication as simply the verbal transmission of information from one person to another, it is so much more than that. Communication ranges from non-verbal, such as a glance and raised eyebrows, to verbal, such as a change in pitch and tone. Let's take an in-depth look at all the ways that we communicate with each other.

9.5 Glossary:

Pragmatic: Dealing with problems in a practical way rather than by following ideas or principles

Semantic: The meaning and interpretation of words, signs, and sentence structure.

Microorganism: A very small living thing that you can only see with a special piece of equipment.

Rhizome bacteria: Soil bacteria that can engage in a symbiosis with leguminous plants that produces nitrogen-fixing root nodules.

9.6 Answers to Self-Check Exercise:

Self-Check Exercise-1

Ans-1: Two

Ans-2: "the replication of tautologies in the universe."

Ans-3 Anecdotes

Ans-4 True

Ans-5 Logic

9.7 References and Suggested Readings

1. Danesi Marcel (2009) Dictionary of Media and Communications ME Starpe. Armonk, New York
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5. Essentials of Educational Technology-J.S. Walia

9.8 Terminal Questions

- Explain in detail the modes of communication.
- Write a short note on Alogrithms communication strategy.
- Write the main features of written communication strategy.

Unit-10

HARDWARE TECHNOLOGIES AND THEIR APPLICATIONS: OVERHEAD PROJECTOR (OHP); SLIDE PROJECTOR

STRUCTURE:

10.1 Introduction:

Educational technology can be conceived as a science of techniques and methods by which educational goals can be realized. It helps in specifying the goals and translating them in to behavioral terms. The audio sense is more active by the use of teaching aids. The use of tape recorder, radio, record player and gramophone make the learner more active and attentive in teaching process. The visual sense is more active by the use of models and line-drawing in his teaching activities. Motion picture films can be classified as entertainment films and educational films. Classroom films are on curricular subjects produced for promoting learning in specific curricular subjects. A slide projector is a specialized projector which has been designed to be used with slides. Slides are small transparencies mounted in sturdy frames which are ideally suited to magnification and projection, since they have a very high resolution and a resulting high image quality. The use of slide projectors is in decline, as other projection methods have become more popular. Nowadays film projectors are considered obsolete as high-resolution digital projectors offer many advantages over traditional film units. For example, digital projectors contain no moving parts except fans, can be operated remotely, and are relatively compact. They also allow for much easier, less expensive, and more reliable storage and distribution of content, including the ability to display live broadcasts. Recently CCTV technology has been enhanced with a shift toward internet-based products and systems, and other technological developments.

10.2 Learning Objectives:

After reading this chapter, the students will be able to know about:

- Meaning, concept and characteristics of overhead projector
- Meaning and concept of slide projector
- Advantages and disadvantages of overhead projector
- Characteristics of slide projector

10.3 Overhead projector:

An overhead projector is a variant of slide projector that is used to display images to an audience. Also called a "viewgraph," the overhead projector was created by Jules Duboscq, a French inventor, in the 1870s." It was first used for police work, and used a cellophane roll over a 9-inch stage allowing facial characteristics to be rolled across the stage. The U.S. Army in 1945 was the first to use it in quantity for training as World War II wound down. It began to be widely used in schools and businesses in the late 1950s and early 1960s.

An overhead projector works on the same principle as a 35mm slide projector, in which a focusing lens projects light from an illuminated slide onto a projection screen where a real image is formed. However, some differences are necessitated by the much larger size of the transparencies used (generally the size of a printed page), and the requirement that the transparency be placed face up (and readable to the presenter). For the latter purpose, the projector includes a mirror just before or after the focusing lens to fold the optical system toward the horizontal. That mirror also accomplishes a reversal of the image in order that the image projected onto the screen corresponds to that of the slide as seen by the presenter looking down at it, rather than a mirror image thereof. Therefore, the transparency is placed face up (toward the mirror and focusing lens), in contrast with a 35mm slide projector or film projector (which lack such a mirror) where the slide's image is non-reversed on the side opposite the focusing lens.

Because the focusing lens (typically less than 10 cm [4 in] in diameter) is much smaller than the transparency, a crucial role is played by the optical condenser which illuminates the transparency. Since this requires a large optical lens (at least the size of the transparency) but may be of poor optical quality (since the sharpness of the image does not depend on it), a Fresnel lens is employed. The Fresnel lens is located at (or is part of) the glass plate on which the transparency is placed, and serves to redirect most of the light hitting it into a converging cone toward the focusing lens. Without such a condenser at that point, most of the light would miss the focusing lens (or it would have to be very large and prohibitively expensive). Additionally, mirrors or other condensing elements below the Fresnel lens serve to increase the portion of the light bulb's output which reaches the Fresnel lens in the first place. In order to provide sufficient light on the screen, a high intensity bulb is used which must be fan cooled.

Focus adjustment: Overhead projectors normally include a manual focusing mechanism which raises and lowers the position of the focusing lens (including the folding mirror) in order to adjust the object distance (optical distance between the slide and the lens) to focus at the chosen image

distance (distance to the projection screen) given the fixed focal length of the focusing lens. This permits a range of projection distances.

Increasing (or decreasing) the projection distance increases (or decreases) the focusing system's magnification in order to fit the projection screen in use (or sometimes just to accommodate the room setup). Increasing the projection distance also means that the same amount of light is spread over a larger screen, resulting in a dimmer image. With a change in the projection distance, the focusing must be readjusted for a sharp image. However, the condensing optics (Fresnel lens) is optimized for one particular vertical position of the lens, corresponding to one projection distance. Therefore, when it is focused for a greatly different projection distance, part of the light cone projected by the Fresnel lens towards the focusing lens misses that lens. This has the greatest effect towards the outer edges of the projected image, so that one typically sees either blue or brown fringing at the edge of the screen when the focus is towards an extreme. Using the projector near its recommended projection distance allows a focusing position where this is avoided and the intensity across the screen is approximately uniform.

Source of illumination: The lamp technology of an overhead projector is typically very simple compared to a modern LCD or DLP video projector. Most overheads use an extremely high-power halogen lamp that may consume up to 750 watts. A high-flow blower is required to keep the bulb from melting due to the heat generated, and this blower is often on a timer that keeps it running for a period after the light is extinguished.

Further, the intense heat accelerates failure of the high intensity lamp, often burning out in less than 100 hours, requiring replacement. In contrast, a modern LCD or DLP projector uses an arc lamp which has a higher luminous efficacy and lasts for thousands of hours. A drawback of that technology is the warm up time required for arc lamps.

Older overhead projectors used a tubular quartz bulb which was mounted above a bowl- shaped polished reflector. However, because the lamp was suspended above and outside the reflector, a large amount of light was cast to the sides inside the projector body that was wasted, thus requiring a higher power lamp for sufficient screen illumination. More modern overhead projectors use an integrated lamp and conical reflector assembly. allowing the lamp to be located deep within the reflector and sending a greater portion of its light towards the Fresnel lens, this permit using a lower power lamp for the same screen illumination.

A useful innovation for overhead projectors with integrated lamps/reflectors is the quick- swap dual-lamp control, allowing two lamps to be installed in the projector in movable sockets. If one lamp fails during a presentation the presenter can merely move a lever to slide the spare into position and continue with the presentation, without needing to open the projection unit or waiting for the failed bulb to cool before replacing it.

Use in education: The overhead projector facilitates an easy low-cost interactive environment for educators. Teaching materials can be pre-printed on plastic sheets, upon which the educator can directly write using a non-permanent, washable color marking pen. This saves time, since the transparency can be pre-printed and used repetitively, rather than having materials written manually before each class.

The overhead is typically placed at a comfortable writing height for the educator and allows the educator to face the class, facilitating better communication between the students and teacher. The enlarging features of the projector allow the educator to write in a comfortable small script in a natural writing position rather than writing in an overly large script on a blackboard and having to constantly hold his arm out in midair to write on the blackboard,

When the transparency sheet is full of written or drawn material, it can simply be replaced with a new, fresh sheet with more pre-printed material, again saving class time vs a blackboard that would need to be erased and teaching materials rewritten by the educator. Following the class period, the transparencies are easily restored to their original unused state by washing off with soap and water.

The overhead projector, used as a controllable blackboard or bulletin board in the teaching of writing, extends the range of teaching techniques so that an instructor may (1) prepare. in advance, handwritten sheets of film-test questions, pupils' sentences, quotations, short poems--to be shown in any order or form; (2) use pictures, graphics, or cartoons as subjects for creative composition; (3) write comments on a prepared text or a pupil's composition transferred to film; or (4) create diagrams or symbols to aid in the discussion of a composition. Although there are many advantages to an overhead projector, it is limited because only a short passage of a composition can be shown at one time, large print must be used, and the materials must be read line by line from the screen. However, the value of the overhead lies in the teacher's increased ability to control the visual content of his message without total reliance upon oral directions and repetitions.

Self Check Exercise-1

Q-1: What do you mean by OHP?

Advantages of Overhead projector: -

1. **Large image:** It projects a very large image on the screen from a minimum of projection distance.
2. **Face the class:** In this projector the image is projected over the shoulder of the teacher. Therefore, he can face t5he class at all times. He can maintain eye contact with the students.
3. **Lighted room:** Overhead projector can operate in an illuminated (well-lighted) room. There is no need of darkening the room.
4. **Bright image:** The lens and mirror arrangement in overhead projector makes a problem to have a bright image even in a well-lighted room.
5. **Simple operation:** It is simple, easy and convenient to operate the overhead projector. It does not need a separate projector operator or the instructor.
6. **Light weight:** The light weight of equipment makes it portable.
7. **Class control:** the teacher can maintain complete class control and interest in a lesson by turning a switch on or off. He, while sitting on his desk, can indicate specific items on the screen by locating them with his pencil on the slides.

8. **Process on the screen: -** By putting a piece of ground glass over the slide space, the teacher can draw the diagram, sketch with pencil or wax pencil and the class can watch the process on the screen.

9. **Large slide:** Due to largeness of its aperture it may allow the use of large slide of the size 20*20 cm. or 25*25 cm. It may facilitate the preparation of art work slides.

10. **User of pointer:** The teacher can use a pointer or pencil to point out important details of a slide. He has not to run about the machine to the wall to explain this to the students.

11. **Low cost:** Effective visual can be made in a minimum of time and at low cost. Once a transparency is made, it is permanent. It need not be erased as in a blackboard. It can be stored for recall at any later time.

12. **Preparation and presentation of transparencies:** Transparencies can be prepared ahead of time, presented exactly when required and quickly removed, when they have served their purpose.

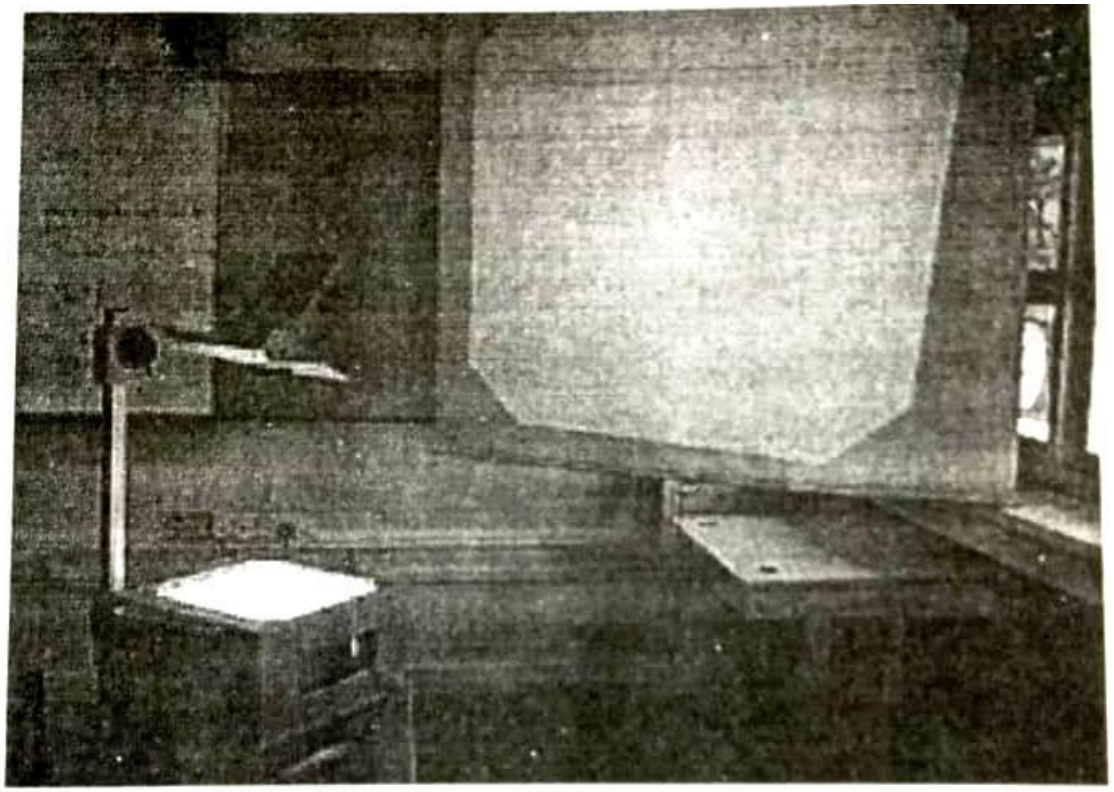
So, in the last we can say that overhead projector is a frequently used instrument in the classroom and other teaching/learning situations. It is a medium through which still visual material are display through projection on the screen. It is a very simple instrument and one does not require any special training to master its operation. The overall use of OHP can be seen under two categories i.e., structure and operation of the instrument and preparation as well as use of the transparencies.

Self Check Exercise-2

Q-1: Write two advantages of OHP.

10.4 Slide projector

A slide projector is a mechanical device for showing photographic slides. 35 mm slide projectors, direct descendants of the larger-format magic lantern, first came into widespread use during the 1950s as a form of occasional home entertainment; family members and friends would gather to view slide shows, which typically consisted of slides snapped during vacations and at family events. Slide projectors were also widely used in educational and other institutional settings.



Photographic film slides and projectors have mostly been replaced by image files on digital storage media shown on a projection screen by using a video projector or simply displayed on a large-screen video monitor.

- A projector has four main elements:
- electric incandescent light bulb or other light source (usually fan-cooled)
- reflector and "condensing" lens to direct the light to the slide
- slide holder
- focusing lens

A flat piece of heat-absorbing glass is often placed in the light path between the condensing lens and the slide, to avoid damaging the latter. This glass transmits visible wavelengths but absorbs infrared. Light passes through the transparent slide and lens, and the resulting image is enlarged and projected onto a perpendicular flat screen so the audience can view its reflection. Alternatively, the image may be projected onto a translucent "rear projection" screen, often used for continuous automatic display for close viewing. This form of projection also avoids the audience interrupting the light stream by casting their shadows on the projection or by bumping into the projector.

Self Check Exercise-3

Q-1: What do you mean by slide projector?

Characteristics of slide projector

A slide projector is a specialized projector which has been designed to be used with slides. Slides are small transparencies mounted in sturdy frames which

are ideally suited to magnification and projection, since they have a very high resolution and a resultingly high image quality. The use of slide projectors is in decline, as other projection methods have become more popular.

There are several different components to a slide projector, starting with a slot where slides can be inserted. Many slide projectors are designed to work with carousels, circular racks of slides which can be rotated to allow a sequential projection of images which may be automatic, or controlled with a button or remote operated by the user.

The rack for slides is surrounded by a light source and focusing lenses which ensure that the light passes through the slide, and allows for focusing so that the slides will appear crisply on the projection screen. Slide projectors can be adjusted to project at a variety of distances, with the use of focusing tools. The device also classically includes a fan to ensure that the workings of the slide projector do not get too hot, as heat can damage the slides.

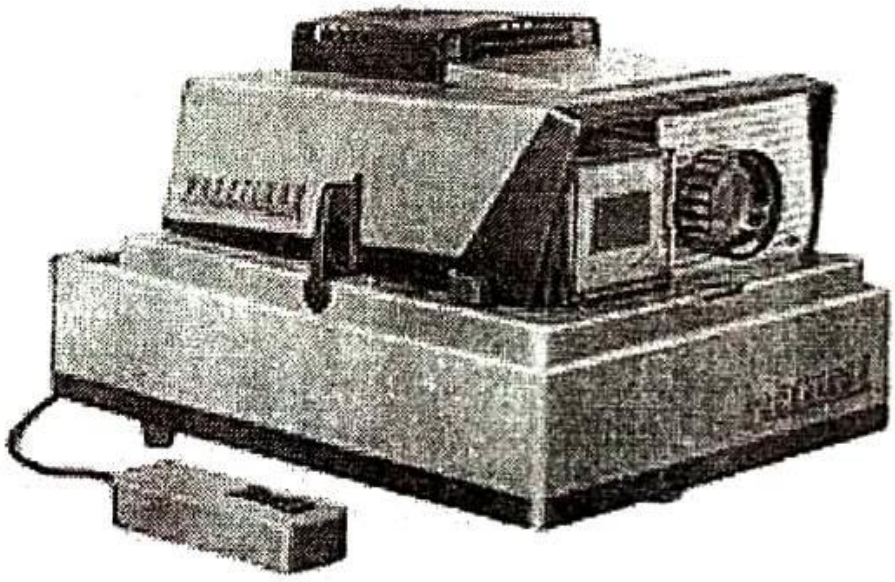
At one time, the slide projector was the presentation method of choice when visual media needed to be presented to a large group. Travelers often took photographs on slide film for the express purpose of holding slide shows of their trips when they returned, and slides I could also be prepared for business and educational presentations. In an art history course, for example, the teacher might use slides of famous works of art to display examples for discussion.

Slides are actually a great presentation tool, because of the very high image quality. However, slide projectors can be difficult to work with, especially in the case of carousel projectors, which can become recalcitrant with time. It is also difficult to remember to insert the slides properly so that the images are not reversed or inverted, and to organize the slides in order. As many people who have made presentations with a slide projector know, one of the worst things which can happen is dropping the carousel on the way to the presentation podium, causing all the slides to fall out.

Because slides can be difficult to work with, other projection methods such as projectors designed to link to computers or read presentations from CDs and DVDs have become more commonplace. These projectors may be of lower quality, but they are simple enough for almost anyone to operate.

Advantages of using slides:

- Students get insufficient sleep, and a slideshow presentation allows them to catch up on their sleep hours somewhat.
- Slides decrease student-teacher interaction, and we are all introverts nowadays, so less interaction is a good thing!
- Slides make it less likely that a student will take notes in class, thus saving on ink.
- Slides are good for ignorance, and as we all know, ignorance is bliss!



Self Check Exercise-4

Q-1 The…….are used to present using overhead projectors.

a) Acetate film transparent sheet
b) Paper sheets
c) Polythene sheets
d) Butter paper

Q-2 The person who invented the OHP was:

a) A French inventor
b) A Russian inventor
c) A American inventor
d) All of the above

Q-3 An overhead projector works on the same principle as a 35mm slide projector.

True/False

Q-4 A slide projector is a specialized projector which has been designed to be used with …….

10.5 Summary: A slide is a photographic transparency which can be projected. It is a piece of transparent surface like cellulose acetate film, transparent paper, glass etc. of a specific dimension with drawings or pictures which can be mounted individually for use in projector or for viewing by transmitted light. A slide may be in colour or black and white. Different forms of glass slides like photographic, etched glass slide, ink slides etc. may be used for teaching purposes. In overhead projection, a transparent visual is placed on the horizontal stage on top of the light

source. The light passes through this transparency and then the reflected at 90-degree angle on the screen at the back of the speaker. Normally Overhead projectors are composed of a projected lamp to act as a source of light, condensing lenses to concentrate all the light into useable beam, a polished mirror and lens assembly and blower for cooling the system. Motion picture as an aid to teaching is inferior to direct experiences. In some cases, motion pictures will be able to provide the expected learning outcome better than even direct experiences. Audio-video recording teaching aids are used to facilitate both audio and visual senses and encourage listening and observing functions. We can conclude that tape-recorder is an effective teaching aid in the classroom used to record the radio programmes for classroom use students' discussion, debates, speeches at celebrations, corrective works in speech, interview with workers, businessmen and community leaders etc. So, in the last we can say that overhead projector is a frequently used instrument in the classroom and other teaching/learning situations. It is a medium through which still visual material are display through projection on the screen. It is a very simple instrument and one does not require any special training to master its operation. The overall use of OHP can be seen under two categories i.e., structure and operation of the instrument and preparation as well as use of the transparencies.

10.6-Glossary:

Condense: To make shorter in length

Transparent: That you can see through

Assembly: The action of fitting the parts ofsomethingtogether

10.7-Answers to Self-Check Exercise:

Self-Check Exercise-1

Ans-1: An overhead projector is a variant of slide projector that is used to display images to an audience. Also called a "viewgraph," the overhead projector was created by Jules Duboscq, a French inventor, in the 1870s."

Self-Check Exercise-2

Ans-1: Bright image: The lens and mirror arrangement in overhead projector makes a problem to have a bright image even in a well-lighted room.

Simple operation: It is simple, easy and convenient to operate the overhead projector. It does not need a separate projector operator or the instructor.

Self-Check Exercise-3

Ans-1: A slide projector is a mechanical device for showing photographic slides.

Self-Check Exercise-4

Ans-1 Acetate film transparent sheet

Ans-2 A French inventor

Ans-3 True

Ans-4 Slides

10.8 References and suggested readings:

- "How Digital Light Processing Works". THRE3D.com. Retrieved 3 February 2014.
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10.9 Terminal Questions:

- Describe the use of overhead projector (OHP) for still pictures. Indicate the use of still pictures in classroom teaching.
- Discuss the characteristics of slide projectors.
- Discuss the role of objective lens in slide projector.

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Unit-11

HARDWARE TECHNOLOGIES AND THEIR APPLICATIONS DLP PROJECTOR

STRUCTURE:

11.1 Introduction:

Educational technology can be conceived as a science of techniques and methods by which educational goals can be realized. It helps in specifying the goals and translating them in to behavioral terms. The DLP chip has an unparalleled 16 microsecond response time, giving users precise, razor- sharp images. Imagine millions of tiny mirrors switching on and off more times than the speed of light. With such a high switching speed, DLP technology is able to deliver a precise, razor-sharp picture with no lag time between frames. Movies, games, and fast-paced educational content are experienced in crisp, vivid detail regardless of the speed of action. Now a days film projectors are considered obsolete as high-resolution digital projectors offer many advantages over traditional film units. For example, digital projectors contain no moving parts except fans, can be operated remotely, and are relatively compact. They also allow for much easier, less expensive, and more reliable storage and distribution of content, including the ability to display live broadcasts. Recently CCTV technology has been enhanced with a shift toward internet-based products and systems, and other technological developments. The first movie projector was the Zoopraxiscope, invented by British photographer Eadweard Muybridge in 1879. The zoopraxiscope projected images from rotating glass disks in rapid succession to give the impression of motion. The stop-motion images were initially painted onto the glass, as silhouettes. A second series of discs, made in 1892-94, used outline drawings printed onto the discs photographically, then colored by hand.Projectors are sometimes called "front projectors" or "two-piece projection systems" in reference to the fact that a projector is typically used with a separate screen that is either mounted on a wall or hung from a ceiling. However, these days many users of the more Inexpensive projectors simply shine the picture on a white wall to save the cost of the screen.

11.2 Learning Objectives:

After reading this chapter, the students will be able to know about:

- DLP and its use in education

11.3 Digital Light Processing

Digital Processing (DLP) is a display device based on optical micro-electro-mechanical technology that uses a digital micromirror device. It was originally developed in 1987 by Dr. Larry Hornbeck of Texas Instruments. While the DLP imaging device was invented by Texas Instruments, the first DLP-based projector was introduced by Digital Ltd in 1997. Digital Projection and Texas Instruments were both awarded Emmy Awards in 1998 for the DLP projector technology. DLP is used in a variety of display applications from traditional static displays to interactive displays and also non-traditional embedded applications including medical, security, and industrial uses.

DLP technology is used in DLP front projectors (standalone projection units for classrooms and business primarily), DLP rear projection television sets, and digital signs. It is also used in about 85% of digital cinema projection, and in additive manufacturing as a power source in some printers to cure resins into solid 3D objects.[1]

Smaller "pico" chipsets are used in mobile devices including cell phone accessories and projection display functions embedded directly into phones.

Digital micro-mirror device:

In DLP projectors, the image is created by microscopically small mirrors laid out in a matrix tin on a semiconductor chip, known as a Digital Micromirror Device (DMD). These mirrors are so small that DMD pixel pitch may be 5.4 um or less. Each mirror represents one or more pixels in the projected image. The number of mirrors corresponds to the resolution of the projected image (often half as many mirrors as the advertised resolution due to wobulation). 800x600, 1024×768, 1280×720, and 1920x1080 (HDTV) matrices are some common DMD sizes. These mirrors can be repositioned rapidly to reflect light either through the lens or onto a heat sink (called a light dump in Barco terminology).

Rapidly toggling the mirror between these two orientations (essentially on and off) produces grayscales, controlled by the ratio of on-time to off-time.

Colour in DLP projection:

There are two primary methods by which DLP projection systems create a color image: those used by single-chip DLP projectors, and those used by three-chip projectors. A third method, sequential illumination by three colored light emitting diodes, is being developed, and is currently used in televisions manufactured by Samsung.

In a projector with a single DLP chip, colors are produced either by placing a color wheel between a white lamp and the DLP chip or by using individual light sources to produce the primary colors, LEDS or lasers for example. The color wheel is divided into multiple sectors: the primary additive colors: red, green, and blue, and in many cases white (clear). Newer systems substitute the primary subtractive colors

cyan, magenta, and yellow for white. The use of the subtractive colors is part of the newer color performance system called Brilliant Colour which processes the additive colors along with the subtractive colors to create a broader spectrum of possible color combinations on the screen.

The DLP chip is synchronized with the rotating motion of the color wheel so that the green component is displayed on the DMD when the green section of the color wheel is in front of the lamp. The same is true for the red, blue and other sections: The colors are thus displayed sequentially at a sufficiently high rate that the observer sees a composite "full color" image. In early models, this was one rotation per frame. Now, most systems operate at up to 10x the frame rate.

The black level of a single-chip DLP depends on how unused light is being disposed. If the unused light is scattered to reflect and dissipate on the rough interior walls of the DMD/lens chamber, this scattered light will be visible as a dim gray on the projection screen when the image is fully dark. Deeper blacks and higher contrast ratios are possible by directing unused HID light away from the DMD/lens chamber into a separate area for dissipation, and shielding the light path from unwanted internal secondary reflections.

Three-chip projectors:

A three-chip DLP projector uses a prism to split light from the lamp, and each primary color of light is then routed to its own DLP chip, then recombined and routed out through the lens. Three chip systems are found in higher-end home theater projectors, large venue projectors and DLP Cinema projection systems found in digital movie theaters.

According to DLP.com, the three-chip projectors used in movie theaters can produce 35 trillion colors. The human eye is suggested to be able to detect around 16 million colors, which is theoretically possible with the single chip solution this high color precision does not mean that three-chip DLP projectors are capable of displaying the entire gamut of colors we can distinguish (this is fundamentally impossible with any system composing colors by adding three constant base colors). In contrast, it is the one-chip DLP projectors that have the advantage of allowing any number of primary colors in a sufficiently fast color filter wheel, and so the possibility of improved color gamuts is available.

Advantages of DLP technology

The advantages of DLP technology are given as under.

All digital display from DLP chip:

DLP technology is a revolutionary display solution that uses an optical semiconductor to manipulate light digitally. When a DLP chip is coordinated with a digital video, graphic signal, a light source, and a projection lens, its mirrors can reflect an all-digital image onto any surface.

Light source agnostic:

Reinforcing the flexibility of the DLP chip, manufacturers can select any light source to pair with DLP technology. The DLP chip is light source agnostic to lamp, laser and LED light.

Award-winning, long-lasting colour accuracy:

DLP Products are the industry standard for all post production cinematic color calibration work due to the color spectrum produced by DLP technology. In February 2015, the DLP Cinema Products team received the 2014 Scientific and Engineering Award (Academy Plaque) for color accuracy of DLP Cinema projectors.

No limits on resolution:

There are no technical limitations to the achievable resolution from a DLP chip. The technology can scale to 4K resolution when needed in the biggest, brightest display down to HD resolution in miniature display put inside devices. DLP technology will scale to any data resolution as content demands it.

Unparalleled switching speed allows built-in intelligence

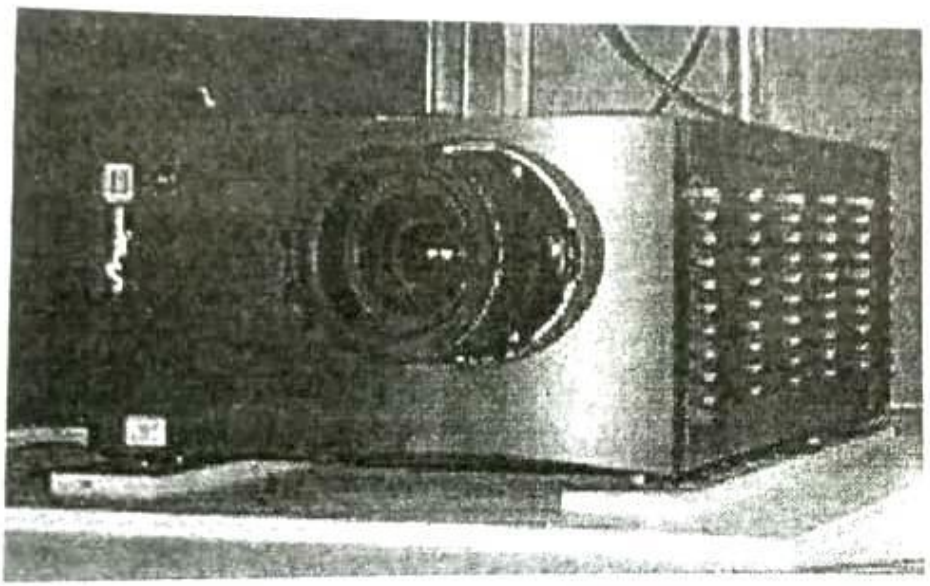
The DLP chip has an unparalleled 16 microsecond response time, giving users precise, razor- sharp images. Imagine millions of tiny mirrors switching on and off more times than the speed of light. With such a high switching speed, DLP technology is able to deliver a precise, razor-sharp picture with no lag time between frames. Movies, games, and fast-paced educational content are experienced in crisp, vivid detail regardless of the speed of action.

Low power consumption

Texas Instruments is a leader in research and development. DLP Products continues to innovate on increasing display brightness decreasing while dramatically decreasing packaging size and required power. DLP® Pico™ has hit milestones on lumens per watt which is directly proportional to allowing consumers to now have embedded projection from a cell phone.

The flexible DLP chip is used in both traditional and non-traditional displays

DLP technology is best known for Scientific and Technical Award-winning TI DLP Cinema® and innovations in classroom projection display such as Smart Source ™ 3D and interactive projection, but the incredibly flexible technology is finding its way into a variety of non- traditional display applications as well. Developers are using the DLP chip to solve real problems for industrial, security, medical and even automotive applications that require built in intelligence.



The Christie Mirage 5000, a 2001 DLP projector

Self Check Exercise-1:

Q-1: What do you mean by DL

Q-2: Discuss the use of three-chip projectors.

Q-3 DLP is a key part of cloud access security brokers (CASBs). **True/False**

Q-4 DLP products can be categorized in to which of the following two deployment models?

Q-5 Digital Processing (DLP)is a display device based on ……..that uses a digital micromirror device.

11.5 Summary: A slide is a photographic transparency which can be projected. It is a piece of transparent surface like cellulose acetate film, translucent paper, glass etc. of a specific dimension with drawings or pictures which can be mounted individually for use in projector or for viewing by transmitted light. A slide may be in colour or black and white. transparencies.While the DLP imaging device was invented by Texas Instruments, the first DLP-based projector was introduced by Digital Ltd in 1997. Digital Projection and Texas Instruments were both awarded Emmy Awards in 1998 for the DLP projector technology. DLP is used in a variety of display applications from traditional static displays to interactive displays and also non-traditional embedded applications including medical, security, and industrial uses. The first movie projector was the Zoopraxiscope, invented by British photographer Eadweard Muybridge in 1879. The zoopraxiscope projected images from rotating glass disks in rapid succession to give the impression of motion.Front projectors generate the biggest possible image size. You can use them to create the very large screen experience of a commercial movie theater in your own home.In choosing a projector you should be aware that some users of projectors using DLP technology can see color separation artifacts, commonly known as rainbows, or rainbow artifacts.

11.6 Glossary:

Illumination: The intensity of light falling at a given place on a lighted surface

Non-traditional: Not following or conforming to traditional

Zoopraxiscope:A motion picture projector

11.7 Answers to Self -Check Exercise:

Self -Check Exercise-1

Ans-1: It is a display device based on optical micro-electro-mechanical technology that uses a digital micromirror device.

Ans-2: A three-chip DLP projector uses a prism to split light from the lamp, and each primary color of light is then routed to its own DLP chip, then recombined and routed out through the lens

Ans-3 True

Ans-4 Network based and agent based

Ans-5 Optical micro-electro-mechanical technology

11.8 References and suggested readings:

- "How Digital Light Processing Works". THRE3D.com. Retrieved 3 February 2014.
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11.9 Terminal Questions:

- What is the use of audio-visual recording instruments in the field of education?
- Discuss the characteristics of slide projectors.
- What do you mean by DLP? Give its uses in education.
- Discuss the characteristics of Digital Light Processing.
- Write two advantages of DLP.

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Unit-12
HARDWARE TECHNOLOGIES AND THEIR APPLICATIONS
MOVIE PROJECTOR

STRUCTURE:

12.1 Introduction:

A projector is a device that allows you to display images, videos, or other content on a large screen or surface. It works by projecting light through a lens, which magnifies and focuses the image onto the desired surface, creating a larger representation of the content being displayed. A movie projector (or film projector) is an opto-mechanical device for displaying motion picture film by projecting it onto a screen. Most of the optical and mechanical elements, except for the illumination and sound devices, are present in movie cameras. A projector enables you to communicate and connect with the group of people at a greater level as the audience understand your point of view more because they can view everything more closely and on a larger scale, they are just not listening to you. To set up a projector, you will need the following: Screen: You need a screen to project the image onto. You can buy a projector screen or use a white wall or white sheet. Cables: You need cables to connect the projector to your video source i.e. laptop, DVD player, or gaming. Seriously, anytime you have a slide, image or display and you want to enlarge it for a better look. Projectors can be set up to project an image at a variety of sizes. But the larger the image, the dimmer it will be because the light is spread out over a larger area.

12.2 Learning Objectives:

After reading this chapter, the students will be able to know about:

- Meaning and concept of movie projector

12.3 Movie projector

Movie projectors are also known as the motion picture projectors or film projectors. Different manufactures have made many different 16mm movie projectors. All movie projectors have distinctive features and merits. But all movie projectors are similar in principle.

Principle involved in movie projectors and their working:

An object kept in between f and 2f of a convex lens will produce a real enlarged image beyond 2f of the lens on a screen.

In movie project the object is the transparent film.

1. The film unwinds from the feed role and goes through the picture head where it is illuminated by the light source.

2. Then the film is projected on the screen at a distance by the projection lens.

3. Then the film passes through the sound head to give sound.

4. Here the sound is illuminated by the exciter lamp and its image is turned in to corresponding electric signals by a photoelectric cell assembly.

5. These signals are amplifies by means of an amplifier and led to the loudspeaker assembly.

6. The film is finally rewound on the take up spool.

A movie projector is an mechanical device for displaying motion picture film by projecting a onto a screen. Most of the optical and mechanical elements, except for the mination and sound devices, are present in movie cameras.

The first movie projector was the Zoopraxiscope, invented by British photographer Eadweard Muybridge in 1879. The zoopraxiscope projected images from rotating glass disks in rapid succession to give the impression of motion. The stop-motion images were initially painted onto the glass, as silhouettes. A second series of discs, made in 1892-94, used outline drawings printed onto the discs photographically, then colored by hand.

A more sophisticated movie projector was invented by Frenchman Louis Le Prince while working in Leeds. In 1888 Le Prince took out a patent for a 16-lens device that combined a motion picture camera with a projector. In 1888, he used an updated version of his camera to film the first ever motion picture, the Round hay Garden Scene. The pictures were privately exhibited in Hunslet.

The Lumiere brothers invented the first successful movie projector. They made their first film, Sortie de rusine Lumiere de Lyon, in 1894, which was publicly screened at L'Eden, La Ciotat a year later. The first commercial, public screening of cinematographic films happened in Paris on 28 December 1895. The cinematograph was also exhibited at the Paris Exhibition of 1900. At the Exhibition, films made by

the Lumiere Brothers were projected unto a large screen measuring 16 by 21 meters (approximately 52.5 x 69 feet).

Self Check Exercise-1

Q-1: Discuss the term movie projector.

Advantages and Limitations

Projectors are sometimes called "front projectors" or "two-piece projection systems" in reference to the fact that a projector is typically used with a separate screen that is either mounted on a wall or hung from a ceiling. However, these days many users of the more Inexpensive projectors simply shine the picture on a white wall to save the cost of the screen.

Advantages:

Largest possible picture: Front projectors generate the biggest possible image size. You can use them to create the very large screen experience of a commercial movie theater in your own home. In theory, actual image size can go up to 300" diagonal or more. But in reality the size of any given projector's image is limited by its light output. Nevertheless, most projectors produce beautiful images at sizes of 90 to 120" diagonal, which is far larger than anything you can get with flat screen TVs or rear-projection TVs.

Smaller images a great option also: Perhaps you don't want a huge image, or maybe you don't have space for one. If this is the case, a projector can be used to throw a smaller image, say about 60" diagonal. So it can serve as an inexpensive substitute for a 60" plasma TV. At this image size the picture is usually very bright, and can be used with some of the room lights on. Given the low cost of many entry level projectors, this can be the least expensive way to get a 60" picture on your wall.

Low cost: Believe it or not, a front projector can be the least expensive alternative for big screen video in your home. Some projectors built for dedicated home theater have now dropped below $1,000, making them much less expensive than flat screen TVs or rear- projection TVs. They can even be cheaper than a regular 36" television. Of course, projectors range in price from very cheap to very expensive depending on a variety of performance factors. But even some of the best ones are now mass-market consumer products and much more affordable than they used to be. And measured on a cost per diagonal inch basis, they are clearly the least expensive video products on the market.

Space saving: A small projector that is mounted on a coffee table, a rear shelf or bookcase, or mounted on a ceiling, takes up no floor space in the room. When not operating. It is largely invisible. Using a projector gets rid of the big box television that really doesn't look very good in the room when it is not being used.

Easy to install: The ease of installation can vary actually. But if you are setting up a simple system on a coffee table or a rear bookshelf and shining it onto a white wall, it really is as easy to set up as a simple television. They are lightweight, and one person can pull it out of the box, hook it up and get a picture on the wall with little trouble. Sometimes some adjustments are

required to fine tune the picture so that it looks its best, but that is true of all video products including conventional televisions.

Limitations:

Dark room often required. Front projectors look their best in a darkened room, just like a movie theater. When you view in a dark room you get maximum contrast and sparkle in the picture. Whether you need a dark room or not depends in part on how bright your projector is, and in part on how picky you are about maintaining maximum image quality. If you are trying to create the "movie theater" experience, this is not really a disadvantage since you want a dark room anyway. However, if you plan to have a lot of family or social gatherings around your screen, a darkened room may not be desired. So your intended usage needs to be considered before selecting a front projector.

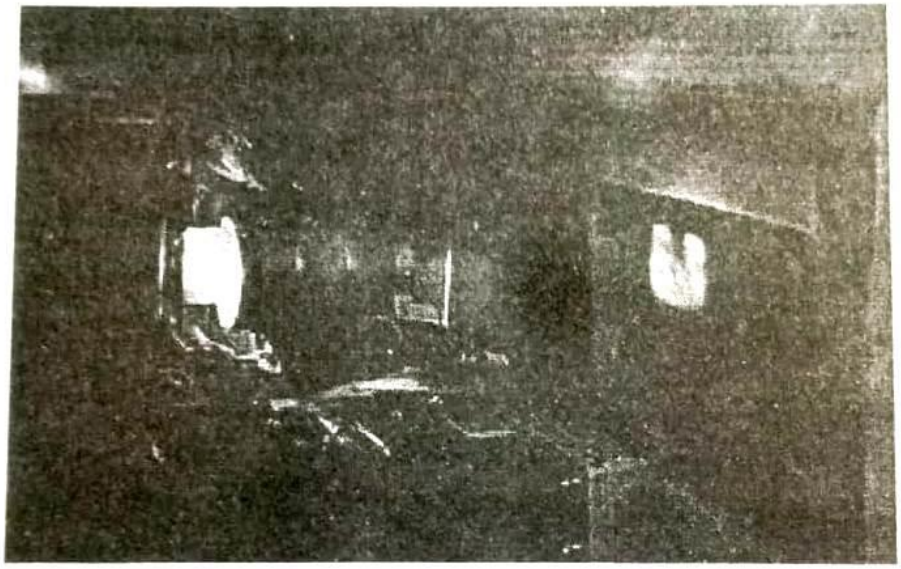
Maintenance required. Most projectors require maintenance attention that flat screen and regular televisions do not. All projectors operate on lamps that need to be replaced periodically, and lamps can cost $300 to $400, or even more in some cases. The frequency of lamp replacement depends on the model and on your usage, but many projector users replace lamps every two to three years.

In addition to lamp replacement, most projectors have air filters that need to be cleared or replaced every couple of months. Failure to keep filters clean can reduce lamp life and increase the chances of dust getting into the unit and creating fuzzy spots on the projected image. Once this happens, a projector usually must be returned to the dealer of manufacturer for cleaning. Some projectors have sealed optics that eliminates this issue but most do not since sealing the optics adds cost to the unit.

Installation can be more involved. As noted above, the ease of installation varies based upon how you want to set it up. If you plan to ceiling mount it, you may need to hire some help to run power and signal cables through the walls. Furthermore, if you are using a projection screen as well, then hooking a fixed screen to the wall, or installing an electric retractable screen on or in the ceiling adds further steps to the installation process. If the projector does not have physical lens shift capability, the job of celling mounting to fit a screen must be done with particular care. (Lens shift is a feature that lets you move the lens up and down, and sometimes sideways, in order to adjust the location of the projected image without moving the projector. Most projectors do not have this feature, and some do.)

Rainbow artifacts. In choosing a projector you should be aware that some users of projectors using DLP technology can see color separation artifacts, commonly known as rainbows, or rainbow artifacts. This is an unfortunate side-effect of the spinning color wheel in the light engine of a DLP projector. Most people are not sensitive to this phenomenon, but those who are can experience it as anything from a minor distraction to a severe flaw that makes the projector unwatchable. In addition to being visually distracting, the effect is also reported to cause headaches and eyestrain. If you are acquiring a DLP projector for home use it is important to verify that you, your spouse, and any other regular viewers are not sensitive to DLP rainbow artifacts.

Separate audio system required. Most projectors either have no audio on board, or if they do, it is not audio you'd want to use for movie presentation. So most people who opt for a projector are also setting up a separate surround sound audio system to go with it (Big pictures look better with big sound.) If budgeting the whole system is too much of a stretch, you can always get the projector today and use your current two-channel stereo as a good audio solution until you have the cash and time to get into the world of multi- channel surround sound.



35 mm movie projector in operation

Self-Check Exercise-2

Q-1: What do you mean by the term projector?

Q-2 Which type of lenses is used in movie projectors?

a) Zoom lens
b) Meniscus lens
c) Concave lens
d) Convex lens

Q-3 Which type of lenses is used in cinema hall?

a) Zoom lens
b) Meniscus lens
c) Concave lens
d) Convex lens

12.4 -Summary: The main precursor to the movie projector was the magic lantern. In its most common setup it had a concave mirror behind a light source to help direct as much light as possible through a painted glass picture slide and a lens, out of the lantern onto a screen. Simple mechanics to have the painted images moving were probably implemented since Christiaan Huygens introduced the apparatus around 1659. Initially candles and oil lamps were used, but other light sources, such as the argand lamp and limelight were usually adopted soon after their introduction. Magic lantern presentations may often have had relatively small audiences, but the very popular phantasmagoria and dissolving views shows were usually performed in proper theatres, large tents or especially converted spaces with plenty seats. A projector or image projector is an optical device that projects an image (or moving images) onto a surface, commonly a projection screen. Most projectors create an image by shining a light through a small transparent lens, but some newer types of projectors can project the image directly, by using lasers. The benefits of projectors in education include making lessons more engaging and interactive, increasing student participation and understanding, and enhancing collaboration and communication among students. It is also observed that the smaller the distance between the mirror and the object, the larger is the image formed. Hence, concave mirrors are used in projectors.

12.5 Glossary:

Typically: In a way that shows the usual qualities of a particular person, type or thing.

Phantasmagoria : is an exhibition of optical effects and illusions.

Silhouettes:
The dark solid shape of somebody/something seen against a light background

12.6 Answers to Self -Check Exercise:

Self -Check Exercise-1

Ans-1: A movie projector is an mechanical device for displaying motion picture film by projecting a onto a screen. Most of the optical and mechanical elements, except for the mination and sound devices, are present in movie cameras.

Self -Check Exercise-2

Ans-1: Projectors are sometimes called "front projectors" or "two-piece projection systems" in reference to the fact that a projector is typically used with a separate screen that is either mounted on a wall or hung from a ceiling.

Ans-2 Convex lens

Self -Check Exercise:

Ans-3 Convex lens

12.7 References and suggested readings: `

- "How Digital Light Processing Works". THRE3D.com. Retrieved 3 February 2014.

- Texas Instruments "DLP3010 Mobile HD Video and Data Display Description & parametrics" Retrieved 2014-10-13
- A The Great Technology War: LCD vs. DLP. By Evan Powell, December 7, 2005. Accessed online at: http://www.projectorcentral.com/lcd_dip_update7.htm?page=Rainbow-Artifacts. Accessed on Dec. 27, 2011.
- "Motion Picture Pioneer. Eadweard Muybridge and the Zoopraxiscope". Retrieved 2012-12-17
- Louis Lumiere, The Lumiere Cinematograph. In: Fielding. Raymond (1979) A technological history of motion pictures and television: an anthology from the pages of the Journal of the Society of Motion Picture and Television Engineers. University of California Press, pp. 49-51. ISBN 0-520-03981-5.
- "Overhead Projectors". National Museum of American History. Retrieved 7 January 2015.
- http://www.life123.com/technology/home-electronics/projectors/who-invented-thoverhead-projector.shtml

12.8 Terminal Questions:

- Describe the use of overhead projector (OHP) for still pictures. Indicate the use of still pictures in classroom teaching.
- What is the use of audio-visual recording instruments in the field of education?
- Discuss the characteristics of slide projectors.
- Write a short note on the movie projector.
- What do you mean by DLP? Give its uses in education.

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Unit-13

HARDWARE TECHNOLOGIES AND THEIR APPLICATIONS CLOSED CIRCUIT TELEVISION

STRUCTURE:

13.1 Introduction:

The communication strategy, teaching strategies and tactics are selected for achieving objectives and generating learning structures. The audio-visual teaching aids also play a significant role for this purpose. Audio-video recording instruments like tape recorder (VCR) and VCD play a very important role in classroom situations. Let us discuss their nature and working as under. Surveillance of the public using CCTV is particularly common in many areas around the world. In recent years, the use of body worn video cameras has been introduced as a new form of surveillance. The audio sense is more active by the use of teaching aids. Classroom films are on curricular subjects produced for promoting learning in specific curricular subjects. A slide projector is a specialized projector which has been designed to be used with slides. Slides are small transparencies mounted in sturdy frames which are ideally suited to magnification and projection, since they have a very high resolution and a resulting high image quality. The use of slide projectors is in decline, as other projection methods have become more popular. Nowadays film projectors are considered obsolete as high-resolution digital projectors offer many advantages over traditional film units. For example, digital projectors contain no moving parts except fans, can be operated remotely, and are relatively compact. They also allow for much easier, less expensive, and more reliable storage and distribution of content, including the ability to display live broadcasts. Recently CCTV technology has been enhanced with a shift toward internet-based products and systems, and other technological developments.

13.2 Learning Objectives:

After reading this chapter, the students will be able to know about:

- Meaning and concept of Closed Circuit Television
- Use of Closed Circuit Television in the field of education

13.3 Closed-circuit television:

Closed-circuit television (CCTV), also known as video surveillance, is the use of video cameras to transmit a signal to a specific place, on a limited set of monitors. It differs from broadcast television in that the signal is not openly transmitted, though it may employ point to point (P2P), point to multipoint (P2MP), or mesh wireless links. Though almost all video cameras fit this definition, the term is most often applied to those used for surveillance in areas that may need monitoring such as banks, casinos, airports, military installations, and convenience stores. Video telephony is seldom called "CCTV" but the use of video in distance education, where it is an important tool, is often so called.

In industrial plants, CCTV equipment may be used to observe parts of a process from a central control room, for example when the environment is not suitable for humans' systems may operate continuously or only as required to monitor a particular event. A more advanced form of utilizing digital video recorders, (DVRs), provides recording for possibly many years, with a variety of quality and performance options and extra features (such as motion detection and email alerts). More recently, decentralized IP cameras, some equipped with megapixel sensors, support recording directly to network-attached storage devices, or internal flash for completely stand-alone operation. Surveillance of the public using CCTV is particularly common in many areas around the world. In recent years, the use of body worn video cameras has been introduced as a new form of surveillance.

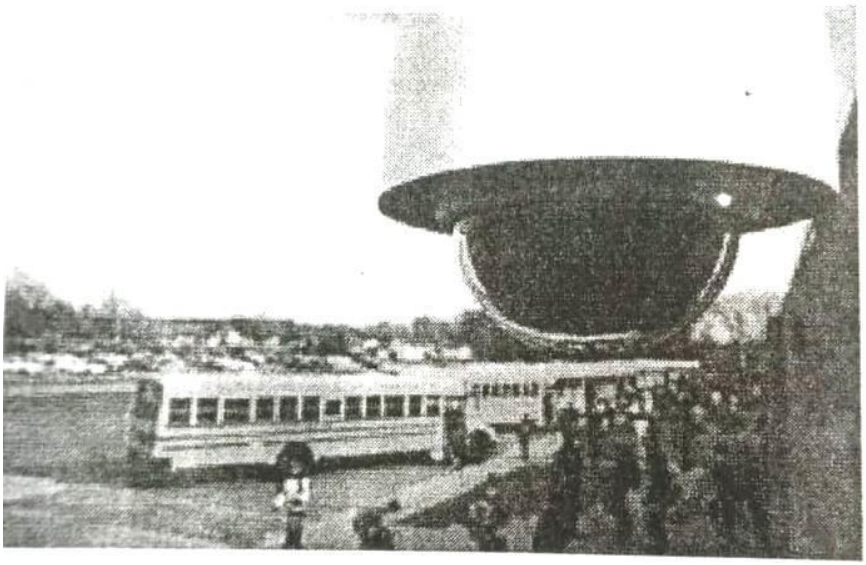
Role of CCTV in Education: The school bell rings and children rush outside eagerly, pushing to get through to the long- awaited freedom that each end of the day guarantees. Scattered papers and pencils are now the only things that clutter the hallways at each day's end. Teachers and school staff hastily complete their lesson plans for the next day, also wanting to get home to their own families and lives. Meanwhile, burglars nearby examine the school for any way to gain entrance undetected. Grant-funded computers and technology are at risk of being stolen, as teachers and staff is unable to incessantly guard the buildings of education around the clock.

The Department of Education published statistics stating that in the 2005-2006 school year, 86 percent of schools nationwide had reported at least one theft, crime, or violent incident, which resulted in a total of 2.2 million crimes. It is impossible to personally monitor every inch of school grounds every single day, so how are school campuses and educational facilities meant to keep their students and staff safe and harbor a sense of security? This is where closed-circuit television, or CCTV, can put up the next line of defense, scanning the perimeters and potentially acting as a deterrent to any future types of criminal activity.

CCTV can serve multiple purposes when utilized by the educational sector. First and foremost, CCTV can provide security services for educational buildings,

guarding the technology and premises from outsiders who have intentions to harm the children, steal costly technology or vandalize school property. CCTV can also protect from threats inside the school, such as proving or disproving accusations of sexual abuse, bullying from other children, or theft from teachers or staff. More recently, CCTV has been put to work as a direct educational tool, being used as a vessel to funnel distance learning to remote areas or to non-traditional learners.

Security cameras have also been used to stop or prevent bullying in schools as well. Bullying has been shown to be very detrimental to a child's health and social wellbeing, so it is crucial to identify and address the perpetrators before victims retaliate or bullies go too far. Installing security cameras would allow for constant monitoring of areas where bullying is suspected to be occurring, and could also possibly discourage any future bullying behaviors. One school in the United States found that once security cameras were installed, the bullying and harassment stopped. Although bullying may still take place outside of school and away from the camera's monitor, security cameras can potentially eliminate bullying on school campuses, which is a slow, but sure step in the right direction. CCTV can also be used as an educational tool to stream learning sessions to remote areas from universities or other educational facilities. There are many people who are unable to attend a traditional classroom setting for a variety of reasons, and this is where CCTV can be used to act as an in-home or off location education setting. Distance education is continuously growing, and is now the most cost-effective education that can be offered to a majority of people. CCTV has many advantages in terms of using it for distance education, such as its quality, control of content, and immediate replay options.



As the world becomes ever more intertwined in technology, CCTV will continue to serve roles in educational facilities by providing security measures against criminal activity and theft, bullying, and vandalism. CCTV in distance learning will continue to grow even more, as more and more countries become developed and are able to access Internet connections more easily. As technology advances, CCTV will perhaps be utilized in even more aspects in order to provide cutting-edge education and assist educators in the learning process of students all around the world.

Self Check Exercise-1

Q-1: Discuss the term closed circuit television.

Q-2: In which country was the first CCTV system introduced?

a) India
b) China
c) Germany
d) USA

Q-3 What is the full form of CCTV?

a) Closed circuit television
b) Circuit capacitor television
c) Community circuit television
d) Closed capacitor Telephone

13.4 Summary:

A slide is a photographic transparency which can be projected. It is a piece of transparent surface like cellulose acetate film, translucent paper, glass etc. of a specific dimension with drawings or pictures which can be mounted individually for use in projector or for viewing by transmitted light. A slide may be in colour or black and white. Different forms of glass slides like photographic, etched glass slide, ink slides etc. may be used for teaching purposes. In overhead projection, a transparent visual is placed on the horizontal stage on top of the light source. The light passes through this transparency and then the reflected at 90-degree angle on the screen at the back of the speaker. Normally Overhead projectors are composed of a projected lamp to act as a source of light, condensing lenses to concentrate all the light into useable beam, a polished mirror and lens assembly and blower for cooling the system. Motion picture as an aid to teaching is inferior to direct experiences. In some cases, motion pictures will be able to provide the expected learning outcome better than even direct experiences. It is a medium through which still visual material are display through projection on the screen. It is a very simple instrument and one does not require any special training to master its operation. The overall use of OHP can be seen under two categories i.e., structure and operation of the instrument and preparation as well as use of the transparencies.

13.5 Glossary:

Surveillance: The careful watching of somebody especially byan organization such as the police or the army

Proportionately: In a way that keeps the same relationship between numbers or amounts

Dramatizations: The reconstruction of an event ,novel,story,etc.in a form suitable for dramatic presentation

13.6 Answers to Self-Check Exercise:

Self-Check Exercise-1

Ans-1: Closed-circuit television (CCTV), also known as video surveillance, is the use of video cameras to transmit a signal to a specific place, on a limited set of monitors.

Ans-2 Germany

Ans- 3 Closed circuit television

13.7 References and suggested readings:

- "How Digital Light Processing Works". THRE3D.com. Retrieved 3 February 2014.
- Texas Instruments "DLP3010 Mobile HD Video and Data Display Description & parametrics" Retrieved 2014-10-13
- Louis Lumiere, The Lumiere Cinematograph. In: Fielding. Raymond (1979) A technological history of motion pictures and television: an anthology from the pages of the Journal of the Society of Motion Picture and Television Engineers. University of California Press, pp. 49-51. ISBN 0-520-03981-5.
- "Overhead Projectors". National Museum of American History. Retrieved 7 January 2015.
- http://www.life123.com/technology/home-electronics/projectors/who-invented-thoverhead-projector.shtml

13.8 Terminal Questions:

- Discuss in detail the role of CCTV in the upliftment of educational system.
- What are the characteristics of CCTV?

Unit-14

HARDWARE TECHNOLOGIES AND THEIR APPLICATIONS AUDIO- VISUAL RECORDING INSTRUMENTS

STRUCTURE:

14.1 Introduction:

Audio Visual is the best approach for communication or sharing the data or information. Audio Visual devices is very effective that because of it uses audio & visuals both for transmitting that in a such way to to create a high-quality useful information which is easy to understand and makes even easier understand. A type of electrical measuring instrument which measures and records the continuous changes of the value of an electrical quantity for a particular period of time is called a recording instrument.The use of tape recorder, radio, record player and gramophone make the learner more active and attentive in teaching process. The visual sense is more active by the use of models and line-drawing in his teaching activities. Motion picture films can be classified as entertainment films and educational films. There are many different types of audio recording devices, including recorders, players, and duplicators. Digital recording devices, such as portable audio recorders, are small and handy, and feature built-in microphones or microphone inputs. A recording instrument is any legal document that is recorded in the public land record system to convey the title of real property or show secured interest or release an interest in a property. Some of the audio video equipment you should consider for your next project include: Microphones — there are many types of microphones you can get depending on the shoot, including wireless, shotgun, stereo, and handheld microphones. This document includes photographs of several physical formats used to record sound and moving images. It is broken up into three categories: magnetic

tape, film, and grooved media. Audio visual or AV communication brings together audio, visual and interactive media components designed to inform, motivate, persuade or simply entertain target audiences. It relies on stimulating the senses through multimedia for a more immersive and memorable experience compared to traditional static content.

14.2 Learning Objectives:

After reading this chapter, the students will be able to know about:

Use of audio-visual recording instruments in the field of education

Meaning and concept of Audio-Visual Recording Instruments

14.3 Audio-Visual Recording Instruments:

The communication strategy, teaching strategies and tactics are selected for achieving objectives and generating learning structures. The audio-visual teaching aids also play a significant role for this purpose. Audio-video recording instruments like tape recorder (VCR) and VCD play a very important role in classroom situations. Let us discuss their nature and working as under:

(1) Tape Recorder: Tape recorder is a useful auditory aid at the service of the teacher. It is an effective recording instrument that can be successfully used for teaching. It calls for the use of auditory senses to convey the educational message to learners. It is an instrument which is used for recording speeches, songs, music and these can be played back at any time and number of times. Recitations, discussions, poems, and dialogues of teachers and students can be recorded and used according to requirements. Students can hear their voices with pleasure and definitely with a sense of pride and elation. Records of gramophone can become useless and unserviceable after some time but tape can be made use of time and again. If some piece or selection is not needed, it can be erased and tape may be used for recording and erasing can go on for a considerable time, till the tape is worm out.

Educational uses of Tape-Recorder:

Educational Uses of Tape Recorder: The advantages of Tape-Recorder in education are discussed as below:

1. **Recording Educational Broadcasts:** Tape-Recorder can be used to record educational broadcasts and for replay at suitable and convenient time. Recordings can be stopped at will to discuss passages to answer questions and to clarify certain points. Recordings can be made to play over and over again. Thus, recordings are two-way communications.
2. **Recording assembly programmes:** Tape-Recorder can be used to record school assembly programmes including talks of important visitors, students, administrators, and programmes like panel discussion, drama, music etc.
3. **Speech Training:** Tape-recorder can widely use in language laboratories for giving speech training and for correction of pronunciation defects. Recording of model talks by teachers or experts

in the languages can be frequently used. Student's talks can also be recorded and played. The mistakes may be pointed out during replay.

4. **Learning of Music:** Tape-recorder can be used for learning instrumental and vocal music. Students can record their performance and then discuss their deficiencies with the teacher. They can have records of their own performances and of an expert's performance and these can be played over and over again until their own defects are completely removed.

5. **Learning of dramatics:** Tape-Recorder can be very useful in learning of dramatics. It can be proved useful for recording rehearsals of school's dramatizations that are to be presented on the radio or school stage for the public. This will help in improving the programmes.

6. **Organization and evaluation of co-curricular activities.** Tape-recorder may help in the organization, conduct and evaluation of various co-curricular activities of the institution.

7. **Improvement of performance:** Tape-recorder can affect an improvement of the performance of those learners who are retarded in any field. When they hear their own recording along with that of others, they tend to improve. The tape recorder can let the pupils hear a variety of such voices as should influence their articulation, tempo and general delivery.

8. **Useful in Micro-Teaching:** In teacher training institutions a tape recorder can be effectively used during the micro-teaching session. The tape recorder is the necessary feedback for discussions to improve the lesson.

Self Check Exercise-1

Q-1: Discuss one use of Tape Recorder in education.

Video-Recording:

A digital video-recorder (DVR) or personal video-recorder (PVR) is a device that records video in a digital format to a disk drive or other medium. The term includes standalone set-top boxes and software for personal computers which enables video capture and playback to and from disc. Some consumer electronics manufacturers have started to offer televisions with DVR hardware and software built in to the television itself. It has also become the main way for CCTV companies to record their surveillance, as it provides far longer recording times than the used VCRs.

Self Check Exercise:2

Q-1: What do you mean by DVR.

Educational Advantages of VCR and VCD:

Experiences of reality: VCR and VCD provide us both auditory and visual experiences of reality. These experiences can be utilized in the classroom or with any group audience according to our experience.

Useful in teaching: The recorder experiences of the VCR and VCD can be utilized for teaching almost all the school subjects including the provision of learning skills regarding the organizations of co-curricular activities.

Feedback to students: The recorder events of the video-camera, VCR or VCD can be used for providing proper feedback to the students in the task of audio instruction or organized classroom teaching-learning experience after observing or evaluating their performances in their real work situations or discussions.

Feedback to student teachers: Video cassette or CD recording or video film can be utilized in providing feedback to the student teachers during their micro-teaching or full dressed rehearsal in actual classroom teaching for improving their teaching skills and teacher behavior.

Training in curricular and co-curricular areas: We can utilized the recorded experiences for arranging a systematic, methodical and enriched procedure for providing training to the students in various curricular and co-curricular areas requiring special skills like laboratory skills, writing and sketching skills, geometrical skills and mathematical skills of surveying estimating proportionately dividing, computing, map drawing, graphical representation, making of models, art and craft material, dancing, gaming proficiency in drill activities, sports and games.

Self-Check Exercise-3

Q-1 What is the full form of CATV?

a) Community Antenna Television
b) Closed Antenna Telephone
c) Circuit Antenna Television
d) Circuit access Telephone

Q-2 A digital video-recorder (DVR) or personal video-recorder (PVR) is a device that records video in a digital format to a disk drive or other medium. **True/False**

Q-3 Tape recorder is a useful …….at the service of the teacher.

14.4 Summary: Audio-video recording teaching aids are used to facilitate both audio and visual senses and encourage listening and observing functions. We can conclude that tape-recorder is an effective teaching aid in the classroom used to record the radio programmes for classroom use students' discussion, debates, speeches at celebrations, corrective works in speech, interview with workers, businessmen and community leaders etc. So, in the last we can say that overhead projector is a frequently used instrument in the classroom and other teaching/learning situations. Audio equipment refers to devices that reproduce, record, or process sound. This includes microphones, radio receivers, AV receivers, CD players, tape recorders, amplifiers, mixing consoles, effects units, headphones, and speakers. In conclusion, good-quality audio is an important part of any event. It can help you communicate effectively, entertain and engage your guests, set the mood, and make your event more accessible. Make sure you invest in a high-quality sound system that can provide the audio you need to make your event a success.

Audio quality plays a crucial role in effective communication. Whether it's ensuring clear and intelligible speech in teleconferencing software, or achieving a clean and consistent dialogue track. The benefits of prioritizing audio quality are evident the world over.

14.5 Glossary:

Standalone:

Able to operate without any other machinery or programs

Considerable: large in extent or degree.

Interactive Media: a method of communication in which a program's outputs depend on the user's inputs.

14.6 Answers to Self-Check Exercise:

Self-Check Exercise-1

Ans-1: Tape-Recorder can be used to record educational broadcasts and for replay at suitable and convenient time. Recordings can be stopped at will to discuss passages to answer questions and to clarify certain points. Recordings can be made to play over and over again. Thus, recordings are two-way communications.

Self-Check Exercise-2

Ans-1-: A digital video-recorder (DVR) or personal video-recorder (PVR) is a device that records video in a digital format to a disk drive or other medium. The term includes standalone set-top boxes and software for personal computers which enables video capture and playback to and from disc.

Self-Check Exercise-3

Ans-1: Community Antenna Television

Ans-2 True

Ans-3 Auditory aid

14.7 References and suggested readings:

- "How Digital Light Processing Works". THRE3D.com. Retrieved 3 February 2014.
- Texas Instruments "DLP3010 Mobile HD Video and Data Display Description & parametrics" Retrieved 2014-10-13
- Louis Lumiere, The Lumiere Cinematograph. In: Fielding. Raymond (1979) A technological history of motion pictures and television: an anthology from the pages of the Journal of the Society of Motion Picture and Television Engineers. University of California Press, pp. 49-51. ISBN 0-520-03981-5.
- "Overhead Projectors". National Museum of American History. Retrieved 7 January 2015.
- http://www.life123.com/technology/home-electronics/projectors/who-invented-thoverhead-projector.shtml

14.8 Terminal Questions:

- What is the use of audio-visual recording instruments in the field of education?
- Discuss the Educational Advantages of VCR and VCD.

Unit-15
SMART CLASSROOM

STRUCTURE:

15.1 Introduction

There is solid research supporting modest academic gains from the use of technology in the classrooms. Smart classes use all interactive modules like videos and presentations and these visually attractive methods of teaching becomes appealing to students who are already struggling with the traditional method of teaching in a classroom. EDUSAT is primarily meant for providing connectivity to school, college and higher levels of education and also to support non-formal education including developmental communication. The digital content may be stored locally, or accessed remotely via computer networks. An electronic library is a type of information retrieval system. A web site may be accessible via a public Internet Protocol (IP) network, such as the Internet, or a private local area network (LAN), by referencing a uniform resource locator (URL) that identifies the site. Web 2.0 describes World Wide Web websites that emphasize user-generated content, usability, and interoperability for end users. Educational resources in the competitive world of higher education were often considered as key intellectual property, so access to those resources was restricted to privileged groups of students and professors, which is unacceptable in today's networked society. Teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others.

15.2 Learning Objectives:

After reading this chapter, the students will be able to know about:

- Meaning and Concept of Smart Classroom

15.3 Meaning and Concept of Smart Classroom:

Smart classrooms are the amalgamation of technology used at the teacher's desk and in front of the classroom, technology in the hands of the student and a physical environment that allows the successful use of that technology.

There is solid research supporting modest academic gains from the use of technology in the classrooms. In addition to academic improvement, there is the opportunity to engage the student more fully, expose them to technology used in the workplace and get immediate feedback of classroom knowledge. Smart classes use all interactive modules like videos and presentations and these visually attractive methods of teaching becomes appealing to students who are already struggling with the traditional method of teaching in a classroom. In fact, smart classes are almost like watching movies as sometimes, animated visuals are used to teach a point. This kind of visual is both eye-catching and young students can easily relate with them. This is because the audio-visual senses of students are targeted and it helps the students store the information fast and more effectively. And then, there is the advantage of utilizing much of the time wasted earlier in drawing or preparing diagrams on board. Smart boards have all these information in memory and can be presented during the time of class lectures and thus, the time saved can be used in more important things.

Some students and teachers have problems with chalk dust and they tend to suffer from allergic reactions. The smart boards save you from such distress and won't let you develop any health issues later. Smart boards are a lot smarter when it comes to field trips which are impossible with textbooks. A field trip to the deserts of Sahara or the rainforests of the Amazon basin becomes easy with visuals in the smart boards of smart classroom. These visuals are definitely more attractive than those descriptions in a few lines of a textbook.

One of the main reasons behind the constant increase in popularity of smart classes is the fact that this kind of education is perfect for all kinds of students. A classroom has students with varied power of understanding and learning, and studying from notes and other materials becomes difficult for some students. But the use of smart classes and modern technology eases the learning process for all students. Moreover, this kind of education in class promotes more interaction between teacher and student with more participation from both sides.

1. **Improving classroom management** SMART Board uses in the classroom at the elementary level increasingly are including management start-of-day routines such as taking attendance and lunch count. For example, before class every day, a first-grade teacher may post large, colorful icons marked with individual student names. The board may also show pictures of the day's lunch choices. Then, instead of waiting for roll call and lunch count or checking in on a magnet board or pocket chart, the students use their fingers to guide their icons to their lunch choices. The teacher views the class and the board to see if the record keeping is complete. Then she can report the attendance and lunch counts.

   This process also helps young students become comfortable with the touch process that is becoming so important in using Wi-Fi digital tools, such as the computer notepads and e-readers that some schools are adopting for instructional use.

2. **Minimizing the need for eyes at the back of the head** Teachers often jokingly say that it takes a few years to develop "eyes" at the back of their heads so they can detect misbehavior when facing away from students. SMART Boards change classroom management by

minimizing the amount of time teachers need to turn their back to the class to write on dry-erase whiteboards or chalkboards.

By connecting a computer to a SMART Board, a teacher can stand face forward and attract student attention to a particular topic by sharing PowerPoint presentations, software lessons or interactive websites with the entire class at one sitting. This occurs before students begin small group or independent work on the same topic.

3. **Providing academic & digital learning** During SMARTBoard lessons, teachers may also help students gain digital and presentation skills by taking turns manipulating the equipment. Think of this practice as the Digital Age equivalent of going up to the blackboard to solve a problem.

   SMART Board uses in the classroom may include teaching various lessons. Examples include:

- Fourth grade fractions made more comprehensible by viewing the movement of virtual tools, such as pictures of cubes, pie graphs and other objects.
- Civil War history for middle school students, who enrich textbook learning by taking a fictional tour of the Underground Railroad in which the class makes choices and sees where those decisions lead.
- Virtual dissection of a frog in high school biology.

4. **Building motion into kindergarten lessons:** Young children have short attention spans and respond better to instruction if it includes movement and hands-on action, such as getting up to answer a question or demonstrating how to use a tool. As one kid-favorite song says, they "like to move it, move it."

   The Australian journal Teaching Science notes that kindergarten students enjoy touching SMART Boards to answer questions and participate in lessons. They also respond well to the colorful graphics that are much easier for a large group to view on a large screen.

   Using electronic pens to circle items or moving virtual objects with their fingers, kindergarten students can sort items on a SMART Board to show what they know about a particular subject. For example, they might be asked to separate objects that need electricity from those that don't

5. Smart class room learning help to increase the learning abilities.

6. Smart class may use as a experimental learning tool to teaching students.

7. The curriculum should be framed keeping in view the application of smart classes of teaching.

8. This strategy helps the learner to move at his own pace as it helps the learners to provide individual instruction.

9. Although students generally work together in small groups in hands on science classes, there are times when all class discussions are valuable. Experimentation, summarizing, comparing, observation and

interpreting often involves the whole class. Teachers can use both small group and whole class approaches to teaching science, and discuss when each may be appropriate.

Self Check Exercise-1

Q-1: What do you mean by the term smart classroom?

Q-2 Which of the following arrangements is an effective supplement for providing teacher -education through distance mode?

a) EDUSAT
b) Smart Classroom,
c) Virtual Universities
d) MO

Q-3 Smart class room learning help to ……. the learning abilities.

15.4 Summary:

GSAT-3, known as EDUSAT is meant for distant class room education from school level to higher education. This was the first dedicated "Educational Satellite" that provide the country with satellite based two way communication to class room for delivering educational materials. EDUSAT is primarily meant for providing connectivity to school, college and higher levels of education and also to support non-formal education including developmental communication. The term digital libraries were first popularized by the NSF/DARPA/NASA Digital Libraries Initiative in 1994. The technology used to create digital libraries is even more revolutionary for archives since it breaks down the second and third of these general rules. In other words, "digital archives" or "online archives" will still generally contain primary sources, but they are likely to be described individually rather than (or in addition to) in groups or collections A site can display the current state of a dialogue between users, monitor a changing situation, or provide information in some way personalized to the requirements of the individual user instead of merely reading a Web 2.0 site, a user is invited to contribute to the site's content by commenting on published articles or creating a user account or profile on the site, which may enable increased participation.

15.5 Glossary:

Eye-catching: Attracting your attention immediately

Digital archives: A place of storage for safekeeping of digital information such as files, invoices, deeds or other documents

Digital Libraries: These are the internet sites consecrated to the creation and preservation of electronic book collections and holdings of other kinds of materials, without the need for end users to purchase the materials they want to consult and read

15.6 Answers to Self-Check Exercise:

Self-Check Exercise-1:

Ans-1: Smart classrooms are the amalgamation of technology used at the teacher's desk and in front of the classroom, technology in the hands of the student and a physical environment that allows the successful use of that technology.

Ans-2 MOOC

Ans-3 Increase

15.7 References and Suggested Readings:

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15.8 Terminal Questions:

1. What do you mean by smart classroom? What is the use of smart classroom in teaching learning process?

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Chapter-16
EDUCATIONAL SATELITE

STRUCTURE:

16.1 Introduction: A satellite is something small or less powerful that orbits around something bigger. It often describes a body in space, such as an artificial satellite that orbits the Earth and beams down signals that power devices like cell phones. A satellite is an object that moves around a larger object. Earth is a satellite because it moves around the sun. The moon is a satellite because it moves around Earth. Earth and the moon are called “natural” satellites. But usually when someone says “satellite,” they are talking about a “man-made” satellite. Satellites have a variety of uses, including communication relay, weather forecasting, navigation (GPS), broadcasting, scientific research, and Earth observation. Additional military uses are reconnaissance, early warning, signals intelligence and, potentially, weapon delivery. Satellites are objects that orbit around other celestial bodies. Satellites of the planets are also called as moons of the planets. India has indeed launched educational satellites, but the most prominent one is EDUSAT. Launched in 2004, EDUSAT was specifically designed to cater to educational needs. It aimed to provide interactive satellite-based distance education to schools and colleges across the country. Student Satellite (STUDSAT) is the first pico-satellite developed in the country by a consortium of seven engineering colleges from Karnataka and Andhra Pradesh. SARAL is not an Indian University Satellite, launched for academic purposes. The Satellite with ARGOS and ALTIKA (SARAL) is a joint Indo-French satellite mission for oceanographic studies.

16.2 Learning Objectives:

After reading this chapter, the students will be able to know about:

- Meaning and Concept of Educational satellite

16.3 Educational satellite:

Keeping in view usefulness of the INSAT in educational programmes MHRD visualized EDUSAT project in October 2002. The satellite was launched on 20 September 2004. EDUSAT is the first Indian satellite built exclusively for serving the

educational sector offering an interactive satellite-based distance education system for the country. It is specially configured for the audiovisual medium, employing digital interactive classroom and multimedia multicenter systems. EDUSAT is primarily meant for providing connectivity to school, college and higher levels of education and also to support non-formal education including developmental communication. The Primary agenda of the satellite was to provide distance learning facilities to the students of the nooks and corners of the nation and specially help strengthen the education for all constraints of the nation. The satellite had been first placed in the 1014 seconds, which is almost 5000 km away from Srihari Kota. And this great satellite was deactivated in the year 2010 and was restored in one of the grave yard orbits. On the 21st September, the Indian Space Research Organization (ISRO) successfully launched a rocket in to space carrying a 1950 kg satellite dedicated to the cause of education, 'EDUSAT'. The rocket was launched from the country's only spaceport at Srihari Kota and placed its payload on a designated orbit, 5000 km away minutes later.

It is mainly intended to meet the demand for an interactive satellite-based distance education system for the country. It strongly reflects India's commitment to use space technology for national development, especially for the development of the population in remote and rural locations.

The 1950 kg EDUSAT was launched into a Geosynchronous Transfer Orbit (GTO) by ISRO's Geosynchronous Satellite Launch Vehicle (GSLV). From GTO, EDUSAT will reach the 36,000 km high Geostationary Orbit (GSO) by firing, in stages its on board Liquid Apogee Motor (LAM). In GSO, the satellite will be co-located with KALPANA-1 and INSAT-3C satellites at 74 deg East longitude.

EDUSAT is expected to have a life of seven years in space, during which it will help educational institutions make up for, among other things, the dearth of good teachers by providing connectivity with classrooms far away.

The universalization of education has become the top priority in India, especially for the developing countries.

But the extension of quality education to remote and rural regions becomes a Herculean task for a large country like India with multi-lingual and multi-cultural population separated by vast geographical distances. There is a lack of adequate rural educational infrastructure and non-availability of good teachers in sufficient numbers which adversely affect efforts made in education.

Compared to other satellites launched in the same series so far, EDUSAT will have several new technologies.

Use of Educational satellite in the field of Education:

1. **Distance Learning:** Education satellites enable distance learning programs by providing access to educational resources, lectures, and interactive sessions to students in remote or underserved areas. These satellites can broadcast educational content to a wide audience, allowing students to learn from anywhere with an internet connection.
2. **Research and Development:** Education satellites are used as platforms for conducting scientific research and experiments in fields such as physics, astronomy, earth sciences, and technology. Students and researchers can design and implement experiments in microgravity environments or study phenomena that are only observable from space.

3. **Global Connectivity:** Education satellites help connect schools, universities, and research institutions around the world, facilitating collaboration and knowledge sharing on an international scale. These satellites can support communication networks that enable real-time data exchange, video conferencing, and collaborative projects among educational institutions.
4. **Earth Observation:** Education satellites equipped with remote sensing instruments can be used to monitor and study various aspects of the Earth, such as environmental changes, weather patterns, natural disasters, and urban development. Students can analyze satellite imagery and data to learn about environmental science, geography, and climate change.
5. **Technology Development:** Education satellites provide opportunities for students to gain hands-on experience in designing, building, and operating satellite systems. By participating in satellite projects, students can learn about spacecraft engineering, communication systems, propulsion technologies, and space mission management, preparing them for careers in the aerospace industry.

Self -Check Exercise-1

Q-1 Which was the first satellite for education launched by ISRO?

a) Apple
b) Chandrayaan
c) Sputnik 1
d) Edusat

Q-2 CIET is a unit of which of the following organizations?

a) SIET
b) SCERT
c) NCERT
d) EMMRC

Q-3 MHRD visualized EDUSAT project in October 2002. **True/False**

Q-4 EDUSAT is expected to have a life of …….. years in space.

16.4 Summary: EDUSAT, a satellite specially designed for facilitating distance education in India has been launched in September 2004. This satellite using Ku band covers the whole country. ISRO has setup this satellite based interactive network, to meet the requirements of various users in education sector. Already having EDUSAT, a satellite completely dedicated for educational sector, can provide connectivity to schools, colleges and other non formal education institutions to deliver e-learning, covering a large geographical area to reach the masses residing

in the remote areas as well. Satellites are useful in navigation, mobile phone communication, and weather forecast. Information about changing weather conditions is recorded by the satellites and used for the weather forecast. We can talk on the phone due to the communication signals provided by the satellites. Usually, the word “satellite” refers to a machine that is launched into space and moves around Earth or another body in space. Still other satellites are used mainly for communications, such as beaming TV signals and phone calls around the world. A group of more than 20 satellites make up the Global Positioning System, or GPS. If you have a GPS receiver, these satellites can help figure out your exact location. Satellites come in many shapes and sizes. But most have at least two parts in common – an antenna and a power source. The antenna sends and receives information, often to and from Earth. The power source can be a solar panel or battery. Solar panels make power by turning sunlight into electricity.Many NASA satellites carry cameras and scientific sensors. Sometimes these instruments point toward Earth to gather information about its land, air and water. Other times they face toward space to collect data from the solar system and universe.

16.5 Glossary:

Longitude: measures distance east or west of the prime meridian.

Universalisation: A process of homogenization towards the utopic idea of universal unity and an obligation to the presupposition of universality.

Accreditation: the act of granting credit or recognition, especially to an educational institution that maintains suitable standards.

16.6 Answers to Self-Check Exercise:

Self-Check Exercise-1

Ans-1: EDUSAT

Ans-2 NCER

Ans-3 True

Ans-4 Seven

16.7 References and Suggested Readings:

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16.8 Terminal Questions:

1. What do you mean by Educational Satellite? Discuss its use in Education.

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Unit-17
DIGITAL LIBRARY

STRUCTURE:

17.1 Introduction

In addition to academic improvement, there is the opportunity to engage the student more fully, expose them to technology used in the workplace and get immediate feedback of classroom knowledge. The digital content may be stored locally, or accessed remotely via computer networks. An electronic library is a type of information retrieval system. A web site may be accessible via a public Internet Protocol (IP) network, such as the Internet, or a private local area network (LAN), by referencing a uniform resource locator (URL) that identifies the site. Web 2.0 describes World Wide Web websites that emphasize user-generated content, usability, and interoperability for end users. A distinction is often made between content that was created in a digital format, known as born-digital, and information that has been converted from a physical medium, e.g., paper, through digitization. It should also be noted that not all electronic content is in digital data format. Websites have many functions and can be used in various fashions; a website can be a personal website, a commercial website, a government website or a non-profit organization website. Teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others.

17.2 Learning Objectives:

After reading this chapter, the students will be able to know about:

- Concept and advantages of Digital library

17.3 Digital library:

A digital library is a special library with a focused collection of digital objects that can include text, visual material, audio material, video material, stored as

electronic media formats (as opposed to print, microform, or other media), along with means for organizing storing, and retrieving the files and media contained in the library collection. Digital libraries can vary immensely in size and scope, and can be maintained by individuals' organizations, or affiliated with established physical library buildings or institutions, or with academic institutions. The digital content may be stored locally, or accessed remotely via computer networks. An electronic library is a type of information retrieval system. A distinction is often made between content that was created in a digital format, known as born-digital, and information that has been converted from a physical medium, e.g., paper, through digitization. It should also be noted that not all electronic content is in digital data format. Many academic libraries are actively involved in building Institutional repositories of the institution's books, papers, theses, and other works which can be digitized or were 'born digital. A fundamental characteristic of archives is that they have to keep the context in which their records have been created and the network of relationships between them in order to preserve their informative content and provide understandable and useful information over time. Most digital libraries provide a search interface which allows resources to be found. These resources are typically deep web (or invisible web) resources since they frequently cannot be located by search engine crawlers. Some digital libraries create special pages or sitemaps to allow search engines to find all their resources. In the past few years, procedures for digitizing books at high speed and comparatively low cost have improved considerably with the result that it is now possible to digitize millions of books per year. Google book-scanning project is also working with [10] libraries to offer digitize books pushing forward on the digitize book

realm.

Self Check Exercise-1

Q-1: What do you mean by digital library?

Advantages:

The advantages of digital libraries as a means of easily and rapidly accessing books, archives and images of various types are now widely recognized by commercial interests and public bodies alike.

Traditional libraries are limited by storage space; digital libraries have the potential to store much more information, simply because digital information requires very little physical space to contain it. As such, the cost of maintaining a digital library can be much lower than that of a traditional library. A physical library must spend large sums of money paying for staff, book maintenance, rent, and additional books.Digital libraries may reduce or, in some instances, do away with these fees. Both types of libraries require cataloging input to allow users to locate and retrieve material. An important advantage to digital conversion is increased accessibility to users. They also increase availability to individuals who may not be traditional patrons of a library, due to geographic location or organizational affiliation.

- **No physical boundary.** The user of a digital library need not to go to the library physically; people from all over the world can gain access to the same information, as long as an Internet connection is available.
- **Round the clock availability.** A major advantage of digital libraries is that people can gain access 24/7 to the information.

- **Multiple Access.** The same resources can be used simultaneously by a number of institutions and patrons. This may not be the case for copyrighted material: a library may have a license for "lending out only one copy at a time; this is achieved with a system of digital rights management where a resource can become inaccessible after expiration of the lending period or after the lender chooses to make it Inaccessible (equivalent to returning the resource).
- **Information retrieval.** The user is able to use any search term (word, phrase, title, name, and subject) to search the entire collection. Digital libraries can provide very user-friendly interfaces, giving click able access to its resources.
- **Preservation and conservation.** Digitization is not a long-term preservation solution for physical collections, but does succeed in providing access copies for materials that would otherwise fall to degradation from repeated use. Digitized collections and born-digital objects pose many preservations and conservation concerns that analog materials do not. Please see the following "Problems" section of this page for examples.
- **Space.** Whereas traditional libraries are limited by storage space, digital libraries have the potential to store much more information; simply because digital information requires very little physical space to contain them and media storage technologies are more affordable than ever before.
- **Added value.** Certain characteristics of objects, primarily the quality of images, may be improved. Digitization can enhance legibility and remove visible flaws such as stains and discoloration.

Self Check Exercise-2

Q-1: Write one use of digital library.

Q-2 The five assumptions about libraries coined by:

a) S.R. Ranganathan

b) S. Radhakrishnan

c) David W. Lewis

d) David L. Rogers

17.4 Summary:

“Library -- from the Latin liber, meaning "book." In Greek and the Romance languages, the corresponding term is bibliotheca. A collection or group of collections of books and/or other print or non-print materials organized and maintained for use (reading, consultation, study, research. Library system means two or more public libraries cooperating in a system approved by the commission to improve library service and to make their resources accessible to all residents of the area the libraries serve. By providing free access to educational, news, and historical resources, libraries help keep the public informed with facts, rather than confused with fiction. They act as a hub of information, and their leaders, the librarians, torch

bearers for facts. In the past few years, procedures for digitizing books at high speed and comparatively low cost have improved considerably with the result that it is now possible to digitize millions of books per year. Google book-scanning project is also working with libraries to offer digitize books pushing forward on the digitize book realm. The term digital libraries were first popularized by the NSF/DARPA/NASA Digital Libraries Initiative in 1994. Any website can contain a hyperlink to any other website, so the distinction between individual sites, as perceived by the user, can be blurred. The technology used to create digital libraries is even more revolutionary for archives since it breaks down the second and third of these general rules. In other words, "digital archives" or "online archives" will still generally contain primary sources, but they are likely to be described individually rather than (or in addition to) in groups or collections.

17.5- Glossary:

Organization: A group of people who form a business, club etc. together in order to achieve a particular aim

Typically- In a way that shows the usual qualities of a particular person, type or thing

Abstraction: The process of taking away or removing characteristics from something in order to reduce it to a set of essential characteristics

17.6 Answers to Self-Check Exercise:

Self-Check Exercise-1

Ans-1: A digital library is a special library with a focused collection of digital objects that can include text, visual material, audio material, video material, stored as electronic media formats (as opposed to print, microform, or other media), along with means for organizing storing, and retrieving the files and media contained in the library collection.

Self-Check Exercise-2

Ans-1: The user of a digital library need not to go to the library physically; people from all over the world can gain access to the same information, as long as an Internet connection is available.

Ans-2: David W. Lewis

17.7 References and Suggested Readings:

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17.8 Terminal Questions:

1. What do you mean by smart Library? What is the use of digital library in teaching learning process?

2 Write a short note on digital library with examples.

Unit-18

WEB SITE, 2.0 WEB TECHNOLOGIES

STRUCTURE:

18.1-Introduction: A website is a collection of webpages that are accessed with a single domain name or URL. It includes all the individual pages, multimedia details and files stored on a web server. Websites are built using languages like HTML, CSS and JavaScript to make visually appealing layouts and functionality. Websites are typically dedicated to a particular topic or purpose, such as news, education, commerce, entertainment, or social media. A website is whatever the website owner wants it to be. It could be informational, educational, divisive – you name it. A website is essentially a platform for an individual or business to express themselves and utilize in whichever way they choose. Websites provide an easier way to handle customer service. Offering answers to regularly asked questions in a FAQ (Frequently Asked Questions) section, you can reduce customer service costs and save yourself time and money, as well as providing much more information. An educational website is a huge interactive platform to present various information for different types of people: future students, current students, teachers, parents, those who want to get a new profession, etc. All the sections have to be well-balanced and organized so users can easily find everything they need. Web 2.0 describes the current state of the internet, which has more user-generated content and usability for end-users compared to its earlier incarnation, Web 1.0. Web 2.0 generally refers to the 21st-century internet applications that have transformed the digital era in the aftermath of the dotcom bubble. Web 2.0 refers to publisher sites that allow users to create their pages with a unique URL. For instance, social media platforms are a common type of web 2.0 sites you'd find across the web, but they are far from the only ones. Video-sharing platforms or social bookmarking sites also fit into this category.

18.2 Learning Objectives:

After reading this chapter, the students will be able to know about:

- The use of Web site in educational process
- Meaning and concept of 2.0 web technology

18.3- Web site:

A website, also written as web site, is a collection of related web pages, including multimedia content, typically identified with a common domain name, and published on at least one web server. A web site may be accessible via a public Internet Protocol (IP) network, such as the Internet, or a private local area network (LAN), by referencing a uniform resource locator (URL) that identifies the site. All publicly accessible websites collectively constitute the World Wide Web, while private websites are typically a part of an intranet. Web pages, which are the building blocks of websites, are documents typically composed in plain text interspersed with formatting instructions of Hypertext Markup Language (HTML, XHTML) They may incorporate elements from other websites with suitable markup anchors. Web pages are accessed and transported with the Hypertext Transfer Protocol (HTTP), which may optionally employ encryption (HTTP Secure, HTTPS) to provide security and privacy for the user. The user's application, often a web browser, renders the page content according to its HTML markup instructions onto a display terminal.

Websites have many functions and can be used in various fashions; a website can be a personal website, a commercial website, a government website or a non-profit organization website. Websites can be the work of an individual, a business or other organization, and are typically dedicated to a particular topic or purpose. Any website can contain a hyperlink to any other website, so the distinction between individual sites, as perceived by the user, can be blurred.

A website is hosted on a computer system known as a web server, also called an HTTP server. These terms can also refer to the software that runs on these systems which retrieves and delivers the web pages in response to requests from the website's users.

Self Check Exercise-1

Q-1: What do you mean by website?

Advantages of Websites in the field of education:

Enhancing student-to-student and faculty-to-student

Communication:

Web-based education tools provide many ways to increase communication between class members and faculty, including discussion boards, chats, and emails. Researchers have found that adding these elements to a course increases student motivation and participation in class discussions and projects.

Students share perspectives:

Online forums, like Course Info's Discussion board and Chat, provide public areas to post information. Each student can view another student's answers and learn through the exposure to different perspectives. This benefits students because they can combine new opinions with their own, and develop a solid foundation for learning.

Students experience a sense of equality:

Another benefit to using web-based communication tools is to give all students a reinforced sense of equality. Each individual has the same opportunity to "speak up" by posting messages without typical distractions such as seating arrangements, volume of student voices, and gender biases. Shy and anxious students feel more comfortable expressing ideas and backing up facts when posting online instead of speaking in a lecture room. Studies prove that online discussions provoke more confrontational and direct communication between students.

Enabling student-centered teaching approaches:

Every student has a unique learning style. Some students are visual learners some learn better when they "learn by doing." Web-based learning environments permit the instructor to build one course, yet implement a variety of resources, so Students can utilize materials in whichever way works best for them. For example: Instructors can use Course Info's Course Documents and Course Information areas to post all sorts of support documents for students, including handouts, audio clips, java students, they can access content and review it at a self-determined pace. This provides increased opportunities for students to view and review course elements without creating an additional drain on TAs or instructors.

Accommodate different learning styles:

An instructor can also present these materials in many formats to accommodate different types of learning styles. For example, if an instructor puts both lecture notes and slides online, both visual and auditory learners benefit. Students who prefer to focus on "listening" and "watching" during lecture do not have to worry that they are missing important concepts while scrambling to take copious notes. They can focus on understanding the material and concepts as they are presented. Students with attention difficulties or those who get overwhelmed by organizational tasks also benefit, because materials provided show how the instructor has grouped and prepared materials in the handouts, and indicate what items are most important.

Provide opportunities for exploration

Instructors can also provide increased opportunity for student exploration and activity learning by putting related web sites into Course Info's External Links feature. When instructors reference these types of web sites content reinforcement is provided as students can see how course material is utilized in "real world" situations.

Encourage additional rehearsal time:

Additional benefits for those who "learn by doing" occur when students participate in online discussions, as students are exposed to an extra period of information rehearsal. Typically, students rehearse information when they study for exams or complete assignments. However, they also rehearse information when formulating thoughts into sentences and typing those thoughts into the computer.

Self Check Exercise-2

Q-1: Write one advantage of website in education.

18.4 2.0 web technology

A second generation in the development of the World Wide Web, conceived as a combination of concepts, trends, and technologies that focus on user collaboration, sharing of user-generated content, and social networking. Web 2.0 describes World Wide Web websites that emphasize user-generated content, usability, and interoperability for end users. The term was popularized by Tim O'Reilly and Dale Dougherty at the O'Reilly Media Web 2.0 Conference in late 2004, though it was coined by Darcy DiNucci in 1999. Web 2.0 does not refer to an update to any technical specification, but to changes in the way Web pages are made and used.

A Web 2.0 site may allow users to interact and collaborate with each other in a social media dialogue as creators of user-generated content in a virtual community, in contrast to the first generation of Web 1.0-era websites where people were limited to the passive viewing of content. Examples of Web 2.0 include social networking sites, blogs, wikis, video sharing sites, hosted services, Web applications, collaborative consumption platforms. With the advent of Web 2.0, it was more common for the average web user to have social networking profiles on sites such as Myspace and Face book, as well as personal blogs on one of the new low-cost web hosting services or a dedicated blog host like Blogger or Live Journal. The content for both were generated dynamically from stored content, allowing for readers to comment directly on pages in a way that was not previously common. Web 2.0 could allow for more collaborative education. For example, blogs give students a public space to interact with one another and the content of the class. Some studies suggest that Web 2.0 can increase the public's understanding of science, which could improve governments' policy decisions. A 2012 study by researchers at the University of Wisconsin-Madison notes that "...the internet could be a crucial tool in increasing the general public's level of science literacy. This increase could then lead to better communication between researchers and the public, more substantive discussion, and more informed policy decision.

Self Check Exercise-3

Q-1: Write a short note on 2.0 web technology.

Advantages of 2.0 web technology in education:

There are many benefits of using technology in the classroom, especially as students become increasingly digitally literate. The shift in worldwide computer usage and the need for computer skills in today's workforce have pushed the United States government to create guidelines, such as the Core Curriculum Content Standards, for educators to ensure that students are prepared to meet the demands of the 21st century. Technology in the classroom enables the use of more interactive educational tools, which allows for a dynamic learning experience that directly benefits students. Web 2.0 interaction involves not only sharing ideas and information with someone else but also receiving feedback, as classroom computer technology is being used for different types of communication (for presentation, for class interaction, and for collaboration), students are required to be readers, writers, editors, and publishers and must be willing to collaborate and co-create closely with

others - all skills that are critical for students to learn as they grow and enter the workplace.

Another advantage of using technology in the classroom is its flexibility and adaptability to differentiated learning. Technologies such as podcasts and vodcasts, for instance, provide students with the opportunity to learn at their own pace and the freedom to go back and relearn content whenever they want. The increasing focus on technology use in schools and the shifts in ways that modern-day learners communicate have impacted how computers are used in the classroom. Currently, teachers utilize various Web 2.0 tools to enhance their instruction. Such tools are also being used to extend classroom communication outside of campus.

Through the implementation and integration of Web 2.0 computer technologies into the classroom setting, students are able to have new authentic and meaningful learning experiences.

Another advantage of using technology in the classroom is its flexibility and adaptability to differentiated learning.

Criticism of 2.0 web technology:

Critics of the term claim that "Web 2.0" does not represent a new version of the World Wide Web at all, but merely continues to use so-called "Web 1.0" technologies and concepts. First, techniques such as Ajax do not replace underlying protocols like HTTP, but add an additional layer of abstraction on top of them. Second, many of the ideas of Web 2.0 were already featured in implementations on networked systems well before the term "Web 2.0" emerged. Amazon.com, for instance, has allowed users to write reviews and consumer guides since its launch in 1995, in a form of self-publishing. Amazon also opened its API to outside developers in 2002.1511 Previous developments also came from research in computer-supported collaborative learning and computer supported cooperative work (CSCW) and from established products like Lotus Notes and Lotus Domino, all phenomena that preceded Web 2.0.

Self-Check exercise-4

Q-1 Who propound the theory of disruptive technologies in the year 2000?

a) Clayton Christensen
b) Elon mask
c) John Fallon
d) None of the above

Q-2 A website is hosted on a computer system known as a web server, also called an HTTP server.
True/False

Q-3 A Web 2.0 site may allow users to ……. with each other in a social media dialogue.

18.5 Summary:

A site can display the current state of a dialogue between users, monitor a changing situation, or provide information in some way personalized to the

requirements of the individual user instead of merely reading a Web 2.0 site, a user is invited to contribute to the site's content by commenting on published articles or creating a user account or profile on the site, which may enable increased participation. First, techniques such as Ajax do not replace underlying protocols like HTTP, but add an additional layer of abstraction on top of them.The shift in worldwide computer usage and the need for computer skills in today's workforce have pushed the United States government to create guidelines, such as the Core Curriculum Content Standards, for educators to ensure that students are prepared to meet the demands of the 21st century. Technology in the classroom enables the use of more interactive educational tools, which allows for a dynamic learning experience that directly benefits students. Web 2.0, term devised to differentiate the post-dotcom bubble World Wide Web with its emphasis on social networking, content generated by users, and cloud computing from that which came before. The 2.0 appellation is used in analogy with common computer software naming conventions to indicate a new, improved version. The term had its origin in the name given to a series of Web conferences, first organized by publisher Tim O'Reilly in 2004. The term's popularity waned in the 2010s as the features of Web 2.0 became ubiquitous and lost their novelty.

18.6-Glossary:

Interoperability: the degree to which a software system, devices, applications or other entity can connect and communicate with other entities in a coordinated manner without effort from the end user.

Ubiquitous: Existing or being everywhere at the same time :constantly encountered : widespread.

Specification: A clear, detailed plan or description of how something will be made

18.7-Answers to Self-Check Exercise:

Self-Check Exercise-1

Ans-1: A website, also written as web site, is a collection of related web pages, including multimedia content, typically identified with a common domain name, and published on at least one web server. A web site may be accessible via a public Internet Protocol (IP) network, such as the Internet, or a private local area network (LAN), by referencing a uniform resource locator (URL) that identifies the site.

Self-Check Exercise-2

Ans-1: Informative Platform for Educational Institutes. A website is a platform where anyone can have access.

Self-Check Exercise-3

Ans-1: Web 2.0 describes World Wide Web websites that emphasize user-generated content, usability, and interoperability for end users. The term was popularized by Tim O'Reilly and Dale Dougherty at the O'Reilly Media Web 2.0 Conference in late 2004, though it was coined by Darcy DiNucci in 1999. Web 2.0 does not refer to an update to any technical specification, but to changes in the way Web pages are made and used.

Self-Check Exercise-4

Q-1: Clayton Christensen

Q-2: True

Q-3:Interact and collaborate

.

18.8 References and Suggested Readings:

- Witten, lan H., Bainbridge, David Nichols. Accessed January 31, 2014
- Castagne, Michel "institutional repository software comparison: DSpace, EPrints, Digital Commons Islandora and Hydra open library ubc.ca Retrieved 2016-04-25
- Bet Suzanne (2015) Librarian's Guide to Online Searching Cultivating Database Skills for Research and Instruction 4th Edition Cultivating Database Skills for Research and Instruction p. 69. ISBN 1610699998
- Edward A Fox The Digital Libraries Initiative Update and Discussion, Bulletin of the America Society of Information Science, Vol 26, No 1, October/November 1999.
- [ab]Graham, Paul (November 2005). "Web 2.0" Retrieved 2006-08-02 1 first heard the phrase Web 2.0 in the name of the Web 2.0 conference in 2004
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- "Internet History-One Page Summary", The Living Internet, Bill Stewart (ed), January 2000
- "So, who really did invent the Internet?", lan Peter, The Internet History Project, 2004. Retrieved 27 June 2014

18.9 Terminal Questions:

1. 2. What is the meaning of 2.0 web technology? Write the advantages of 2.0 web technology in education.
2. Write a short note on digital library and website.

Unit-19

MEANING AND NATURE OF OPEN EDUCATION RESOURCES

STRUCTURE:

19.1 Introduction

Today, an increasing number of institutions and individuals share such digital resources via the Internet free of any legal, financial or technical barriers. Open Educational Resources (OER) are the right way which enables free and accessible education to everyone and access to knowledge as public good. OER cherish the culture of participation, collaboration and sharing and with an open access to scientific information it brings a notable contribution in knowledge society development.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". An electronic library is a type of information retrieval system. A web site may be accessible via a public Internet Protocol (IP) network, such as the Internet, or a private local area network (LAN), by referencing a uniform resource locator (URL) that identifies the site. Web 2.0 describes World Wide Web websites that emphasize user-generated content, usability, and interoperability for end users. Educational resources in the competitive world of higher education were often considered as key intellectual property, so access to those resources was restricted to privileged groups of students and professors, which is unacceptable in today's networked society. Teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others. The Wiki Educator project suggests that OER refers to educational resources (lesson plans, quizzes, syllabi, instructional modules, simulations, etc.) that are freely available for use, reuse, adaptation, and sharing'. Since OER are intended to be available for a variety of educational purposes, most organizations using OER neither award degrees nor provide academic or administrative support to students

seeking college credits towards a diploma from a degree granting accredited institution.

19.2 Learning Objectives:

After reading this chapter, the students will be able to know about:

Meaning and Nature of open education resources with its advantages and disadvantages.

19.3 Meaning and Nature of Open Education Resources:

Educational resources in the competitive world of higher education were often considered as key intellectual property, so access to those resources was restricted to privileged groups of students and professors, which is unacceptable in today's networked society. Today, an increasing number of institutions and individuals share such digital resources via the Internet free of any legal, financial or technical barriers. Open Educational Resources (OER) are the right way which enables free and accessible education to everyone and access to knowledge as public good. OER cherish the culture of participation, collaboration and sharing and with an open access to scientific information it brings a notable contribution in knowledge society development.

The idea of open educational resources (OER) has numerous working definitions. The term firstly coined at UNESCO's 2002 Forum on Open Courseware and designates "teaching, learning and research materials in any medium, digital or otherwise, that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions. Open licensing is built within the existing framework of intellectual property rights as defined by relevant international conventions and respects the authorship of the work". Often cited is the William and Flora Hewlett Foundation term which defines OER as:

"Teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others. 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".

The Organization for Economic Co-operation and Development (OECD) defines OER as: "digitized materials offered freely and openly for educators, students, and self-learners to use and reuse for teaching, learning, and research. OER includes learning content, software tools to develop, use, and distribute content, and implementation resources such as open licenses". (This is the definition cited by Wikipedia's sister project, Wikiversity.) By way of comparison, the Commonwealth of Learning "has adopted the widest definition of Open Educational Resources (OER) as 'materials offered freely and openly to use and adapt for teaching, learning, development and research". The Wiki Educator project suggests that OER refers to educational resources (lesson plans, quizzes, syllabi, instructional modules, simulations, etc.) that are freely available for use, reuse, adaptation, and sharing'.

The above definitions expose some of the tensions that exist with OER:

- **Nature of the resource:** Several of the definitions above limit the definition of OER to digital resources, while others consider that any educational resource can be included in the definition.
- **Source of the resource:** While some of the definitions require a resource to be produced with an explicit educational aim in mind, others broaden this to include any resource which may potentially be used for learning
- **Level of openness:** Most definitions require that a resource be placed in the public domain. Others require for use to be granted merely for educational purposes, or exclude commercial uses.

At the same time, these definitions also share some universal commonalities, namely all:

Cover both use and reuse, repurposing, and modification of the resources;

Include free use for educational purposes by teachers and learners

Encompass all types of digital media

Self-Check Exercise-1

Q-1: What do you mean by OER?

Advantages and disadvantages of open educational Resources:

Advantages of OERS:

1. Flexibility for instructors to draw from multiple resources to support course learning without requiring students to spend money on multiple books. 2. Infinite opportunities for collaboration among OER developers. 3. Promises to make higher education more accessible to people from all around the globe. 4. Web-based resources can be "living textbooks that are constantly updated with new information and technology developments. 5. Save students on textbook costs.

Self-Check Exercise-2

Q-1: Write two advantages of O.E.R.

Disadvantages of OER:

- Inconsistent quality control.
- Inconsistent availability across disciplines and/or across specific content areas within disciplines.
- Reliance on web-based resources presents potential problems with unequal access for students who do not have broadband internet connections. This could be solved with 24-hour computer labs on campus!
- Unrealistic expectations from administrators as to the extra time it takes for faculty to incorporate OER into their courses. To some degree this is can be just a cost-shifting exercise where the money the students save is due to uncompensated extra time put in by faculty.
- Uncertainty in ongoing maintenance of web-based resources.

Self-Check Exercise-3

Q1 …….is the characteristics of online library.

a) Lower maintenance cost
b) Maximum physical space for storage
c) Less fees
d) Easiness in reading

Q2 Web-based resources can be "living textbooks that are constantly updated with new information and technology developments. **True/False**

Q3 Uncertainty in ongoing maintenance of web-based resources is one of the limitations of OER. **True/False**

Q4 The term OER firstly coined at ……. 2002 Forum on Open Courseware.

19.4 Summary:

Smart classes use all interactive modules like videos and presentations and these visually attractive methods of teaching becomes appealing to students who are already struggling with the traditional method of teaching in a classroom. EDUSAT is primarily meant for providing connectivity to school, college and higher levels of education and also to support non-formal education including developmental communication. The term digital libraries were first popularized by the NSF/DARPA/NASA Digital Libraries Initiative in 1994. The technology used to create digital libraries is even more revolutionary for archives since it breaks down the second and third of these general rules. In other words, "digital archives" or "online archives" will still generally contain primary sources, but they are likely to be described individually rather than (or in addition to) in groups or collections A site can display the current state of a dialogue between users, monitor a changing situation, or provide information in some way personalized to the requirements of the individual user instead of merely reading a Web 2.0 site, a user is invited to contribute to the site's content by commenting on published articles or creating a user account or profile on the site, which may enable increased participation. Since OER are intended to be available for a variety of educational purposes, most organizations using OER neither award degrees nor provide academic or administrative support to students seeking college credits towards a diploma from a degree granting accredited institution.

19.5 Glossary:

Electronic library: An electronic library is a type of information retrieval system.

Inconsistent: Not the same as something else

Unrealistic: Not showing or accepting things as they are

19.6 Answers to Self-Check Exercise:

Self-Check Exercise-1

Ans-1: Open Educational Resources (OER) are the right way which enables free and accessible education to everyone and access to knowledge as public good. OER cherish the culture of participation, collaboration and sharing and with an open access to scientific information it brings a notable contribution in knowledge society development.

Self-Check Exercise-2

Ans-2: Flexibility for instructors to draw from multiple resources to support course learning without requiring students to spend money on multiple books. 2. Infinite opportunities for collaboration among OER developers.

Self-Check Exercise-3

Ans-1: Lower maintenance cost

Ans-2: True

Ans-3: True

Ans-4: UNESCO's

19.7 References and Suggested Readings:

- Witten, lan H., Bainbridge, David Nichols. Accessed January 31, 2014
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19.8 Terminal Questions:

1. What do you mean by Open Educational Resources? What are the advantages and disadvantages of open educational Resources?

Unit-20

Computer and its role in teaching-learning process

STRUCTURE:

20.1 Introduction

In addition to academic improvement, there is the opportunity to engage the student more fully, expose them to technology used in the workplace and get immediate feedback of classroom knowledge. Teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others. computer system consists of mainly four basic units; namely input unit, storage unit. central processing unit and output unit. Central Processing unit further includes Arithmetic logic unit and control unit, as shown in the figure. Computers have changed the way we work, be it any profession.A computer is distinguished from a calculating machine such g as a n electronic calculator by able to store computer programs and it can repeat its operations and make a logical decision by the number and complexity of the operations it can perform and by its ability to process store and retrieve data without human intervention (McGraw-Hill Dictionary. 2002) Computer for Instruction.Given the fact that the internet can serve as a channel for global communication, the computer can very well be the key tool for video teleconferencing sessions (Lucido, 2001). Furthermore, computer is also used as a constructive tool.

20.2 Learning Objectives:

After reading this chapter, the students will be able to know about:

- Meaning and Concept of Computer
- Role of computer in teaching-learning process
- Major functions of computer

- Advantages of computer to promote theteaching-learning process

20.3 Computer and its role in teaching-learning process:

A computer system consists of mainly four basic units; namely input unit, storage unit. central processing unit and output unit. Central Processing unit further includes Arithmetic logic unit and control unit, as shown in the figure. Computers have changed the way we work, be it any profession. Therefore, it is only but natural the role of computers in education has been given a lot of prominence in recent years. Computers play a vital role in every field. They aid in industrial processes, they find application in medicine, they are the heart of the software and they play a vital role in education. To understand further the role of computer in education, let us define what are computers and its capabilities? Is it useful tool in teaching and learning process? What are its effects to students and teachers? How can it be used by teachers as a tool for their instruction? And the most intriguing question is that can computer improve the skills of students in terms of technology? This research paper aims to discuss the role and importance of computer in teaching and learning process. Computer is an electronic device which executes software programs. This is a programmable machine that can store, retrieve and process data. It automatically carries out a sequence of an arithmetic or logical operation. The particular sequence of operation can be changed readily, allowing the computer to solve more than one kind of problem (Britannica Concise Encyclopedia 2012.)

In addition, according to Columbia Encyclopedia (2012) computer is a device that accepts information (in the form of digitalized data) and manipulates it for some result based on a program or sequence of instruction n how the data is to be processed. Computers also include the means for storing data for some n necessary duration. Moreover, computer is device that is capable of performing a series of arithmetic or logical operations. A computer is distinguished from a calculating machine such g as a n electronic calculator by able to store computer programs and it can repeat its operations and make a logical decision by the number and complexity of the operations it can perform and by its ability to process store and retrieve data without human intervention (McGraw-Hill Dictionary. 2002) Computer for Instruction

According to Lucido (2001) Computer is a useful tool in instruction because it has many capabilities. It serves as information tool communication tool situating tool and constructive tool. Computer n can provide a vast amount of information in various forms such as text, graphics, sound and video. Even multimedia encyclopedias are available today on the internet. The internet itself provides an enormous database from which users can access global information resources that include the latest news as well as educational information directly useful to learners (Lucido 2001) In addition, computer can be used as a situating tool. By means of Virtual Reality (RS) extension systems, the computers can create 3-D images on display to give the user the feeling that are situated in a virtual environment. A flight simulation programs is an example of situating tool which places the user, in a simulated flying environment (Lucido, 2001). Moreover, computer can be used as communication tool.

Along the constructivist point of view, it is not enough for students to download relevant information using the computer as an information tool. Students

can use the gathered information for composition or presentation projects as may be assigned by the teacher. Given the fact that the internet can serve as a channel for global communication, the computer can very well be the key tool for video teleconferencing sessions (Lucido, 2001). Furthermore, computer is also used as a constructive tool. Computer itself can be used for manipulating information; visualizing one's understanding and building new knowledge. The Microsoft word computer program itself is a desktop publishing software that allows the users to organize and presents their ideas in attractive formats (Lucido, 2001), Computer for Enjoyment.

A computer performs five major operations or functions irrespective of its size and make. These are

- it accepts data or instructions as input,
- it stores data and instruction
- it processes data as per the instructions,
- it controls all operations inside a computer, and
- it gives results in the form of output.

Desktop Computer System

Contents

1. Functional Units:
2. Memory
3. Input/Output

Devices:

Input Devices

Scanner

Output Devices

Functional Units:

a. Input Unit. This unit is used for entering data and programs into the computer system by the user for processing.

Self Check Exercise-1

Q-1: Discuss the word computer.

Q-2: What do you mean by the term keyboard?

Basic Computer Organization:

b. Storage Unit: The storage unit is used for storing data and instructions before and after processing.

c. Output Unit: The output unit is used for storing the result as output produced by the computer after processing.

d. Processing: The task of performing operations like arithmetic and logical operations is called processing. The Central Processing Unit (CPU) takes data and instructions from the storage unit and makes all sorts of calculations based on the instructions given and the type of data provided. It is then sent back to the storage unit. CPU includes Arithmetic logic unit (ALU) and control unit (CU)

Computer Chip:

- Arithmetic Logic Unit: All calculations and comparisons, based on the instructions provided, are carried out within the ALU. It performs arithmetic functions like addition, subtraction, multiplication, division and also logical operations like greater than, less than and equal to etc.
- Control Unit: Controlling of all operations like input, processing and output are performed by control unit. It takes care of step by step processing of all operations inside the computer.

Memory:

Computer's memory can be classified into two types; primary memory and secondary memory.

RAM:

a. Primary Memory can be further classified as RAM and ROM.

RAM or Random Access Memory is the unit in a computer system. It is the place in a computer where the operating system, application programs and the data in current use are kept temporarily so that they can be accessed by the computer's processor. It is said to be 'volatile' since its contents are accessible only as long as the computer is on. The contents of RAM are no more available once the computer is turned off.

ROM or Read Only Memory is a special type of memory which can only be read and contents of which are not lost even when the computer is switched off. It typically contains manufacturer's instructions. Among other things, ROM also stores an initial program called the 'bootstrap loader whose function is to start the operation of computer system once the power is turned on.

b. Secondary Memory

RAM is volatile memory having a limited storage capacity. Secondary/auxiliary memory is storage other than the RAM. These include devices that are peripheral and are connected and controlled by the computer to enable permanent storage of programs and data.

CD ROM

Secondary storage devices are of two types; magnetic and optical. Magnetic devices include hard disks and optical storage devices are CDs, DVDs, Pen drive, Zip drive etc.

Hard Disk

Hard disks are made up of rigid material and are usually a stack of metal disks sealed in a box. The hard disk and the hard disk drive exist together as a unit and is a permanent part of the computer where data and programs are saved. These disks have storage capacities from 1GB to 80 GB and more. Hard disks are rewritable.

Compact Disk

Compact Disk (CD) is portable disk having data storage capacity between 650-700 MB. It can hold large amount of information such as music, full-motion videos, and text etc. CDs can be either read only or read write type.

CD Drive

Digital Video Disk

Digital Video Disk (DVD) is similar to a CD but has larger storage capacity and enormous clarity. Depending upon the disk type it can store several Gigabytes of data. DVDS are primanly used to store music or movies and can be played back on your television or the computer too. These are not rewritable.

Hard Disk

Input/output Devices:

These devices are used to enter information and instructions into a computer for storage or processing and to deliver the processed data to a user. Input/Output devices are required for users to communicate with the computer. In simple terms, input devices bring information INTO the computer and output devices bring information OUT of a computer system. These input/output devices are also known as peripherals since they surround the CPU and memory of a computer system.

Input Devices

An input device is any device that provides input to a computer. There are many input devices, but the two most common ones are a keyboard and mouse. Every key you press on the keyboard and every movement or click you make with the mouse sends a specific input signal to the computer.

Keyboard:

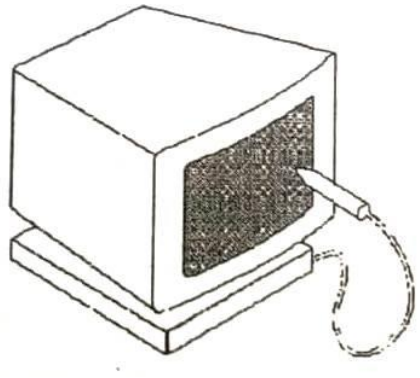
- **Keyboard:** The keyboard is very much like a standard typewriter keyboard with a few additional keys. The basic QWERTY layout of characters is maintained to make it easy to use the system. The additional keys are included to perform certain special functions. These are known as function keys that vary in number from keyboard to keyboard.
- **Mouse:** A device that controls the movement of the cursor or pointer on a display screen, A mouse is a small object you can roll along a hard and flat surface. Its name is derived from its shape, which looks a bit like a mouse. As you move the mouse, the pointer on the display screen moves in the same direction.
- **Trackball:** A trackball is an input device used to enter motion data into computers or other electronic devices. It serves the same purpose as a

mouse, but is designed with a moveable ball on the top, which can be rolled in any direction.

- **Touchpad:** A touch pad is a device for pointing (controlling input positioning) on a computer display screen. It is an alternative to the mouse. Originally incorporated in laptop computers, touch pads are also being made for use with desktop computers. A touch pad works by sensing the user's finger movement and downward pressure, Touch Screen: It allows the user to operate/make selections by simply touching the display screen. A display screen that is sensitive to the touch of a finger or stylus. Widely used on ATM machines, retail point-of-sale terminals, car navigation systems, medical monitors and industrial control panels.

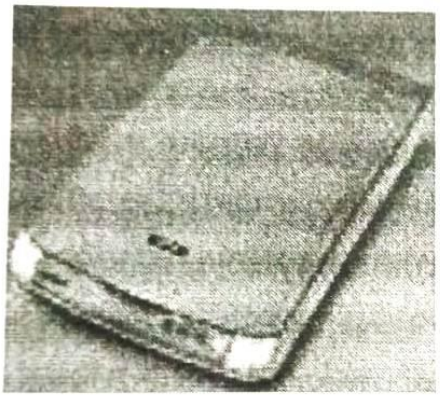
Mouse

- **Light Pen:** Light pen is an input device that utilizes a light-sensitive detector to select objects on a display screen.



- **Magnetic Ink character recognition (MICR):** MICR can identify character printed with a special ink that contains particles of magnetic material. This device particularly finds applications in banking industry.
- **Optical mark recognition (OMR):** Optical mark recognition, also called mark sense reader is a technology where an OMR device senses the presence or absence of a mark, such as pencil mark. OMR is widely used in tests such as aptitude test.
- **Bar code reader:** Bar-code readers are photoelectric scanners that read the bar codes or vertical zebra strips marks, printed on product containers. These devices are generally used in super markets, bookshops etc.

Light Pen



Scanner

Scanner is an input device that can read text or illustration printed on paper and translates the information into a form that the computer can use. A scanner works by digitizing an image. (Fig. 1.7)

Scanner

Output Devices:

Output device receives information from the CPU and presents it to the user in the desired from. The processed data, stored in the memory of the computer is sent to the output unit: which then converts it into a form that can be understood by the user. The output is usually produced in one of the two ways-on the display device, or on paper (hard copy).

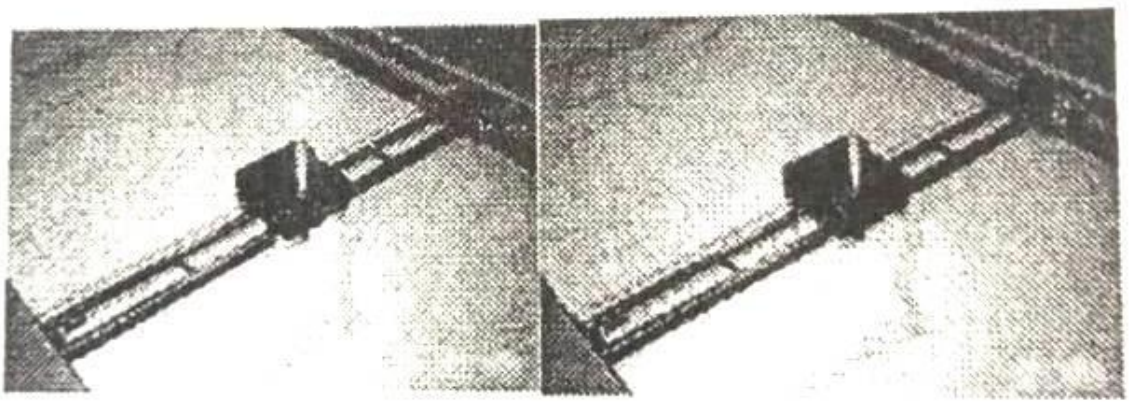
Monitor: is often used synonymously with "computer screen" or "display." Monitor is an output device that resembles the television screen (fig. 1.8). It may use a Cathode Ray Tube (CRT) to display information. The monitor is associated with a keyboard for manual input of characters and displays the information as it is keyed in. It also displays the program or application output. Like the television, monitors are also available in different sizes.

Printer: Printers are used to produce paper (commonly known as hard copy) output. Based on the technology used, they can be classified as Impact or Non-impact printers.

Impact printers use the typewriting printing mechanism wherein a hammer strikes the paper through a ribbon in order to produce output. Dot-matrix and Character printers fall under this category.

Monitor:

Non-impact printers do not touch the paper while printing. They use chemical, heat or electrical signals to etch the symbols on paper. Inkjet, Deskjet, Laser, Thermal printers fall under this category of printers.



Plotter.

Plotters are used to print graphical output on paper. It interprets computer commands and makes line drawings on paper using multi colored automated pens. It is capable of producing graphs, drawings, charts, maps etc. Facsimile (FAX): Facsimile machine, a device that can send or receive pictures and text over a telephone line. Fax machines work by digitizing an image.

Plotter

Sound cards and Speaker(s): An expansion board that enables a computer to manipulate and output sounds. Sound cards are necessary for nearly all CD-ROMs and have become commonplace on modem personal computers. Sound cards enable the computer to output sound through speakers connected to the board, to record sound input from a microphone connected to the computer, and manipulate sound stored on a disk.

Importance and Role of Computers in Teaching and Learning Process Essay Sample

Computer makes the teaching and leaming process more enjoyable, interesting and interactive by using of software programs such as educational games, PowerPoint presentation, Photoshop and other audio-visual presentations. Computer games are great way for students to learn that learning can be fun. Educational games allow students to learn in fun and enter active way. Computer in the classroom are beneficial and helps students to learn and grow (Johason 2011). A teacher who uses computer in this teaching can easily get attention of his students. Through PowerPoint presentation a teacher can deliver his lessons on a colorful and dynamic presentation that many students find it more interesting than traditional teacher lectures by providing the student with visual presentation of information help than to retain information from lessons covered in class (Thea, 2012). Moreover, computer also provides interactive learning. When learners use computer in the classroom, it provides active participation from students, which could lead to a better understanding of the school subjects (Thea, 2012)

In addition, using computer projectors to present lessons adds the audio-visual element to instruction and reaches those whose learning style is not addressed through traditional teacher lecture. Since today's students are heavily oriented to the visual, this approach appeals to everyone. Students and teacher in learning situations both respond positively to the use of computer for the same reasons and both groups benefit when computer technology is utilized in instruction

(Watts and Hammons, 2002). Students today instantly rises their level of interest and appreciable when they are allowed to work on the computer. A student learns best by doing instead of listening and using computer in instructions is hands on for them, requiring active involvement and participation. Many instructional programs are interactive, giving the students the opportunity to answer a question or work a problem and receive immediate feedback (Walts & Hammons, 2002).

Furthermore, when students are using computer, they are in an active role of recipient of information transmitted by a teacher, textbook or broadcast. The students are actively making choices about how to generate, obtain, manipulate or display information technology use allows many more students to be actively thinking about information, making choices and executing skills than is typical teacher lessons. Moreover, when computer is used as a tool to support in performing automatic tasks, the students are in the position of defining their goals, making design decision, and evaluating their programs (Brownet.al, 2001). On the other hand, using of computer in the classroom, the teacher's role changes as well. The teacher is no longer the center of attention and the dispenser of information, but rather plays the role of facilitator, setting project goals and providing guidelines and resources, moving from the student to student or group to group to group, providing suggestions and support for student activity. As the student work on technology-supported projects, the teacher rotates through the room, looking over shoulders, asking about the reasons for various design choices and suggesting resources that might be used (Brown et al, 2001).

Conclusion:

Using of computer in the classroom is very useful. It makes the teaching and learning process more fun, interesting and interactive. computer in the classroom, the instruction tends to be less teacher-centered. Instructors In addition, using felt more like facilitators than leaders and students tend to assume more responsibility for what goes on during class. Moreover, student to student and student to teacher interaction tent to increase the students' conversation more frequently focus on writing. And students tend to leave the computer classroom with greater confidence in their writing (Hussein, 2002)

On the other hand, the researcher recommended that when computer is used in the classroom, the teacher should be strict in facilitating the students while they are doing their activities in the computer because may be the students will open and surf some pornographic sites or may be some students will play games which are not educational.

Self-Check Exercise-2

Q-1 Who is the father of computer

a) James Gosling
b) Charles Babbage
c) Dennis Ritchie
d) Bjarne Stroustrup

Q-2 What is the full form of CPU?

a) Computer processing unit
b) Computer principle unit
c) Central processing unit
d) Control processing unit

Q-3 Which of the following is not a characteristic of computer**:**

a) Versatility
b) Accuracy
c) Diligence
d) I.Q

Q-4 Which of the following is the smallest unit of data in a computer:

a) Bit
b) KB
c) Nibble
d) Byte

20.4 Summary: Computer makes the teaching and learning process more enjoyable, interesting and interactive by using of software programs such as educational games, PowerPoint presentation, Photoshop and other audio-visual presentations. Computer games are great way for students to learn that learning can be fun. Educational games allow students to learn in fun and enter active way. Computer in the classroom is beneficial and helps students to learn and grow (Johason 2011). A teacher who uses computer in this teaching can easily get attention of his students. Using of computer in the classroom is very useful. It makes the teaching and learning process more fun, interesting and interactive. Computer in the classroom, the instruction tends to be less teacher-centered. Instructors In addition, using felt more like facilitators than leaders and students tend to assume more responsibility for what goes on during class. Moreover, student to student and student to teacher interaction tent to increase the students' conversation more frequently focus on writing. Output device receives information from the CPU and presents it to the user in the desired from. The processed data, stored in the memory of the computer is sent to the output unit: which then converts it into a form that can be understood by the user. The output is usually produced in one of the two ways-on the display device, or on paper (hard copy).MICR can identify character printed with a special ink that contains particles of magnetic material. This device particularly finds applications in banking industry. In addition, using computer projectors to present lessons adds the audio-visual element to instruction and reaches those whose learning style is not addressed through traditional teacher lecture. Since today's students are heavily oriented to the visual, this approach appeals to everyone.

20.5 Glossary:

Intriguing: Very interesting because of being unusual

Pornographic: Sexual subject material such as a picture, video etc.

Interactive: Involves people working together and having an influence on each other

20.6: Answers to Self-Check Exercise:

Self-Check Exercise-1

Ans-1: A computer system consists of mainly four basic units; namely input unit, storage unit, central processing unit and output unit. Central Processing unit further includes Arithmetic logic unit and control unit, as shown in the figure.

Ans-2: The keyboard is very much like a standard typewriter keyboard with a few additional keys. The basic QWERTY layout of characters is maintained to make it easy to use the system. The additional keys are included to perform certain special functions. These are known as function keys that vary in number from keyboard to keyboard.

Self-Check Exercise-2

Ans-1 Charles Babbage

Ans-2 Central processing unit

Ans-3 I.Q.

Ans-4 Bit

20.7 References and Suggested Readings:

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20.8 Terminal Questions:

1. What do you, mean by computer? Discuss its concept.
2. What are the characteristics of computer?
3. Write a short note on the functions of computer.
4. Discuss the advantages of computer in educational set up.

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