CVDMM(N) 301

Technology Enabled Education:

Concept and Tools

Minor / Minor Vocational

(For BBA/ B.Com./ BTTM)

School of Vocational Studies

उत्तराखण्ड मुक्त विश्वविद्यालय

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UNIT- 1

INTRODUCTION TO TECHNOLOGY ENABLED EDUCATION- I

1.1 INTRODUCTION

The use of Information Technology (IT) and Computer Science is increasing day by day. Almost every part of our life is benefitted by its use. Technological progress can be hitch up for increasing both expansion and quality of education [1].

The 'Technology Enabled Learning' sometime known as ‘E-mastering’ is a teaching format which merges lectures, simulations and hands-on desktop experiments to develop an advanced collaborative learning experience. Its goal is to inspire the emergence of new way of teaching

which can be sustained by context-conscious use of time and anchored within the practices of readers.[2]

- Collaborative learning- Students working during class in small groups with shared desktop/laptop computers.
- Desktop experiments with data acquisition links.
- Media-rich visualizations and simulations delivered via laptops, desktop and the Internet.
- Personal response systems that stimulate interaction between students and Teachers. [4,25]

The Information Technology (IT) has become a major part of everyone's, due to technological progress it is very important to provide quality education. It is also essential to develop infrastructure and network for technology enabled education in institutes of higher education. The digital resource should be developed and utilized for quality certified programmes and courses for universities and other educational institutions.

Government of India in 2009, launched its National Mission on Education through Information and Communication Technology (NMEICT) providing an excellent opportunity for teachers and experts in the country to provide their collective wisdom for the benefit of every learner. This mission is also important to maintain a high growth rate of our economy by capacity building and knowledge empowerment of people. It will helpful for promoting new, upcoming multi-disciplinary fields of knowledge. Finally, we can say that the Technology Enabled Education is the future.

1.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Define the role and importance of Technology Enabled Education for effective teaching learning.
- Understand the use of Technology for effective communication between teachers, parents and students.
- Define Internet and E-Learning.
- Know about Govt. initiatives for Technology Enabled Education and the National Knowledge Network.

1.3 ROLE AND IMPORTANCE OF TECHNOLOGY ENABLED EDUCTION FOR EFFECTIVE LEARNING AND TEACHING

We can experience and understand the transformative energy of a competent instructor. If we were particularly lucky, we would have had excellent teachers who made class an interesting

place. Those teachers who possessed an ardour for the topics that they taught. They took actual care of the scholars whom they taught. They always motivate us to play with thoughts, suppose deeply about the situation matter. They also tackle challenging work and even pursue careers in a particular area. Few brilliant teachers achieve celeb popularity. However, many of students do not get success because their understanding is not good with teachers or do not match with their teacher. It shows the importance of understanding with teachers [25].

This is the value of the teacher, who looks at a face and says there's something behind that. I want to reach that person, I want to influence that person, I want to encourage that person, I want to enrich, I want to call out that person who is behind that face, behind that color, behind that language, behind that tradition, behind that culture. I believe you can do it. I know what was done for me [6].

-Maya Angelou

Teaching and learning, is not as smooth as we assume. It doesn't mean only giving facts or assigning homework. Constructing, engaging & linked study room environment and healthy student-trainer relation calls for continuous and powerful communication. In this virtual age, teachers want to examine the artwork of interacting and speaking with the student effective for effective communication and understanding [25].

Educators ought to be skilled in listening and understanding thoughts and concepts of their students. They should be able to elaborating things clearly. Educators want's clarity in communication. They always scold their student for good and clear communication. They ought to be able to break down complicated ideas into simpler, straightforward steps. Educators should be able to read and understand their student's mind. Effective communication includes changing an uneventful spoken communication into a smart and equally fascinating presentation [25].

Sometimes, a teacher who is keen to understand their students will make an attempt to learns their name. He will try to call them with their name. A teacher invariably attempts to perceive his student's dream, biggest concerns, hopes and preferences, which plays a significant role in effective and continuous communication. Academicians should celebrate their student's successes. Acknowledging the work of students may be an excellent way to positive impact on their learning highlighting their strengths [25].

1.4 USE OF TECHNOLOGY FOR EFFECTIVE COMMUNICATION BETWEEN TEACHERS, PARENTS AND STUDENTS

Nowadays, we use phone calls, emails, newsletters, e-cards, chat applications, video conferencing for sharing any information from one place to another place. Use of technology

is faster making communication effective and straightforward. There are a variety of applications and platforms that change teacher-student & parent communication [25].

It is very important to use tools for educators, students and others. Education through the web, network or standalone laptop is easy and helpful. E-learning is actually a network-enabled transfer of education, skills and data. E-learning refers to the process of receiving knowledge through electronic means or applications. E-learning applications and process embraces web-based learning, computer-based learning, virtual lecture rooms and digital collaboration. Content is delivered via web, intranet/extranet, audio or video tape, television system and CD-ROM [25]. E-learning was called "Internet-Based training" in the beginning, but now is addressed as "Web-Based Training" [8].

1.5 IMPORTANCE OF TECHNOLOGY ENABLED EDUCATION

The importance of technology-enabled education is measured on the basis of the outcome of learning. Following are some key important points:

- We can examine different models of integrating technology for learning & teaching through technology-enabled education
- Learner can redefine Technology Enabled (Enhanced) Learning (TEL)
- Outline an overview of TEL environment as per learner's ease.
- Learner can identify current trends & prospective developments of the TEL
- TEL can give success stories/visual case studies & help self-reflect which is very beneficial for learner [7].

In this era, Internet is a vital part of our day to day life; anyone can connect throughout the world [25].

1.6 INTERNET AND E-LEARNING

Internet-

Internet is an interconnected computer network that uses the (TCP/IP) to link number of computers/devices worldwide. It is the network of networks that consists millions of private, public, academic, business and government networks of local as well as global, linked by a broad array of electronic, wireless, and optical networking technologies. Internet carries a wide range of information resources and services such as the inter-linked hypertext documents, applications of World Wide Web (www), electronic mail, telephony, and peer-to-peer networks for file sharing. Last two decades since 1995, Internet use has grown 100 times covering one third of the world population in a year [9].

E-Learning-

Educational technology is referred by the Association for Educational Communications and Technology as "the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources. It refers to the use of both physical hardware and educational theoretic [11]. Following are some facts about E-Learning [25].

- E-learning is an extremely wide term. It includes all web-based training.
- Open Universities started utilizing a web-based conferencing framework as a learning tool around late 80s. Now, these university offers entire degree courses on web. Since 2000, the web has been also utilized by schools and colleges as a method for disseminating various media materials and course documentation [25].
- E-learning can be disseminated through various means. The non-benefit Khan Academy is a bank of free video addresses by prominent scholars though progressive programming stages, for example, Blackboard and Canvas permit educators and understudies to interface all the more adequately on web. MOOC's (Massive Online Open Courses) are extensively popular free and easily accessible short online courses offered by main colleges [25].
- MOOC's are free and can possibly be lucrative. America's most popular MOOC system, 'Coursera' offers courses from thousands of colleges around the world. These courses are genuine and free, one can ask for certifications after successful completing course and payment.
- The British version to Coursera, Future learn, offers courses from more than half of the hundreds of best UK colleges.
- Today not all e-learnings courses are free. In some colleges, MOOC authentications are traded for genuine school credit which is very profitable for the employment market. Full degree capabilities stay accessible just to the paying understudy.
- MOOC's offer tutorials that are easy to understand. It is very helpful for students of educated and developed background.
- Data collected from e-learners is priceless. Significant number of learners and teachers use e-learning for lectures, test, apps, courses on web platforms. It is represented by the "Learning Analytics". It can be handy data source for the teachers [12, 25].

1.7 GOVERNMENT INITIATIVE FOR TECHNOLOGY ENABLED LEARNING

Albert Einstein once said that " Education is what remains after one has forgotten, what one has learned in the school." Unlike, the conventional classroom model, instruction today has transformed into discovering into instant, effective, and self- propelled learning etiquette. The use of e-learning has navigated the limits of school and school training to saturate the whole learning range, including web-based training for examinations [25].

NPTEL, gives E-learning through online Web and Video courses on engineering, science and humanities streams. The mission of NPTEL is to upgrade the nature of engineering instruction through free online courseware in India [25]. Following are some government initiatives for technology-enabled learning:

- The purpose of Virtual Labs is to give remote-access to labs in different courses of science and engineering. These Virtual Labs are for undergraduates, post graduate students, and research scholars.
- Spoken Tutorial is the activity of 'Converse with a Teacher' of National Mission on Education through Information and Communication Technology (NMEICT), launched by the Ministry of Human Resources and Development, Government of India. This project is run by IIT Mumbai [25].
- E-Yantra is an activity to introduce robotics in building instruction with the target of drawing in understudies and instructors through energizing hands-on utilization of math, software engineering and designing standards.
- UGC's Infonet Digital Library Consortium was launched in December, 2003 by Honourable Dr A P J Abdul Kalam, then President of India, in the wake of giving the Internet network to colleges in the year 2003, under the UGC-Infonet program.
- Venture Open Source Courseware Animations Repository (OSCAR) presents an archive of electronic intelligent movements. These learning modules traverse themes in science and mathematics at school level. Students and educators can view, run and download these learning modules.
- E-Kalpa is an initiative for making digital-learning environment for design supported by the Ministry of Human Resources, Government of India, as a component of the National Mission in Education through Information and Communication Technology (NMEICT).
- Virtual Learning Environment (VLE), is an online domain of e-assets, obliging few controls taught at undergraduate and postgraduate level. It is an activity of Institute of Life-Long Learning, University of Delhi, drawing from a few fruitful models, the multi-media intuitive substance stacked on Virtual Learning Environment (VLE) are classified order astute.
- Aakash Tablet / Educational Portal is a highly beneficial for educators in conducting workshops directed for a huge number of instructors at one place, utilizing a one-of-a-kind mix of innovation, and an inventive instructional method. Thousands of users have benefitted the viability of this methodology and of the subsequent open-source substance. Somehow, the students have also relived from the weight of their school bags [25].

1.8 NATIONAL KNOWLEDGE NETWORK (NKN)

National Knowledge Network is a multi-gigabit system. It brings together fast system spine for instructive establishments in India. The National Knowledge Network consists of an ultra-rapid CORE (products of 10 Gbit/s), complimented with a conveyance layer at suitable paces. The foundation at the Edge will interface with the National Knowledge Network consistently at rates of 1 Gbit/s or higher. The system is intended to bolster overlay-networks, dedicated Networks and Virtual Networks. Propelled applications in regions, for example, Health, Education, Science and Technology, Grid Computing, Bioinformatics, Agriculture and Governance will be an indispensable part of NKN. The whole system will consistently incorporate with worldwide academic groups at various gigabits every second speed [25].

National Knowledge Network (NKN) is the best in class multi-gigabit dish India system. It is a unified high-speed network backbone for education institutions in India. The motivation behind such an information system goes to the very centre of the nation's mission for building quality foundations with essential examination offices and making a pool of profoundly prepared experts. The NKN empowers researchers, scientists, and students from various foundations and different geologies to work intently to advance human improvement. [25].

National knowledge network (NKN) is planned as a Smart Ultra High Bandwidth. It flawlessly interconnects the main Scientific and Technological establishments that are seeking world-class innovative work. It is intrinsically proactive. It considers the necessities that may arise in close term and long haul. The remarkable components of the NKN are:

- Establishing connectivity for knowledge and data sharing.
- Enabling collaborative research in rising ranges, for example, Climate Modelling.
- Facilitating separation instruction in particular fields, for example, pharmaceutical, rising cutting-edge regions covering information bio-nano innovation, etc.
- Facilitating an ultra-fast e-administration spine for data sharing.

Major benefits of NKN system

- High level accessibility
- Robust and dependable availability
- High level scalability

The Administrations of NKN

- Generic Services- Domain Name System, Internet, Intranet, Network Management Views, email, Messaging Gateways, Caching Gateways, Web Hosting, Voice over IP, Multipoint Control Chapter (MCU) Services, Video Portals, SMS Gateway, Co-Location Services, Video Streaming, and so on [25].

- Common Services- Authentication Service, Shared Storage, email List Software Application (LISTSERV), EVO, Session Initiation Protocol (SIP), Collaboration Service, Content Delivery Service, International Collaborations with EU-India Grid, Global Ring Network for Advanced Applications Development (GLORIAD) and so on [25].
- Special Services- Virtual Private Network Stitching services.

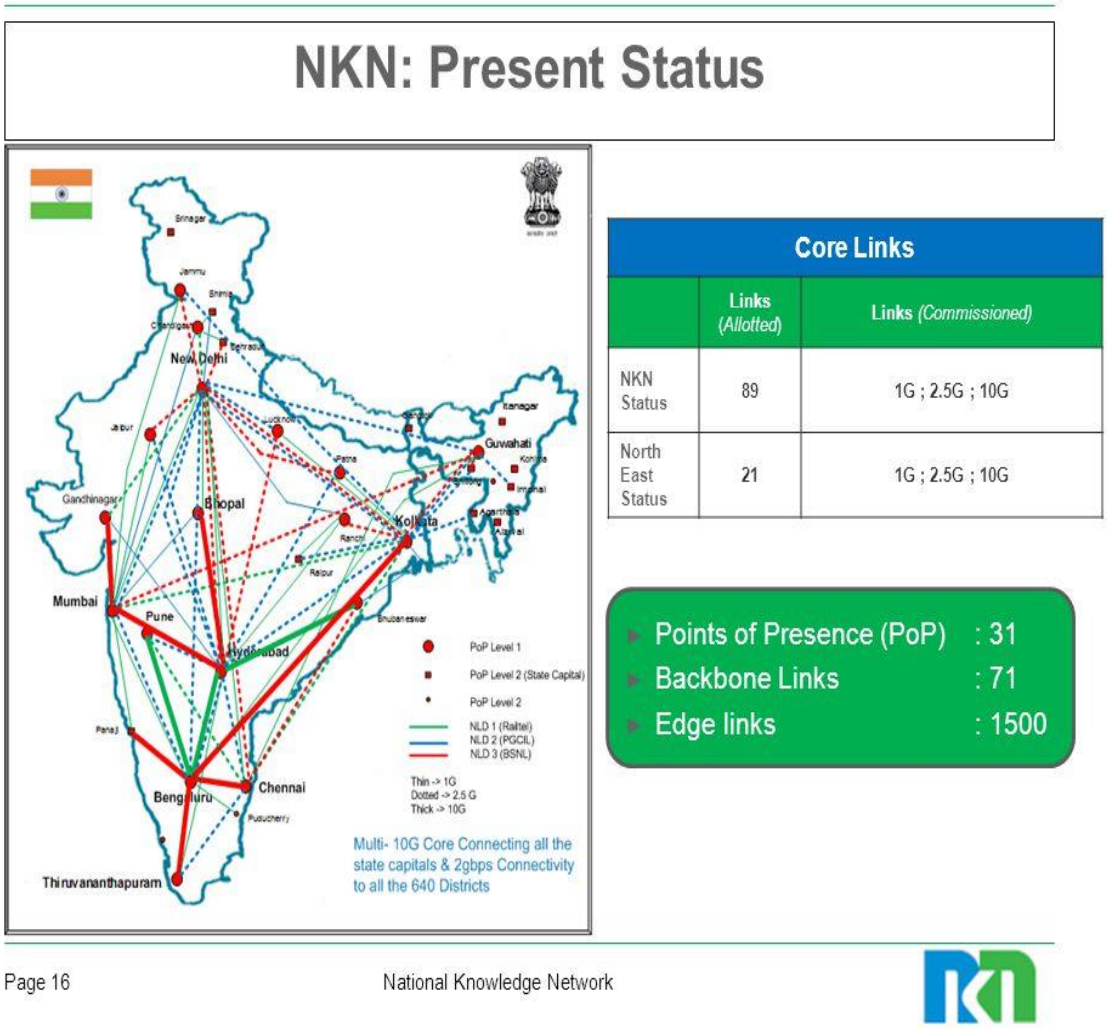

Figure 1.2 (Source: Appendix 1) Present status of National Knowledge Network

Higher learning and research with a fast information correspondence system encourages easily shareable learning and synergistic examination. It will fill the current information void in the nation and help India advance as a knowledge society and foster financial exercises in the Knowledge space [25]. The application ranges imagined, under the National Knowledge Network cover are-

- Agriculture
- Education
- Health

- E-administration
- Grid Computing
- High Performance Computing

Until 31st May 2014, there are 1261 connections to institutions have been charged and made operational under the initiative. This incorporates 341 connections to organizations under NMEICT, which have been relocated to NKN. 66 virtual classrooms have been set up. NKN availability has likewise been stretched out to 286 NIC regions focusses. 89 Nos of core links have been made operational and charged. NKN availability has been reached out to State Wide Area Network (SWAN) in 26 States/UTs and State Data Center (S, DC) in 23 States/UT's [25].

1.9 E-REPOSITORY TOOLS

E-Repository tools are an important and essential part of the technology-enabled learning. E-Repository is an effective and adaptable device for putting away, arranging, sharing, seeking and utilizing learning materials. It is an instrument to interoperability alternatives, empowering and securing computerized content techniques. It is at the heart of the technology-enabled learning. The E-Repository incorporates consistently with the E-Learning devices. E-Repository makes it simple for your library to safely convey copyright-cleared substance to your student and personnel [25].

The Digital Library gives you E-Repository framework. It empowers the organization to deal with all its computerized learning assets in one spot while making them accessible to the e-learning devices and various types of teaching and learning. This isolates the administration of assets from the administration of e-learning courses. The learning assets can be reports, mixed media courses, sites join, video address, gifts, presentations, worksheets, podcasts, video cuts, flash liveliness, and other straightforward articles. On the other hand, they can be more unpredictable reproductions, contextual analyses, intelligent modules or short courses which contain many documents and have different learning ways [25].

Digital book is a computerized book. This book comprises content, pictures, or both, discernible on PCs or other electronic devices. Although, at times characterized as "an electronic rendition of a printed book", numerous e-books exist with no printed proportional. Industrially created and sold, e-books are generally planned to be perused on devoted tablets. In any case, any modern electronic gadget that components a controllable survey screen, including PCs, tablets and cell phones can likewise be utilized to peruse e-books. These days, both print and in addition digital book offering is moving to the web. The fundamental reasons that individuals are purchasing books online are costs, comfort, and choice procedure. Despite, vast majority acknowledges higher general "blocks and mortar" bookshops, yet practically each one of us is purchasing books online". Based on this data, e-distribution will soon overwhelm the customary distribution [25].

E-books has numerous benefits in Technology-enabled learning. Following are some advantages and disadvantages of E-books-

Speed- E-books are very advantageous. You can buy a book specifically online. It shows up on your smart screen and you can read it any time. You can buy a book whenever, day or night. There are no shipping costs [25].

Capacity- E-books are very handy. Since one gadget can hold several books, when you travel you can take your whole library along and hold it in the palm of your hand. Any book that you have obtained online can undoubtedly be downloaded again so you never need to stress over losing a book, regardless of the fact that you lose your digital book per user [25].

Reading a digital book has certain focal points over using customary books. Instead of attempting to discover a paper book with huge content, you just make the content bigger on your gadget. You can change the textual style and the shade of the foundation in most gadgets as per your tastes. For instance, you can change to dark content on any suitable style or white content on dark foundation. With digital book, users you have your decision of e-ink per users like the first Kindle and Nook, or illuminated per users like the new Kindle Fire and other tablet-sort per users. E-ink book per users have no shading, yet they are less demanding on the eyes. Like customary books, they require outside lighting. They are awesome in brilliant sun yet require a light to read around evening time. Illuminated per users, similar to PC screens have shading capacities yet perusing on them is tiring for the eyes. Both Kindle and Nook, additionally have e-ink per users like the Kindle Paperwhite that are high contrast e-ink, however have their own inner lighting. The upside of a physical book here is that you don't need to stress over the sort of innovation [25].

PDF [16] refers to Portable Document Format. PDF is a record group created by Adobe Systems in 1992. PDF catches and organizes data from an assortment of desktop distributed applications, making it conceivable to send designed reports and have them show up on the beneficiary's screen or printer, as they were intended. This is on the grounds, that a PDF will keep up the first textual styles, pictures, representation and in addition, the precise format of the document [25].

To see a PDF record, you require Adobe Reader. It is a free application program circulated by Adobe Systems. Adobe likewise makes an Acrobat Plug-in for Web programs. It empowers PDF records to be seen inside a program window [25].

A PDF record can be shared, seen and printed by anybody utilizing free Adobe Reader programme, paying little attention to the working framework, unique outline application or text styles. The apparatuses to see and make PDF records, called Acrobat, was discharged in 1993. To see a record in PDF position, you require Adobe Reader, a free application circulated by Adobe Systems. At first, the apparatuses to make and view PDF’s were costly. But later, Adobe propelled a free form of Acrobat Reader [25].

Today PDF is an open standard kept up by the International Organization for Standardization (ISO). The organization has expanded throughout the years and now PDF documents can contain components including joins, structure fields, sound, and can be marked electronically to gather e-marks that are lawfully official. Access to PDF documents can be controlled with passwords and secured PDFs can be made in various office and efficiency applications. Following are the major features of PDF document:

- Graphic outline improvement for colleagues working at a different place with the need to investigate and plan thoughts online.
- Help work area individuals who need to see the printed book for clients.
- Online appropriation of any printed record in which you need to safeguard its printed appearance [25]

PDF records are upgraded for the Web by rendering content before realistic pictures and hypertext joins.

Microsoft Word is a word processor created by Microsoft. It was initially under the name Multi-Tool Word for Xenix systems. Subsequent adaptations were later composed for a few different stages including IBM PCs running DOS (1983), Apple Macintosh running Mac OS (1985), AT&T Unix PC (1985), Atari ST (1988), OS/2 (1989), Microsoft Windows (1989) and SCO Unix (1994). Business forms of Word are authorized as a standalone item or as a part of Microsoft Office, Windows RT or the stopped Microsoft Works suite. Microsoft Word Viewer and Office Online are Freeware versions of Word with restricted components [25].

Microsoft Word's local record arrangements are meant either by a .doc or .docx filename with extension. PPT [18] is a record expansion for a presentation document position utilized by Microsoft PowerPoint, the mainstream presentation programming ordinarily utilized for office and instructive slide appears. All content pictures, sound and video utilized as a part of the presentation are contained in the PPT document [25].

Microsoft PowerPoint is a slide show presentation program. It is created by Microsoft. PowerPoint is valuable for building up the slide-based presentation arrange, and is as of now a standout amongst the most usually utilized presentation programs accessible [25].

PPT is a document expansion for a presentation record group. It is utilized by Microsoft PowerPoint, the mainstream presentation programming regularly utilized for office and instructive slide appears. All content pictures, sound, and video utilized as a part of the presentation are contained in the PPT document. PPT records can be seen by PowerPoint, PowerPoint Viewer or the Open Office programming suite [25].

Online Reading is a way to read out articles on a laptop, mobile phone, and electronic gadgets. Internet is a major tool to find products we need. With more and more content going digital, now you don’t have to go to a bookstore to preview the book before buying it [25].

Now, you only need a computer which is connected to the internet and also Internet browsers like Chrome, Safari, Firefox or Internet Explorer. Following are some services commonly used for Online Reading:

- Slide Share
- Shelfari
- DocStock
- Freado
- Publication etc.

Following are 10 different sites where you can read books online:

- Project Gutenberg
- Internet Archive
- Open Library
- Google Books
- Smash words
- Blurb
- Scribd
- Watt pad
- Bookish
- 24Symbols etc.

Online Publication [19] which is also known as e-publishing or digital publishing, includes digital publication of e-books, digital magazines. It is also used for development of digital libraries and catalogues [25].

It should be a regular practice to circulate books, magazines and daily papers to customers. The kindle, tablet, and other smart gadgets are very popular in now a day for online reading.

Electronic publishing and copyright laws are now custom-made for the printed books. Electronic distributed raises new inquiries in connection to copyright. Following are some electronic versions of traditional media [25]:

- CD-ROM
- E-book
- Electronic journal
- Online magazine
- Online newspaper
- PDF

Following are some new media which are commonly used at present[25]:

- Blog

- Collaborative software
- Digital publication app
- File sharing
- Mobile apps
- Podcast
- Enhanced publication

1.10 ROLE OF TECHNOLOGY ENABLED EDUCTION IN QUALITY EDUCTION

In this age of Fourth Industrial Revolution, it's clear that technology will play a key role. It will positively affect our lives. It's roughly estimated that by 2020 there will be million new digitised jobs across the globe. At the same time, the organisations will have IT skills shortage. The educators and students will feel that there is a gap in their ability to meet the skills needs of the Information Technology workforce. In order to prepare the workforce and talent required for the digital economy, the education must adapt as fast as the demand for Information Technology. The skills are now growing and evolving very rapidly. Finally analysing all these facts, we can understand the fact that the role of technology enabled education in quality education is crucial.

1.11 POINTS TO REMEMBER

- Through Technology Enabled Education, we can examine different models of integrating technology for learning & teaching.
- E-learning is actually a network-enabled transfer of education, skills and data. E-learning applications and processes embrace web-based learning, computer-based learning, virtual lecture rooms and digital collaboration. Content is delivered via web, intranet/extranet, audio or video tape, television system and CD-ROM.
- Internet is the network of networks that consists of millions of private, public, academic, business and government networks of local as well as global, linked by a broad array of electronic, wireless and optical networking technologies.
- In some colleges, MOOC authentications are traded for genuine school credit which is progressively profitable for the employment market.
- E-Yantra is an activity to introduce robotics into building instruction with the target of drawing in understudies and instructors through energizing hands-on utilization of math, software engineering and designing standards.
- Venture Open Source Courseware Animations Repository (OSCAR) presents an archive of electronic intelligent movements. These learning modules traverse themes of science

and mathematics at school levels. Students and educators can view, run and download these learning modules.

- Digital Library gives you E-Repository framework. It empowers the organization to deal with all its computerized learning assets in one spot while making them accessible to the e-learning devices and various types of teaching and learning.
- PDF is a free application program circulated by Adobe Systems. Adobe makes an Acrobat Plug-in for Web programs. It empowers PDF records to be seen inside a program window.
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1.12 GLOSSARY

- Collaborative learning- Students working during class in small groups with shared desktop/laptop computers.
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- National knowledge network (NKN)- It flawlessly interconnects the main Scientific and Technological establishments that are seeking world-class innovative work.
- E-Repository- is an important and essential part of the Technology Enabled Learning. E-Repository is an effective and adaptable device for putting away, arranging, sharing, seeking and utilizing learning materials. The E-Repository incorporates consistently with the E-Learning devices.

- Digital book- is a computerized book comprising content, pictures, or both, discernible on PCs or other electronic devices.

1.13 CHECK YOUR PROGRESS

Objective type questions-

a) TEE stands for.....

b) ..... refers to the process of get knowledge from an electronic application.

c) The ..... is an interconnected computer networks that uses the (TCP/IP) to link number of computers/devices worldwide.

d) The ..... is a unified high-speed network backbone for educational institutions in India.

e) .....refers to Portable Document Format.

f) MS Word is a word processor created by .....

g) The extension of Microsoft Word file is.....

h) Kindle, tablet and other smart gadgets are very popular in nowadays for.....

Descriptive type questions-

a) What is Collaborative learning? What is the benefit of students working in class in small groups with shared desktop/laptop computers? Explain.

b) What are Massive Open Online Courses (MOOCS)? What is their benefits? Explain some popular MOOCS.

c) What is the purpose of the Virtual Labs? What are the different courses where Virtual Labs can be used?

d) What are the components of the National Knowledge Network (NKN)? What are its Major benefits? Explain the configuration of National Knowledge Network (NKN)?

e) What is the role of E-books in technology-enabled learning? What are their advantages?

f) How Online Reading is helpful in technology-enabled learning? How are internet browser like Chrome, Safari, Firefox or Internet Explorer are helpful in online reading?

g) What are the important services used for Online Reading? Write the name of commonly used different sites where you can read books online?

h) What do you understand by Electronic publishing and copyright laws? What is the difference between Electronic versions of traditional media and new media?

Answers (Objective type question)-

[a] Technology Enabled Education	[b] E-learning	[c] Internet
[d] National knowledge network	[e] PDF	[f] Microsoft
[g] .doc or .docx	[h] online reading	

1.14 BIBLIOGRAPHY/ REFERENCES

- [1] Chapter 5 Work, Society, Family and Learning for the Future1 by Martin Carnoy Stanford University, United States, https://www.oecd.org/site/schoolingfortomorrow knowledgebase/ futuresthinking/trends/38967084.pdf
- [2] Information and Communication Technology In Education, http:// unesdoc. unesco.org /images/0012/001295/129538e.pdf
- [3] https://ntulearn.ntu.edu.sg/images/ci/NTUlearn/faculty_design.html
- [4] TEAL – Technology Enabled Active Learning, http://icampus.mit.edu/
- [5] Communication and Effective Teaching, https://www.ncbi.nlm.nih.gov/pmc/ articles/PMC1705977/
- [6] www.psychologytoday.com/us/blog/happiness-and-the-pursuit-leadership / 201506/ what-makes-extraordinary-teacher
- [7] Massive Open Online Course on Introduction to Technology-Enabled Learning Course Materials, 2017_Mishra-Cleveland-Innes-Ostashewski_MOOC-on-Intro-TEL-Course-Materials_.pdf
- [8] Business Communcation HM-101 Uttarakhand Open University 2 Unit: 1 Communication - Introduction, Meaning & Definition, Uttarakhand Open University, http://uou.ac.in/sites/default/files/slm/HM-101.pdf.
- [9] https://en.wikipedia.org/wInternetiki/
- [10] siasat.com/news/3-47-billion-people-using-internet-worldwide-india-top-spot-1274634
- [11] https://en.wikipedia.org/wiki/Educational_technology
- [12] E-Learning concepts, trends, applications, Epignosis LLC , Epignosis LLC ,PP-29-33 ,79-81 , https://www.talentlms.com/elearning/elearning-101-jan2014-v1.1.p
- [13] Project Implementation Unit National Knowledge Network iNOC, National Informatics Centre (NIC), http://nkn.gov.in/documents/NKN_Brochure.pdf, https://en.wikipedia.org /wiki/National_Knowledge_Network
- [14] http://www.edigitallibrary.com/ERepository%20System.html
- [15] www.adigitallifeexamined.com/digital-books/2015/12/19/is-a-digital-book-still-a-book
- [16] https://techterms.com/definition/pdf
- [17] https://szamalk.hu/word-halado, Microsoft Word, https://en. wikipedia.org/ wiki/Microsoft_Word

- [18] whatis.techtarget.com/fileformat/PPT-PowerPoint-presentation-Microsoft
- [19] Electronic publishing, https://en.wikipedia.org/wiki/Electronic_publishing
- [20] What are intellectual property rights? https://www.wto.org/ english/ tratop_e/ trips_e/ intel1_e.htm
- [21] https://onlinecources.nptel.ac.in/
- [22] https://www.orgkhanacademy,
- [23] Case Study: Khan Academy Bhatt, Grozdev, Hackney, Love-Davis, Stankiewicz, and Walters, April2014, han Academy 2014.pdf
- [24] Roberty Murphy, Lawrence Gallagher, Andrew Krumm, Jessica Mislevy and Amy Hafter, "Research on the Use of Khan Academy in Schools," SRI International, March 2014, http://www.sri.com/sites/default/files/publications/2014-03-07_implementation briefing.pdf (accessed April 4, 2014).
- [25] Technology Enabled Learning, Pant D, Nautiyal O P, Bhatt A K, ISBN 9789381089347, 1st Ed., March 2018, Book World, pp. 1-22.

1.15 SUGGESTED READINGS

- Technology Enabled Learning, Pant D, Nautiyal O P, Bhatt A K, ISBN 9789381089347, 1st Ed., March 2018, Book World.

UNIT- 2

INTRODUCTION TO TECHNOLOGY ENABLED EDUCATION- II

2.1 INTRODUCTION

It is always said that 'Knowledge is power' and education is one of the best tools to bring equality in this world. Education helps us to earn livelihood and get a sense of understanding. Education brings the quality of life. It also enhances the power of thinking, imagination, creativity, and helps us see beyond the obvious [1]. Government always believe that education is for everyone. Unfortunately, the access to quality education or learning is still far away from the millions of people. In order to cater the problem technology-enabled education is an urgent need which may help the spread of quality education to each and every corner of the country through Information Communication Technology.

Education in India should not be confined to urban areas but must reach to the last mile learner. Statistics suggest that most of the schools are located in rural areas [2]. Lack of proper infrastructure and accessibility of information is the biggest challenge for these school. Very few private schools move towards rural area to open their branches or new unit. Though in recent years, government initiatives, private, and personal efforts are bringing tremendous changes. With the advent of Information Technology (IT) as an essential part of our life, education is also changing. Smart classrooms, online education, virtual universities are few glimpses of the change. We are in the age, where global education hubs are at our fingertips and easily choose degrees, courses, contents, teachers and timings anytime as desired.

The main objective of Technology-enabled Education is to provide quality education at the door steps of the common man. This Information Communication Technology based education is more focused on the upliftment of rural community [3]. In nutshell, it is "Integrated Development of Education and Economic Empowerment for Rural Students". The paradigm shift of traditional education to technology-based education offers several benefits like:

Accessibility to Education- Before Information Communication Technology (ICT), it was difficult to spread or access the information especially in urban and rural areas. But, now with the help of Technology Enabled Education the accessibility of education has become more viable.

Learning at your own pace- Due to many technological developments, better infrastructure, quality services and communication is making way for the user to have education at their ease. The Internet, mobile technology, virtual classrooms are providing more options for the users to access information and learning resources anywhere and anytime.

We have learnt that e-learning is an important mechanism through which we can enhance our knowledge irrespective of time, place, university and course. There are many options available for all knowledge seekers as many virtual universities are making their mark in the market. The easy accessible knowledge is supported by various e-learning tools like Wiki-university, NPTEL, Spoken tutorial, Brihaspati. Most of them are open source, user-friendly and offer technical support which makes them more effective and easier to use. We must use these tools to enhance our knowledge and to get up-to-date with the ever-changing technology of today.

2.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Define the applications of Technology Enabled Education, e.g. Virtual Classroom, Blogs, Lesson on Demand, Virtual University, etc.
- Know success stories of Technology Enabled Education, e.g. NPTEL, YouTube video Channels, etc.

- Understand importance and the prospects of Technology-Enabled Education.

2.3 TECHNOLOGY ENABLED EDUCATION (TEE) APPLICATION

The application of Information Communication Technology in education can help students to compete in the ever-changing global economy. It will also help create skilled workforce. TEE helps facilitate social mobility by:

- Technology-enabled education enhances learning experiences and provides new sets of skills.
- Reaches more students with Massive Open Online Courses (MOOCs).
- Facilitates and train the faculties.
- Minimises costs of education.
- Saves time associated with information delivery and automating regular day-to-day tasks.
- Improves administration of institutions to enhance the quality and efficiency of service delivery.
- Enables Technology-enabled education in institutions which is essential for NAAC, NBA, and ABET accreditations.

Improving the quality of education is to make use of efficient technology i.e. through Technology-Enabled Education which facilitates learning without time constrains. It's also helpful to conduct assessments and generate reports. This new tool of education will open up more opportunities for the teachers as well as for students for flexible and smoother learning. It also facilitates better results, and the accreditations too. Virtual University and virtual classroom are many more application of Technology-Enabled Education.

2.4 VIRTUAL CLASSROOM

Virtual Classroom is classroom connected by Internet providing communication environment for distance learners. It is just like conventional face-to-face classroom [4]. A virtual classroom allows learners to attend a class from anywhere in the world. It aims to provide a learning experience similar to a real classroom. Usually in virtual classrooms, classes are conducted through the NPTEL videos or by conducting workshop and modular program through SKYPE, etc.

Advantage of Virtual Classroom-

- No geographical barriers mean any student can learn from anywhere.
- Virtual Classroom supports instructor and learner to participate in live context, discussion.
- Virtual Classroom provides the look and feel of the real class.

- It provides support to communicate with one another.
- In virtual classroom along with chat, sharing of presentations, images and video is also possible.
- Group discussions and sharing of thoughts is also possible in a big group.
- Recording of lectures in audio and video formats is useful for students to understand subjects in as many times through available media.

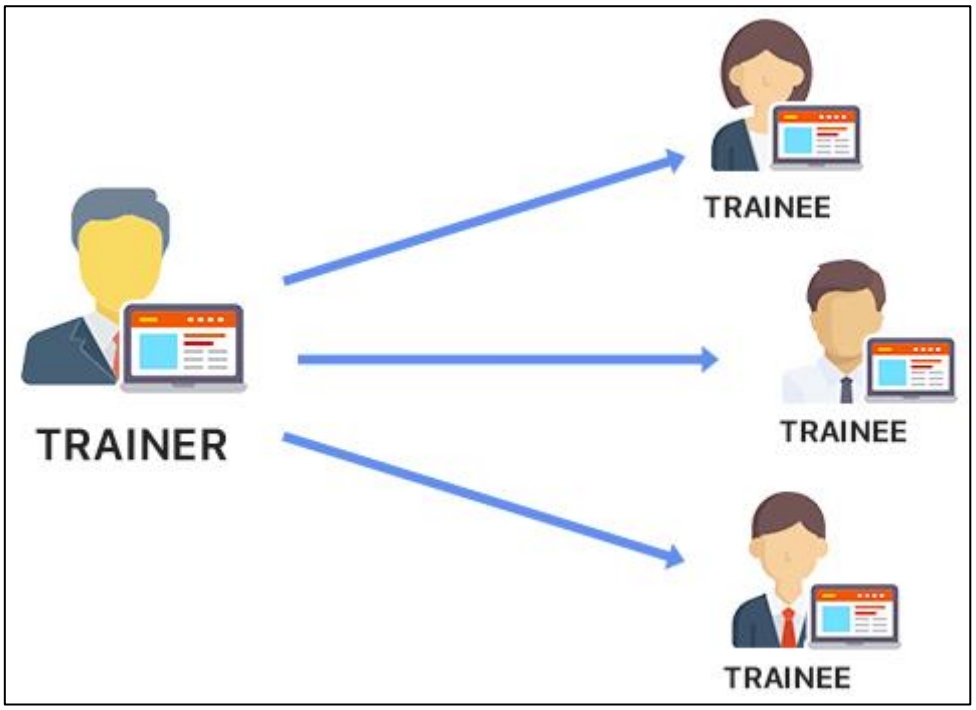

Figure 2.1 Model of Virtual Classroom

2.5 BLOGS

Blogging is basically an online journal to express your views and ideas. It is a novel way through which you can reach out to millions. There are many common blogs like WordPress, BlogSpot that cover all the dimensions of lifestyle, understanding subjects, sports, personality, youth, business, job, career guidance, psychological counselling, guidance, motivation, and much more. Popular blogs one must read, are- Digital inspiration, your story, Tech 2, Shout me loud, Save delete, Next big what, and many more.

Celebrities like Amitabh Bacchan, Karan Johar write on regular basis. Tech-savvy people like Mohan Babu (Infosys), Vineet Naiyyar (HCL), Ajit Balakrishnan (Rediff.com), Hrush Bhatt (Cleartrip) are also make their digital presence through blogs. Popular writers like Chetan Bhagat, Meenakshi, Nandita, and D Kunal Goel also have their blogs. Swim India, Jammy, Sportsnob, Chinaman are some popular blogs in Sports segment. There are many ways to become famous and so are the ways to get acknowledged by the society. It could be any discipline however; one has to work hard to achieve success. There are many important benefits one can have while writing a blog-

- The blog are creative, innovative and expressive. So, blogs give us the way to learn new things, subjects and domains.
- We often find people who are searching for answers but still not able to get the right answer. So, if you write a blog you might easily get solutions to many problems that others may be facing.
- We often search a place where we can share our versions of thoughts, sentiments, and emotions. Blog is the right place to express without hesitation and fear.
- Blog is the best way to build up your own brand. You can be subject expert, knowledge treatise or powerhouse of a particular subject. While expressing continuous on any topic, you can become maestro of the same and this will give you a perfect brand image.
- The world is full of dynamic, charismatic and energetic people. Blog opens up ways through which one can be part of a big society, country or world. It can help you to meet new and interesting people.

Therefore, blogging is one of the best ways to get to others in term of knowledge, idea sharing, researches, finding or expressing the self in terms of politics, sports, life style and other important segments of life.

2.6 LESSON ON DEMAND

Lesson on demand has recently become a popular tool for e-learning on virtual space. There is always a demand for lessons in different forms. Whenever, we need some information on life style, livelihood, essays, dissertations, thesis, we need lessons. There are certain third parties in the market that provide solutions to these issues. Lesson on Demand is becoming popular by day as one is running short of time to write or may not have the competency to deliver on time. The search for lesson on demand becomes a popular option to turn to and companies provide the same for a cost.

Many popular sites are available in the virtual world. These companies are making millions through lesson on demands while some of them are doing it free RISE (Roots in Science and Engineering), Associate university etc. are its example. They are providing free of charge lesson on demand.

2.7 VIRTUAL UNIVERSITY

Today internet has emerged as a big player providing reliable and easy communication among students and teachers which further provided the space for a virtual university environment. Technology-based education on high-end platforms has brought a revolution by providing round-the-clock classes, 365 days admission, and no time dependency [5].

Virtual university concept is booming in the education sector. In lieu of traditional knowledge or conventional pattern of education people are shifting towards non-conventional education like online education. It is a boon for the working class who have had to leave their education

because of family problems or other reasons. Such people can join these virtual universities to continue or resume their education and to acquire more skills that will help with better job opportunities. Moreover, it also helps in improving the literacy rate of the country.

In brief, we can say virtual university is like a multimedia learning environment on networks. Virtual university is more comfortable than our conventional method of learning. Software like Skype are highly effective on networks used for receiving and delivering information. Interestingly we can find a number of courses in these virtual universities like regular curriculum degrees to non-conventional certificates and diplomas. It also helps the students enhance their skills in both personal and professional environment [6].

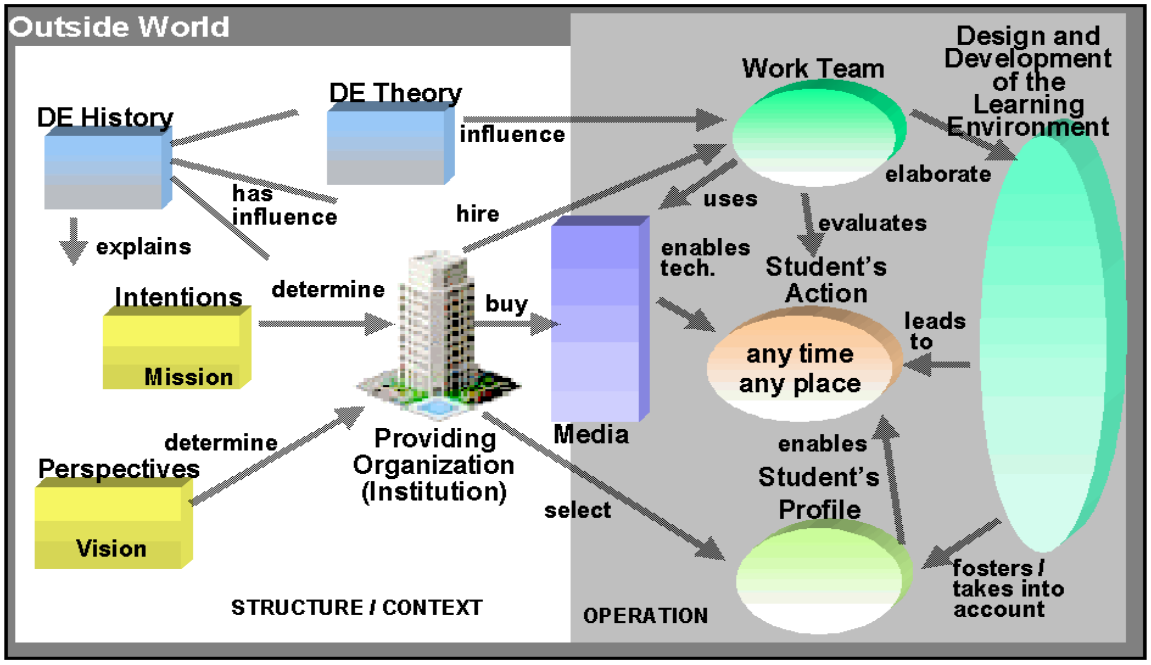

Figure 2.2 Virtual University Model (Source: www.oocities.org)

The figure 2.2 clearly depicts that virtual university is delivering all the virtues of a regular university, rather the advantage is that the student is learning at their own pace also the university is delivering the contents as and when wished by the student. Work team is occupied in developing the quality contents along with delivery of the same into the user perspective like language, level and quality of the contents [7]. It is helping the students to gain knowledge in a similar environment as of traditional classrooms with their own level of understanding and pace [8].

Advantage of Virtual University-

- It removes geographical barriers and allows students to learn from anywhere.
- It is collaborative learning and allows students to learn in cross culture environment.
- It provides flexible study environment and benefits learning anytime, and anywhere. Now, learning is no longer location dependent and learners are able to take courses independent of their physical location.

- Content presentation can be customized according to each student needs in Virtual University. Similarly, differing teaching styles can be easily adopted. Overall, it provides both teacher and learner a platform to present and learn according to their comfort zone.
- It is Cost effective as income of the lower class is generally low. The lower class can't afford an expensive education for their children or themselves. In such a scenario, Information Communication Technology provide a golden platform for them to learn and present their ideas. E-learning and virtual university environments are less expensive to produce and distribute the content, resulting in a higher degree of cost effectiveness and cost reduction. Its cost can be reduced through resource sharing, reduced travelling cost, etc.

You can easily register over on virtual university with limited fees after which you can find your schedule for classes.

Traditional vs. Virtual University

Virtual/Online universities and traditional university both have same goal. They provide good opportunity to learn something which enables them to grow in their chosen field and not only earn a degree but also implement their learning in real time. Although their purpose is the same, both having some notable differences in the approach they take, making them distinctly apart.

Traditional University	Virtual University
In conventional university we have predefined class schedule.	In virtual university students can manage classes on their own.
In conventional university every day you need to cover some distance to attend the classes.	In virtual university you can attend your lecture or classes from home.
Traditional university is good for students who want to complete their degree on regular basis.	If somebody wants to pursue their degree while doing job then virtual university is better option for them.
You need to pay high prices for some courses in traditional university like MBA, MCA and other professional courses.	You can complete any professional course at very low prices through virtual university and shape your career.
In traditional university you have very limited option to learn any subject because the university may have two or three experts of that subject.	In virtual university you have better understanding regarding subject because you have a higher number of experts.
Students always refrain from using technology.	Students will have a higher level of computer literacy than students in traditional universities.

Following are some success stories or case studies of virtual universities-

NPTEL- National Programme for Technology Enabled Learning is a great initiative of Government of India, a joint venture of IIT and IIMs in collaborative efforts of the Ministry of Human Resources Development. One can access the NPTEL through its website i.e. www.nptel.ac.in. Interestingly, it has 995 + courses, 292 million pages is popularly getting into 12 odd countries. The site is having 19498 videos more than 5 lakhs subscribers more than 171 million view across the globe showing its popularity [9]. There are more than 3200 colleges having NPTEL local chapters. NPTEL videos are available on YouTube as well. The web link is https://www.youtube.com/user/nptelhrd.

Figure 2.3 NPTEL website home page (Source: www.nptel.ac.in)

The popular courses related to the following areas are available on the NPTEL, as- Aeronautical engineering, Agriculture, Automobile engineering, Biotechnology, Chemical engineering, Civil engineering, Computer engineering, Environmental science, General courses, Humanities, Management, Ocean, Physics, Textile engineering, etc.

NROER- National Repository on Open Educational Resources is another initiative of the government. The basic objective of NROER is to provide digital resources to students and teachers of the country. It is also aimed at providing participation of the community in development and sharing of digital resources. The major objective was to improve the quality and standardize education. NROER also helps teachers create and share contextual learning and teaching resources. Following are some features of NROER:

- NROER is on open access so that everyone can access the digital resources.
- There is absolutely no charge for using and sharing of information.
- There is no need to search for contents on various websites or pages as all resources are stored in one place.
- NROER offers resources for all subjects in multiple languages.

- These resources can be added to the NROER pool through proper channel. One can find this NROER on http://nroer.gov.in/welcome

YouTube- It is one of the most popular video sharing websites in the world owned by the Google incorporation. This website is very popular among audiences because of millions of videos covering each aspect be it lifestyle, entertainment, education, knowledge sharing experiences, TV shows, music, movies, etc. One can post their video on YouTube channels and share with family, friends or with the global community. Videos can also be viewed online or offline. The download facility of the YouTube makes it more popular. There are millions of videos which are available for free download. This can be found on www.youtube.com

Spoken Tutorial- It is an initiative of National Mission on Education, Govt. of India through ICT (NMEICT). It is a rather friendly forum for online discussion registration to the forum is completely free and hardly takes a few minutes to get registered. With the initiative from IIT Mumbai, this program is quite popular in the educational institutions across the country. It provides services on many fronts like you attach files to your post's directly from your computer.

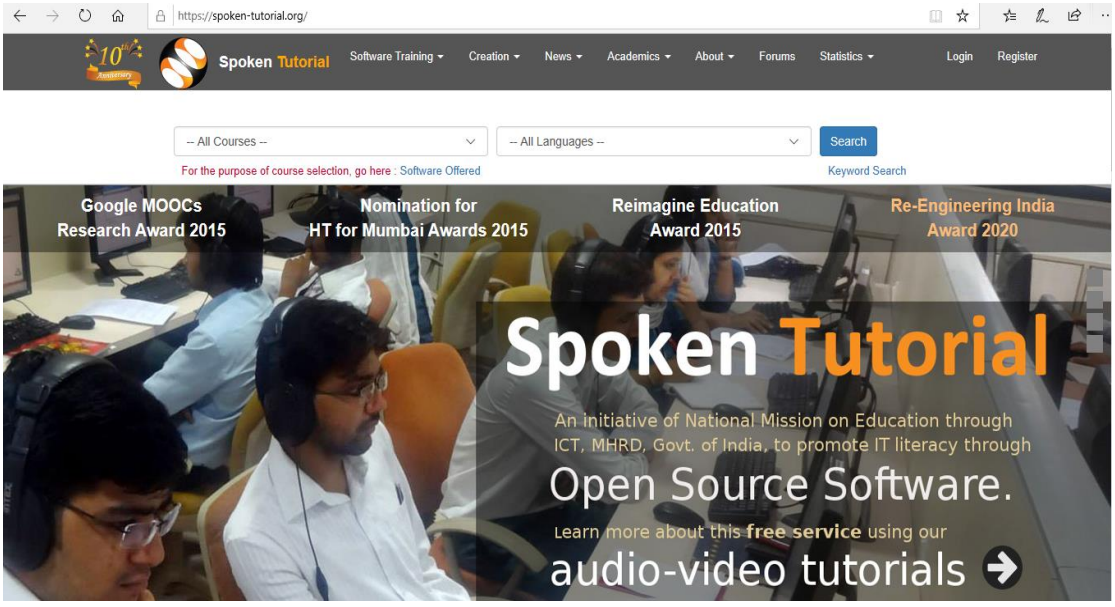

Figure 2.4 Spoken Tutorial Project Website home page (Source: www.spoken-tutorial.org)

You can give links to webpages or videos from other video websites. One can get the free training of popular programming software's like Linux, Scilab, LaTeX, PHP & MySQL, Java, and C/C++ on spoken tutorial. Spoken tutorial also has provision of online test. Online test is another interesting feature that gives the student's confidence, practice and also certificates on successful completion of the programs.

Wiki University- Commonly called Wikiversity offering more than 20 international languages like French, German, Dutch, Italian, Russian, Portuguese etc is a knowledge platform with the most popular e-Learning platform. The common Wiki products are Wikipedia, Wiktionary, Wikinews, Wikiquotes, Wikibooks, Wikidata, Wikispecies, Wikisources, Wikivoyages,

Mediwiki, Metawiki shows the popularity of this eLearning source. With more than 22,000 eLearning resources, there are various schools, portals, courses, learning projects available for the students. The hand-on experience session, counsellor support makes this university more popular among working professionals.

TED Talks- It stands for 'Technology, Entertainment and Design Talks.' and is currently quite popular in enhancing knowledge in E-learning mechanism. Usually the TED talks are confined to 15-18 minutes only. The energetic and enthusiastic speakers on this talk show speak on a noble idea supported with suitable evidences to draw the attention of academicians and students globally. The topic covers a range of subjects from science to business, technology to global issues. Moreover, these talks are conducted in more than 100 languages. This only makes TED talks a popular medium for academicians and the intelligentsia.

2.8 FUTURE PROSPECTS OF TECHNOLOGY ENABLED EDUCTION

The future of technology in education is that it changes at a fast pace. Today, we have iPads and other mobile technology. They are playing very important role in the future. Four years ago, iPad didn't exist and we don't know what new technology may come up in next four years. We have other devices like wearable devices such as Google Glass, tablets etc. These devices are frequently used in education.

The main factor of future education is access, anywhere learning and collaboration, locally/globally. In future, teaching and learning will be social. Schools of the future could be traditional cohort of students, as well as online. It could be available to the students across the country or even the world. Things are moving this direction. For example, OER, massive open online courses (MOOCs), Virtual University etc.

Cloud is going to be very important part of education technology. The future schools, will not need software installed, servers or local file storage. Schools will need a fast-robust internet connection, everything will be on cloud. Infrastructure is paramount to the future of technology in education. Teachers can use cloud to set, collect, and grade work online. Students will have instant access to grades, comments. They can work via a computer, smartphone or tablet. Many university and schools are already doing this.

Now, school classrooms are going to change due to cloud and mobile devices. Technology will be integrated into every part of school where teachers, students, and support staff all will be connected. In future, all classrooms will be paperless with cloud, the whole world will be our classroom. E-learning will drastically change teaching and learning where students can learn from anywhere and teachers can teach from anywhere.

Teachers can adopt a flipped classroom approach in future where students will take ownership of their own learning. There could be videos, documents, audio podcasts or interactive images

with all of these resources to be accessed via a student's computer, smartphone or tablet as long as student has an internet connection either via Wi-Fi, 3G, 4G or 5G.

2.9 IMPORTANCE OF TECHNOLOGY-ENABLED EDUCATION FOR EFFECTIVE TEACHING - LEARNING

Technology- Enabled Learning tools and technology enable learner to develop effective self-directed learning skills. They can identify what they need to learn, learner can find online resources, problem at hand. Technology-Enabled Learning increases learner's efficiency and productivity. It is handy for learners who can explore open-ended questions with imagination and logic learn how to make decisions, as opposed to just temporarily memorizing the textbook [9].

Learner has positive feelings of digitized learning tools and it gives them the confidence. They get motivate to learn even more new things. The millions of courses of the best educators are available for free to anyone with internet connection with endless possibilities. Digital Learning makes learner self-motivated and more accountable. Both trainer and learner using digital learning tools and technology become more engaged in growing their knowledge base, teamwork, problem-solving, reverse teaching, gamification [9].

Technology-Enabled Education and digital learning is more interactive than textbooks or one-sided lectures, and more engaging activities than traditional education methods. This allows students to better connect with the learning material. TEE and Digital Learning Tools involve educators and parents to a deeper extent, digital learning tools and technology is expected to rapidly increase information sharing [9].

Technology-Enabled Learning enable educators to rapidly share information with other educators in real-time. The explosion of free and open content and tools has created an environment of sharing. By connected learning, classrooms around the country and around the globe can not only coordinate with one another to share insights but also boost learning, experience, and communications skills [9].

Technology enabled learning enable increasing student's employability with digital learning tools and technology. It has replaced the traditional education methods. The traditional lectures may still exist along with the new-age learning tools and technology, but lecture materials should be provided as a supplement to classroom activities and moved online for students to reference outside the classroom [9].

Issues and Challenges in implementing Technology Enabled Education in India-

The biggest challenge to provide ICT-based education in India is how latest technology trends can shape education in future. In a developing country like India, lack of education technology, internet access, and qualified teachers are the biggest challenges in providing ICT-based educational services, especially to the rural area. The rate of internet penetration in the country,

especially in the remote corners of India is the biggest challenge of Technology-Enabled Education. The shortage of technical equipment and eligible teachers is another challenge. However, in the coming few years, the scenario of e-learning will take a complete 360 degree turn in the country, especially in remote areas.

2.10 POINTS TO REMEMBER

- Knowledge is power and education is one of the best tools to bring equality in this world. Education helps us to earn livelihood, get a sense of understanding. Education brings the quality of life and enhances the power of thinking, imagination, creativity, and help us see beyond the obvious [1].
- The main objective of Technology-enabled education is to provide quality education at the door steps of common man. This Information Communication Technology based education is more focused to upliftment of rural community.
- Information Communication Technology in education can help students to compete in the global economy. It will also help create skilled workforce.
- In Virtual Classroom chat, sharing of presentations, images and video is possible. In Virtual Classroom the recording of the lectures in audio and video formats is useful for student to understand the subject in as many times through available media.
- A blog should be creative, innovative and expressive. So, blogs give us the way to learn new things, subjects and domains.
- We often find people searching for answers but still not able to get the right answer. So, if you write a blog it can provide solution to many problems that others may be facing.
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- Blogging is one of the best ways to get to others in term of knowledge, idea sharing, researches, finding or expressing the self in terms of politics, sports, life style, and other popular segments of life.
- Virtual university concept is booming in the education sector in lieu of traditional knowledge or conventional pattern of education, people are shifting towards non-conventional education like online education.

- Advantage of virtual university is that the student is learning at their own pace. The university is delivering contents as and when wished for by the student.
- One can post their video on YouTube channels and share with family, friends or with the global community. Videos can also be viewed online or offline. There are millions of videos which are available for free download. This can be found on www.youtube.com

2.11 GLOSSARY

- Virtual Classroom - is a kind of classroom connected through Internet where we get technology-enabled Education. It provides a communication environment for distance learners. It is just like conventional face-to-face classroom. A virtual classroom allows learners to attend a class from anywhere in the world.
- Blogging - is an online journal where you can express your views and ideas. It is a novel way through to reach out millions. There are many common blogs like WordPress, BlogSpot that cover all the dimensions of lifestyle, understanding the subjects, sports, personality, youth, business, job, career guidance, psychological counselling, guidance, motivation, and much more.
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2.12 CHECK YOUR PROGRESS

Objective type questions-

a) Usually in virtual classrooms, the classes are conducted through the .....videos or by conducting workshop and modular program through SKYPE, etc.

b) Virtual Classroom supports instructor and ..... to participate in live context, discussion.

c) .....Classroom provides the look and feel of the real class.

d) Blog opens up a way through which one can be part of a big society, country or world. It can help you to meet new and interesting.....

e) Virtual university is like a multimedia ..... environment on networks.

f) Software like Skype which are highly effective on networks which are used for receiving and delivering.....

g) NPTEL ..... are available on YouTube as well.

h) National Repository on Open Educational Resources (NROER) is on Open access so that everyone can access the ..... resources.

i) One can get the free training of popular programming software's like Linux, Scilab, LaTeX, PHP & MySQL, Java, and C/C++ on ..... tutorial.

j) YouTube the most popular video sharing website in the world which is owned by the ..... incorporation.

k) TED Talks stands for .....

Descriptive type questions-

a) What do understand by "Integrated Development of Education and Economic Empowerment for Rural Students"? Explain

b) What is Virtual classroom? What is its aim? How it benefits the Technology enabled education?

c) What are the applications of technology-enabled education? Explain.

d) What are the advantages of a Virtual Classroom? What do you mean by the term "student can learn from anywhere"?

e) What are blogs? List and explain briefly some popular blogs in the area of Technology enabled education. What are the advantages of blogs?

f) Why is the blog required? What will you get while writing blogs? How will you benefited if you have a digital space in form of blog?

g) What do you understand by the term lesson on demand? What are its benefits? What are different companies providing lesson on demands?

h) What is a virtual university? What are the advantages of Virtual University? How does it removes geographical barriers?

i) What is collaborative learning? How will you provide flexible study environment to the student?

j) What do you understand by "learning is no longer location dependent and learners are able to take courses independent of their physical location"? Explain.

k) What is National Programme for Technology Enabled Learning? What are the popular courses available in the NPTEL?

l) What are the different features of NROER? How does it store all the resources in one place so that there is no need to search for the contents on various websites or pages?

m) What are the popular courses and resources available in multiple languages under NROER? Are these resources available in YouTube?

Answers (Objective type question)-

[a] NPTEL [b] learner [c] Virtual [d] people [e] learning [f] information

[g] videos [h] digital [i] spoken [j] Google

[k] Technology, Entertainment and Design Talks

2.13 BIBLIOGRAPHY/ REFERENCES

- [1] Harasim, L.M., Hiltz, St. R., Teles, L., Turoff. M. (1995). Learning networks: A field guide to teaching and learning online. MIT Press.
- [2] Moore, M., Kearsley. G. (1996). Distance Education: A Systems View. New York: Waldsworth Publishing Company
- [3] Oblinger, D. G., & Rush, S. C. (Eds.). (1998). The future compatible campus. Bolton, MA: Anker Publishing Company, Inc. "1999 Research Report on the Effectiveness of Technology in Schools: Executive Summary 6th Edition". http://www.spa.org/project/edu_pub/99effreport.htm
- [4] Abdoli-Sejzi, A., Aris, B., & Yahaya, N. (2009). An investigation of virtual universities in developed and developing countries: importanceand neccessity, The proceeding of Educational postgraduate research seminar (Edupres), Universiti Teknologi Malaysia,1, 84-93.
- [5] Steve,R, Bernard,S, Howard,F, & Daxa,P. (2000).The virtual university ,the internet and resource-Based learning,London, Kogan Page Limited. Twigg,C,A & Oblinger , D.G.(1996).
- [6] Ministry of Education. (2004). Development Plan for Education and Research 2003−2008. Publication of the Ministry of Education, Finland 2004:8. www.minedu.fi/julkaisut/koulutus/2004/opm08/opm08.pdf
- [7] Dziuban, C., Moskal,p., Brody, J., & Shea.(2007).Student satisfaction with asynchronous learning ,Journal of Asynchronous learning Network,11,87-95.
- [8] H. Stein “A Virtual Education Model” presented at the International Congress of Education, Technology and Change, Santiago de Cali, June 11th to 14th 1999.
- [9] http://www.panworldeducation.com/2017/03/23/benefits-of-digital-learning-over-traditional-education-methods

2.14 SUGGESTED READINGS

- Technology Enabled Learning, Pant D, Nautiyal O P, Bhatt A K, ISBN 9789381089347, 1st Ed., March 2018, Book World.

UNIT- 3

TECHNOLOGY CENTRIC EDUCATION

3.1 INTRODUCTION

The potential of Information and Communication Technology (ICT) in education greatly facilitates the acquisition and absorption of knowledge and also increases the access of education among the aspirants. It provides the opportunities to enhance educational systems, reachability, and improves policy formulation and execution. The technology centric education is a powerful tool for extending educational opportunities among the teaching-learning community. The ability of ICT is to transcend time and space which make it possible for asynchronous learning, where one can learn by his/her own pace. Todays with the access of Internet (World Wide Web), a wealth of learning resources are available in multiple forms, i.e. audio, video, animation, graphics, etc. in which almost every subject's learning material available either free (example- SWAYAM, NPTEL, NIOS, NROERs, OERs, etc) or in payment basis (example- many online learning platforms, as- byju's). ICTs can contribute to

enhance the quality of education by increasing learner motivation and engagement, facilitating the acquisition of basic skills, and enhancing teacher training. [1]

ICT is the need of 21st century workplace skills where particularly computers, the Internet, and related technologies, are becoming more and more ubiquitous. The ability to use ICTs applications effectively and efficiently is seen as representing a competitive edge in an increasingly globalized job market. 21st Century Skills not only includes technological literacy but also covers digital age literacy (consisting of functional literacy, visual literacy, scientific literacy, technological literacy, information literacy, cultural literacy, and global awareness), inventive thinking, higher-order thinking, and sound reasoning, effective communication, and high productivity. [1] However, the digital divide is a major issue between those who have access to and control of technology and those who do not have any such facilities. Fostering availability of digital teaching-learning infrastructure is an urgent need to overcome digital divide. [1]

Today's we commonly used two terms inter-changeably, i.e. Open Learning and Distance Education. They are often combined to be known as Open and Distance Learning (ODL). Open learning is a philosophy and Distance Education is the mode used for translating it into reality as the two are complementary to each other. Distance Education (DE) is an umbrella term which describes all the teaching learning arrangements in which the learner and the teacher are separated by space and time. In fact, it is a mode of delivering education and instruction to learners who are not physically present in a traditional setting of a face-to-face classroom mechanism. [2]

Transaction of the learning material (curriculum) to the learners is affected by means of specially prepared materials called Self Instructional Learning Material (SILM). The learning materials which are delivered to the learners at their doorstep through various media such as print, television, radio, satellite, audio/video tapes, CD-ROMs, Internet and World Wide Web etc. [2]

In today's digital era (in reference to Open and Distance Learning), technological medium replaces the inter-personal communication of conventional classroom-based education that takes place between the teacher and the learners. Communication between the institution, teacher and learners is mainly through electronic media (telephone, interactive radio counselling, teleconferencing, videoconferencing, chat sessions, e-mail, website, etc) and also through Learning Management System (LMS) held at virtually by the Study Centres that are set up by the DE institutions as close to the learners' homes as possible or by the DE institutions themselves. [2]

Open and Distance Learning (ODL) system has been instrumental in enhancing the access to quality higher education in India. In the coming years, challenges before ODL institutions especially on technology integrated education and quality concerns, will be immense. For

sustenance and greater impact, ODL system will have to be transformed to a learner-centric approach, coupled with technology-enabled online education system. [3]

3.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Explore Open and Distance Education (ODE).
- Explore the historical development of ODE in India.
- Define ODE in present scenario.

1.3 OVERVIEW OF OPEN AND DISTANCE EDUCATION

Over last couple of years, Open and Distance learning (ODL) institutions have successfully changed the image of ODL to multimodal technology supported education, and have become a credible alternative to conventional higher education.

Transition towards online learning can overcome some of the biggest challenges faced by conventional higher education as well as ODL. With the greater emphasis on cost effective online education which is beyond the limitation of territorial jurisdiction, the ODL Institutions have to remodel their framework aligning with technology supported learning environment. [3]

The Open and Distance Education system of study focuses on open access to education and training to make the learners free from the constraints of time and place, and offering flexible learning opportunities to individuals. Open and distance learning (ODL) is one of the most rapidly growing fields of education now a days and it has substantial impact on all education delivery systems. The new ODL system growing fast because of the development of Internet-based information technologies used for teaching-learning (Ghosh, et. al., 2012).

There are several approaches to define the term open and distance learning. Few of them are- [4]

- It is a way of separation of teacher and learner in time or place, or in both.
- It uses of mixed-media for teaching-learning which includes print, radio and television broadcasts, video, Internet-based learning.
- Following are the more commonly used terms related to open and distance learning are- correspondence education, independent study, continuing education, distance teaching, self-instruction, adult education, technology-based or technology-mediated education, learner-centred education, open learning, flexible learning, distributed learning, etc.

In Indian higher education system, the Open and Distance Learning (ODL) has a major contribution in enhancing the Gross Enrollment Ratio (GER) and ensure the accessibility of the higher education to large segments of the Indian population particularly to reach out to the unreached and to meet the demands of lifelong learning. ODL is an innovative system of university-level education which is both flexible and open in terms of methods and pace of learning; combination of courses; eligibility for enrollment; age of entry; conduct of

examination and implementation of the programmes of study. It provides an opportunity to up-grade skills and qualifications; and also develops education as a lifelong activity to enable persons to update their knowledge or acquire knowledge in new areas. [2]

Transformation of Open and Distance Learning to Online Learning-

The Ministry of education (formerly known as- Ministry of Human Resource Development), Government of India, is setting a target of GER of 40 percent by the year 2024. With greater role to be played by the Open and Distance Learning (ODL) system, it is inevitable that the ODL system will have to be transformed to a learner-centric approach, coupled with technology-enabled online education system. The key factors of such transformation are (Rao, 2020) -

- Conventional student support moved to IT enabled support system.
- Hard copy learning material moved to e-SLMs (Self Learning Material).
- Face-to-Face counselling moved to online counselling.
- Conventional ODL system (Learner -> Study Centre -> ODL Institution) moved to ICT-based Student Management System (Learner -> ODL Institution).
- Programs offerings by institution moved to online programs.

3.4 HISTORICAL DEVELOPMENT OF OPEN AND DISTANCE EDUCATION

In India, the University Grants Commission (UGC) suggested in its report for (1956-1960) the proposals for evening colleges, correspondence courses and award of external degrees should be considered. The planning commission started to think about it. In the third Five Year Plan, the need for the introduction of correspondence education in the country has been discussed. [2]

Under the chairmanship of Prof. D. S. Kothari, an expert committee has been constituted. The committee recommended the institution of correspondence courses in view of the greater flexibility, economic viability and innovative methods of imparting education. The committee also suggested that correspondence courses in India should be administered by the universities only and in the first instance, by one University, viz., the University of Delhi as a pilot project. [2]

In the year 1962, the University of Delhi's School of Correspondence Courses and Continuing Education established. After the successful drive of pilot project for distance learning in India, the next decade i.e. the 1970s saw the growth and spread of the Correspondence Education system in India, by more conventional universities opening Correspondence Course Institutes (subsequently renamed as Directorates of Distance Education/ Centres of Distance Education). The opportunity of access, affordability and convenience offered by the Distance Education system contributed to its increasing popularity and growth. [2]

Later on, it was realized that unless we will not open educational opportunities to the deprived, unless we will not remove the structural rigidities in our educational system and unless we will not integrate Information and communication technology in educational system's developments, we cannot and will not succussed in educating majority of the people and of catering to the diverse types of education that a modern society demands. [2]

In the year 1980s, the Open University system started with the objectives to further democratize opportunities for higher education to large segment of the Indian population, particularly those for whom face-to-face educational access was difficult or somehow impossible because of several hurdles, i.e. living in remote and rural areas, working people, women and other adults who wish to acquire and upgrade their knowledge and skills through studies in various fields. [2]

The Ministry of Education (Formerly known as Ministry of Human Resource Development) in its National Policy on Education (NPE) 1986, and NEP 2020, gave prominence to an Open and Distance Education system as a means to "augment opportunities for higher education and as an instrument of democratizing education". [2]

Dr. BR Ambedkar Open University, Hyderabad (year 1982) was the first Open University in the country, followed by the establishment of Indira Gandhi National Open University at the national level by the Parliament of India in 1985. Subsequently the idea was accepted by Nalanda Open University (NOU) Patna, Bihar (year 1987); Vardhman Mahaveer Open University (VMOU), Kota, Rajasthan (year 1987); Yashwantrao Chavan Maharashtra Open University (YCMOU), Nashik, Maharashtra (year 1989). The major responsibility for the promotion and coordination of Open and Distance Education was handed over to the Indira Gandhi National Open University (IGNOU) by the Parliament of India. [2]

Thus, IGNOU has become a unique institution as it was entrusted with a dual role: of functioning like an Open University by offering programmes of education and training through distance mode and also acting as the promoter, coordinator of the Open and Distance Education system in the country and determining standards in such systems. To well performing such responsibilities, the Distance Education Council (DEC) was set up by IGNOU in the year 1991. [2]

The DEC started functioning within the broad framework, and the policies laid down by the Board of Management of IGNOU while enjoying a significant measure of autonomy in its operations. The DEC started interacting with the State Governments for establishing the State Open Universities in the respective states. As a result of DEC initiatives several State governments established Open Universities. [2]

The DEC took several initiatives for promotion, coordination and maintenance of standards of open and distance education system in the country. DEC has also developed guidelines for regulating the establishment and operation of ODL institutions in the country. In August 2010, the Ministry of Human Resource Development constituted a Committee under the Chairmanship of Prof. Madhava Menon in respect of regulation of standards of education

imparted through distance mode. As per the Menon's report recommendations the creation of a new regulatory body for ODL system, named the Distance Education Council of India (DECI) is to be required. The Menon's Committee also decided that as an interim measure, the DEC of IGNOU may be shifted to UGC. [2]

UGC notified the University Grants Commission (Open and Distance Learning) Regulations, 2017 in the official Gazette on June 23, 2017. Subsequently, several amendments in the UGC (Open and Distance Learning) Regulations, 2017 were notified in the official Gazette till date. The regulations and its amendments are available on UGC website (https://deb.ugc.ac.in). These Regulations lay down the minimum standards of instruction for the grant of degree at the undergraduate and post-graduate levels, through Open and Distance Learning mode. These Regulations are in addition to and not in derogation of any other Regulations, Notifications, Guidelines or Instructions issued by the Commission from time to time. After notification of the UGC (ODL) Regulations- 2017, the process for granting recognitions to HEIs for offering programmes through the ODL mode was undertaken by the UGC. (Source: https://deb.ugc.ac.in/DEB/Regulations)

List of State Open Universities in India-

1. Dr. B.R. Ambedkar Open University (BRAOU), Hyderabad, Andhra Pradesh.
2. Vardhman Mahaveer Open University (VMOU), Kota, Rajasthan.
3. Nalanda Open University (NOU). Patna, Bihar.
4. Yashwantrao Chavan Maharahstra Open University (YCMOU), Nashik, Maharashtra.
5. Madhya Pradesh Bhoj Open University (MPBOU), Bhopal, Madhya Pradesh.
6. Dr. Babasaheb Ambedkar Open University (BAOU), Ahmedabad, Gujarat.
7. Karnataka State Open University (KSOU), Mysore, Karnataka.
8. Netaji Subhas Open University (NSOU), Kolkata, West Bengal.
9. U.P. Rajarshi Tandon Open University (UPRTOU), Allahabad, Uttar Pradesh.
10. Tamil Nadu Open University (TNOU), Chennai, Tamil Nadu.
11. Pt. Sunderlal Sharma Open University (PSSOU), Bilaspur, Chhattisgarh.
12. Uttaranchal Open University (UOU), Haldwani, (Nainital), Uttarakhand.
13. K. K. Handique State Open University (KKHSOU), Guwahati, Assam.

Note- The Indira Gandhi National Open University (IGNOU) is only the National Open University.

3.5 KEY FEATURES OF OPEN AND DISTANCE EDUCATION

- It offers a flexible and affordable education where a variety of courses are available to choose.
- It offers a self-paced learning.
- It provides the advantages of blended mode of learning.

- It is free from age limit, and physically face-to-face interaction with the teachers, so that it a boon for working people those who want to up-skill.
- Increased freedom for both learners and educators with maintaining quality standards.
- Distance education believes on anyone, anywhere, and anytime can connect with the formal learning system without any barriers.
- Ease of use is another key feature of distance education where a user-friendly environment is available for all those involved.
- In Open and Distance Education, the learner support services are backed by powerful applications of information technology.

3.6 ROLE OF OPEN AND DISTANCE LEARNING IN PRESENT SCENARIO

Distance education, also called distance learning, is the education of students who may not always be physically present at a physical location called classroom. A distance learning program can be completely distance learning, or a combination of distance learning and traditional classroom learning. Today's, distance learning usually involves online education which is sometimes called hybrid or blended learning. Massive open online courses (MOOCs), offering large-scale interactive participation and open access through the World Wide Web, which is the recent educational mode in distance education. [5]

The COVID-19 pandemic resulted in the closure of the vast majority of learning centres worldwide. Almost, all learning institutions are moved to online mode of learning through different connecting platforms, i.e. Zoom, Cisco Webex, Google Classroom, Google Meet, Microsoft Teams, etc. During the COVID-19 pandemic, only distance education mode of teaching-learning becomes successful for connecting with their peers. Information and communication technology (ICT) has enabled many forms of distance learning through open educational resources and facilities such as e-learning and MOOCs. [5]

The distance education technologies are divided into two modes of delivery, i.e. synchronous learning and asynchronous learning. In synchronous learning, all learners are "present" at the same time in a virtual classroom, as in traditional classroom teaching. It requires a timetable. Web conferencing, videoconferencing, educational television, instructional television are examples of synchronous technology, as are direct-broadcast satellite (DBS), internet radio, live streaming, telephone, and web-based VoIP. In asynchronous learning, learners access course materials flexibly on their own schedules. Students are not required to be together at the same time. Mail correspondence, which is the oldest form of distance education, is an asynchronous delivery technology, as are Learning Management System, message board forums, e-mail, video and audio recordings, print materials, voicemail, and fax. [5].

3.7 OPEN AND DISTANCE LEARNING AND TECHNOLOGY CENTRIC EDUCATION

With the emergence and expansion of Internet, the concept of traditional education has transformed rapidly. Now, being physically present in a classroom is not the only learning option. The applications of information and communication technology in teaching-learning have opened the multiple doors of information sharing/interactive discussion.

We are living in 21st century, you can access quality education whenever and wherever you want with the help of internet. This way, totally revolutionized the traditional education system. Through online education, where you can get short duration courses as well as you may earn undergraduate and post graduate degrees which are fully offered in online mode. And, also you have a chance to join your dream institution for such courses.

Technology centric education/ online education is becoming the popular choice of youngster because it offers several benefits to the learners, such as-

- Online education enables the teacher and the learner to set their own learning pace, and there is the added flexibility of setting a schedule that fits to you.
- Studying online teaches you time management skills, which makes finding a good work-study balance easier.
- Online learning platforms offers a wide range of programs, where you can get the courses as per your choice.
- Online learning makes you accessible to the quality learning resources and also enables you to study from anywhere in the world.
- Now, online programs are accredited globally.

3.8 POINTS TO REMEMBER

- The potential of Information and Communication Technology (ICT) in education greatly facilitates the acquisition and absorption of knowledge and also increases the access of education among the aspirants.
- The ability of ICT is to transcend time and space which make it possible for asynchronous learning, where one can learn by his/her own pace.
- Todays with the access of Internet (World Wide Web), a wealth of learning resources are available in multiple forms, i.e. audio, video, animation, graphics, etc. in which almost every subject's learning material available either free (example- SWAYAM, NPTEL, NIOS, NROERs, OERs, etc) or in payment basis (example- many online learning platforms, as- byju's).
- Today's we commonly used two terms inter-changeably, i.e. Open Learning and Distance Education. They are often combined to be known as Open and Distance Learning (ODL).
- The Open and Distance Education system of study focuses on open access to education and training to make the learners free from the constraints of time and place, and offering flexible learning opportunities to individuals.

- A distance learning program can be completely distance learning, or a combination of distance learning and traditional classroom learning.

3.9 GLOSSARY

- LMS- Learning Management System.
- UGC- University Grants Commission.
- HEI- Higher Educational Institute.
- MOOC- Massive open online courses.
- VoIP- Voice over Internet Protocol.

3.10 CHECK YOUR PROGRESS

a) Define Open and Distance Education in your own words.

b) Explain the historical development of Open and Distance Learning in India.

c) Define the role of Open and Distance Education in current scenario.

3.11 BIBLIOGRAPHY/ REFERENCES

- [1] https://en.wikibooks.org/wiki/ICT_in_Education/ The_Promise_of_ ICTs_in_Education.
- [2] https://www.ugc.ac.in/deb/pdf/ODLwhatwhyandhow.pdf.
- [3] Rao, N. (2020). Envisioning the Future of Open and Distance Learning System in India. Scholarly Article from the book REIMAGINING INDIAN UNIVERSITIES, Editors: Pankaj Mittal and Sistla Rama Devi Pani, Publisher: Association of Indian Universities, New Delhi (India), 2020. ISBN No. 81-7520-154-1.
- [4] An Introduction to Open and Distance Learning, Published by THE COMMONWEALTH of LEARNING, Available at- http://www.col.org/ODLIntro/introODL.htm.
- [5] https://en.wikipedia.org/wiki/Distance_education.
- Ghosh, S., Nath, J., Agarwal, S. & Nath, A. (2012). Open and Distance Learning (ODL) Education System: Past, Present and Future– A Systematic Study of An Alternative Education System. Journal of Global Research in Computer Science, 3(4), 53-57, Available at- www.jgrcs.info.

3.12 SUGGESTED READINGS

- https://en.wikipedia.org/wiki/Distance_education
- Rao, N. (2020). Envisioning the Future of Open and Distance Learning System in India. Scholarly Article from the book REIMAGINING INDIAN UNIVERSITIES, Editors: Pankaj Mittal and Sistla Rama Devi Pani, Publisher: Association of Indian Universities, New Delhi (India), 2020. ISBN No. 81-7520-154-1.

- An Introduction to Open and Distance Learning, Published by THE COMMONWEALTH of LEARNING, Available at- http://www.col.org/ODLIntro/introODL.htm.

UNIT- 4

ROLE OF TECHNOLOGY ENABLED EDUCATION IN OPEN AND DISTANCE LEARNING

4.1 INTRODUCTION

Distance education denotes an educational experience where the teacher and the learner are not face- to- face during the teaching and learning process (Rahman, 2014). Today's Open and Distance Learning (ODL) is highly dependent on information and communication technology (ICT), because the applications of ICT provide several mediums of information delivery, learner support services. A diverse set of ICT tools and applications are used to communicate, disseminate, store and manage information. ICT is playing a key role in ODL to meet the requirements and expectations of the learners in large scale. The use of ICT has empowered the learner's community like never before by E-mails, e-mail groups, on-line forums, webinars, web conferencing. It provides a way to connects with learner's at anytime, anywhere and to anyone. Social Networking technologies like blogs, wikis, media-sharing services and collaborative editing tools are also helpful for sharing and exchange of information between

peers. The applications of ICT's pushed a revolutionary impact on ODL system of study, because of such impacts ODL is continuously growing (Bedanta, 2020).

Education is the most important investment because is the basic need of every human being. A communication network has become an essential tool in today's educational environment than ever before where we have entered into the age of information revolution. Teaching to the distance learners requires different skills to prepare relevant and valuable learning materials (called Self Instructional Learning Material) to facilitate the construction of knowledge and learning. The global era is characterized by rapid advances in ICT and expansion of knowledge using online platforms. Basically, ICT is a tool which is used in implementing learner support services in ODL system of study education. It has been proved that ICT can improve the quality of the student learning experiences and make education and training opportunities available to a broader spectrum of the population in developing countries (Rahman, 2014).

With the advancement of ICT, a variety of audio-visuals, technology mediated broadcasts, and other internet based smart and innovative techniques are used for effective transmission of knowledge to the learners of ODL system of learning. Open and Distance Learning is the delivery of learning or training to those who are separated mostly by time and space from those who are teaching training where a variety of technology enabled teaching-learning tactics are used to transmit knowledge to the learners. ODL system of education promises the flexible learning and ICT supported smart learning model for those are unable to join the conventional system of education because of a variety of limitations (Rahman, 2014). ICT facilitates ODL system of education in several ways, as (Vasudevaiah, 2016)-

- Faster and flexible course delivery.
- Improved and increased access of education to the remote locations.
- Enhanced pedagogical and course design experience.
- Improved educational administration and monitoring.
- Enhanced collaboration and interactive experience.
- Provides several ways of preparing teaching-learning materials.
- Improved assessment system.

4.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Define the role of technology supported learning in Open and Distance Learning.
- Explore governing bodies of Open and Distance Learning in India.
- Explore futuristic online and Open and Distance Learning.

4.3 TECHNOLOGY ENABLED EDUCATION AND OPEN & DISTANCE LEARNING

ICT has a power to establish communication between two physically distant locations. ICT is playing a vital role in open and distance learning to achieve the expectations of the learners. ICT provides a backbone for today's ODL system of education because ICT has proven applications for meeting the learners' requirements at various phases of learning, such as- Admission, Assignment, Queries, assessment, and design and development of learning resources (Rao, n.d.). A majority of people are living in rural areas where access to the formal education system (face-to-face system of learning) is not possible, in such circumstances technology supported ODL system of education can be a good alternate to fulfill the educational needs of the society. Technologies that are used to deliver information to distance learners are often classified as two-way interactive (such as- video conferencing, WhatsApp groups, etc.) or one-way non-interactive (Such as- radio broadcasts, etc.) mediums (Shah & Salimullah, 2009).

ICT enriching the potential of ODL system of education using several connecting and information dissemination tools/applications, i.e. telephone tutoring, teleconferencing, audio, graphics, video conferencing, teletext, hypermedia (media using hyperlinks), Intelligent educational solutions, Open Educational Resources, Massive Open Online Courses, etc. ODL system of education becomes the need of today's digital era to provide educational services to the learners' using ICT supported tools (Rahman, 2014).

Barriers in Technology Enabled Education in Open and Distance Learning- There are several barriers in availing maximum benefits of ICT applications in ODL.

- Digital Literacy among society.
- Lack of availability of ICT resources.
- Lack of availability of Internet connectivity.
- Lack of technical skills to avail such educational applications.
- Lack of awareness of accessing educational facilities using various digital platforms.
- Lack of accessibility of ICT based educational resources.
- Lack of awareness of digital repositories / Courseware.
- Lack of orientation of ODL teachers.
- Lack of motivation among ODL teachers to avail ICT oriented learner support services.

4.4 OPEN AND DISTANCE LEARNING GOVERNING BODIES IN INDIA

In the year 1982, Dr. B.R. Ambedkar Open University was established, as the first open university in India. This was followed by the establishment of Indira Gandhi National Open University (IGNOU) at the national level in the year 1985. The University Grants Commission (UGC), is the highest authority for regulating Open and Distance Learning (ODL) programmes

in India, although the responsibility for promotion and coordination of ODL was given to IGNOU under the Indira Gandhi National Open University Act (1985). [1]

The Distance Education Council (DEC) was set up by IGNOU in the year 1991 and it became operational in 1992. In the year 2010, the Ministry of Education (formerly known as Ministry of Human Resource Development) constituted a committee for investigating distance education standards in India. The committee recommended the creation of a new regulatory body, the Distance Education Council of India (DECI). It also recommended that until such body is established, the DEC may be shifted to UGC. [1]

In year 2013, IGNOU dissolved the DEC and the UGC took over the entire assets and manpower, establishing the Distance Education Bureau (DEB). The UGC, DEB is in the process of framing new regulations for Distance Education. Till the year 2020, two regulations have come into existence, i.e. University Grants Commission (Open and Distance Learning) Regulations, 2017; and University Grants Commission (Open and Distance Learning Programmes and Online Programmes) Regulations, 2020 (Complete links of both regulation given under "Suggested Readings").

4.5 QUALITY ASSURANCE IN IN OPEN AND DISTANCE LEARNING

Quality assurance is directly linked to academic development in terms of improving the teaching and learning skills in an ODL institutions. The few quality assurance factors which should be considered by any ODL institutions are, public accountability, improved teaching and learning, academic and administrative processes, informed student choices, and a means of continuous feedback and improvement. Such activities lead to quality educational environment, and also gives us a chance to improve our processes time to time. There are numerous reasons for quality becoming strategically important in all spheres of higher education undertakings. Some of the important reasons are indicated as- Intensifying global competition; Growing expectations; and Learners expect high quality education at minimal cost. (Ramdass, & Nemavhola, 2018).

Quality assurance from any institution satisfy the needs and aspirations of the learners in a appropriate level of delivery of services. There are many factors that may be considered for the improvement of the management strategy of distance education programmes in order to achieve higher quality. as- (Kihwelo, n.d.)

- Admission requirements and procedures.
- Development and production of Self-Instructional Learning Material.
- Structure and management of the delivery system.
- Student assessment procedures.

- Quality of materials used for teaching and promotion of learning.
- The student support services.
- Problem of assessment of the effectiveness of an individual learner.
- Monitoring, evaluation and feedback mechanisms.
- availability of adequate human and material resources for the operation of the ODL programmes.

4.6 FUTURISTIC SCENARIO OF OPEN AND DISTANCE LEARNING

There is no doubt, that the future education is strongly based on the pillars of online and Open and Distance Learning. We have seen during the Covid-19 pandemic that the online learning revives the world education system.

Several arguments are associated with online and Open and Distance Learning, such as- Accessibility, affordability, flexibility, learning pedagogy, life-long learning opportunities, etc. The online mode of learning is easily accessible and reachable to the rural and remote areas. It is considered to be a relatively cheaper mode of education in terms of the lower cost of and easy accessibility of learning resources. Flexibility is another interesting aspect of online and open and distance learning; a learner can schedule or plan according his/her own pace for completion of courses. Such type of learning environment can increase the learning potential of the learners in near future. With the help of such futuristic learning environments, the learners can learn anytime and anywhere, by utilizing online learning resources, so that one can develop new skills and habits of life-long learning (Dhawan, 2020).

The following key transformations are noted with regards to online and open and distance learning, as-

- Student support system transformed into ICT-based student support.
- Printed Self Learning Materials (SLMs) transformed into online learning resources, i.e. e-books, podcasts, etc.
- Face-to-Face counselling transformed into Four-Quadrant-based Support, i.e. e-tutorial/e-content,
- web resources, discussion forum and self-assessment;
- Training and capacity building programs transformed into online programmes/courses/Webinars/short online courses.
- Paper based assignment transformed into Online assignments.

Challenges of online learning-

- Internet access for everyone.
- Infrastructure.
- Awareness towards online learning.
- Motivation.

4.7 POINTS TO REMEMBER

- Distance education denotes an educational experience where the teacher and the learner are not face- to- face during the teaching and learning process.
- Open and Distance Learning is the delivery of learning or training to those who are separated mostly by time and space from those who are teaching training where a variety of technology enabled teaching-learning tactics are used to transmit knowledge to the learners.
- The use of ICT has empowered the learner's community like never before by E-mails, e-mail groups, on-line forums, webinars, web conferencing.
- ICT enriching the potential of ODL system of education using several connecting and information dissemination tools/applications, i.e. telephone tutoring, teleconferencing, audio, graphics, video conferencing, teletext, hypermedia (media using hyperlinks), Intelligent educational solutions, Open Educational Resources, Massive Open Online Courses, etc.

4.8 GLOSSARY

- SILM- Self Instructional Learning Material.
- ODL- Open and Distance Learning.
- DEC- Distance Education Council.
- DEB- Distance Education Bureau.

4.9 CHECK YOUR PROGRESS

a) How Open and Distance learning is supported by the ICT? Explain.

b) Define the governing bodies of open and distance learning in India.

c) Why quality assurance is required in open and distance learning system of education?

d) Explain the futuristic scenario of online and open and distance education.

4.10 BIBLIOGRAPHY/ REFERENCES

- Bedanta, K. K. (2020). ICT Support for Distance Learning. IJARW, 1(9), ISSN- 2582-1008.
- Rahman, H. (2014). The Role of ICT in Open and Distance Education. Turkish Online Journal of Distance Education-TOJDE, 15(4), 162-169, ISSN 1302-6488.
- Vasudevaiah, G. (2016). Promoting usage of ICT in Open and Distance Education Programs. The International Journal of Indian Psychology, 3(3), ISSN(e) 2348-5396, ISSN(p) 2349-3429.
- Rao, M. M. (n.d.). ICT in Open Distance Learning: Issues and Challenges. Indira Gandhi National Open University, New Delhi, India.

- Shah, A. & Salimullah, K. (2009). Use of Information and Communication Technology (ICT) for Effective Open and Distant Learning (ODL). iJET, 4(4), DOI: 10.3991/ijet.v4i4.1034.
- Ramdass, K. & Nemavhola, F. (2018). Quality Practices: An Open Distance Learning Perspective. Turkish Online Journal of Distance Education-TOJDE, 19(1), 234-246, ISSN 1302-6488.
- Kihwelo, P. F. (n.d.). Quality Assurance Systems in Open and Distance Learning: A Search for Normative Judgement. The Open University of Tanzania.
- Dhawan, S. (2020). Online Learning: A Panacea in the Time of COVID-19 Crisis. Journal of Educational Technology Systems, 49(1), 5-22, https://doi.org/10.1177/0047239520934018.
- [1] https://en.wikipedia.org/wiki/Distant_Education_Bureau.

4.11 SUGGESTED READINGS

- University Grants Commission (Open and Distance Learning Programmes and Online Programmes) Regulations, 2020. [Link- https://www.ugc.ac.in/pdfnews/221580.pdf]
- University Grants Commission (Open and Distance Learning) Regulations, 2017 [Link- https://www.ugc.ac.in/oldpdf/regulations/distance%20education%20regulations.pdf]
- Rahman, H. (2014). The Role of ICT in Open and Distance Education. Turkish Online Journal of Distance Education-TOJDE, 15(4), 162-169, ISSN 1302-6488.

UNIT- 5

OPEN EDUCATIONAL RESOURCES (OERs)

5.1 INTRODUCTION

Open Educational Resources (OERs) are learning materials that can be modified and enhanced because their creators have permitted others to do so. Internet provides vast amounts of OER for use and reuse. Educational institutions usually produce it (sometimes by individuals too) and published online to the general public for their immediate use or repurposing according to the user's needs. Individuals or organizations that create OERs can include materials like presentation slides, podcasts, syllabi, images, lesson plans, lecture videos, maps, worksheets, and even entire textbooks, typically via legal tools like Creative Commons licenses, so others can freely access, reuse, translate, and modify them.

Few perspectives towards OERs-

The William and Flora Hewlett Foundation-

"OER is 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."

OECD (Organisation for Economic Co-operation and Development)-

"Digitised 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 implement resources such as open licenses."

UNESCO (United Nations Educational, Scientific and Cultural Organization)-

"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."

The Cape Town Open Education Declaration-

"Open educational resources should be freely shared through open licenses that facilitate use, revision, translation, improvement, and sharing. Resources should be published in formats that facilitate both use and editing, and that accommodate a diversity of technical platforms. Whenever possible, they should also be available in formats accessible to people with disabilities and people who do not yet have access to the Internet."

Open education is a philosophy about the way people should produce, share, and build on knowledge. Proponents of open education believe everyone in the world should have access to high-quality educational experiences and resources, and they work to eliminate barriers to this goal. Such barriers might include high monetary costs, outdated or obsolete materials, and legal mechanisms that prevent collaboration among scholars and educators. Promoting collaboration is central to open education. As the Open Education Consortium says: "sharing is probably the most basic characteristic of education: education is sharing knowledge, insights, and information with others, upon which new knowledge, skills, ideas, and understanding can be built."

In conclusion, OERs are those teaching and learning materials available either in the public domain or under an open license. "Public domain" in the context of OER means teaching and learning materials for which copyright has expired or for which copyright has been explicitly forfeited by the author while you will learn about open licenses, a free license can allow the adoption/adaptation of work under different circumstances.

5.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Understand OERs and Open Education.
- Define Creative Commons (CC) licenses.
- Define the benefits and challenges of using OERs

- Know the popular OER databases.

5.3 HISTORICAL DEVELOPMENT OF OERs

OER and the open movement have recently evolved, in the year 1999, both the University of Tübingen (Germany) and The Open University (UK) released some educational resources for free. However, the most commonly known OER initiative came from the Massachusetts Institute of Technology (USA) in 200. By the year 2002, it had released 32 courses with open licenses and set a precedent in terms of university courseware.

In 2002, UNESCO convened the forum on the Impact of Open Courseware for Higher Education in Developing Countries, where OER was coined. Since then, many other education service providers have used open licenses and Internet to share teaching and learning resources.

The Cape Town Open Education Declaration (2008) and the Paris OER Declaration (2012) provided guidelines and encouragement for governments to release educational resources- especially those created using public funding with open licenses. OER's integration into national policy is an ongoing and slow process, but there has been a continuous success.

The Government of India is keen to use technological resources in helping its mission to make higher education accessible to all deserving students. In this regard, it launched its National Mission on Education through Information and Communication Technology (NMEICT) in 2009 to allow all the teachers and experts in the country to pool their collective wisdom for the benefit of every Indian learner, thereby, reducing the digital divide.

Under NMEICT, a proper balance between content generations, research in critical areas relating to the imparting of education and connectivity for integrating our knowledge with the advancements in other countries is to be attempted. This mission seeks to support such initiatives and build upon the synergies between various efforts by adopting a holistic approach. Emphasis on ICT is a crying need as it acts as a multiplier for capacity building efforts of educational institutions without compromising the quality. The mission is also necessary to sustain a high growth rate of our economy through capacity building and knowledge empowerment of the people and promoting new, upcoming multi-disciplinary fields of knowledge.

What are Open Educational Resources (OERs)?

In its simplest form, the concept of Open Educational Resources (OER) describes any educational resources (including curriculum maps, course materials, textbooks, streaming videos, multimedia applications, podcasts, and any other materials that have been designed for use in teaching and learning) that are openly available for use by educators and learners, without an accompanying need to pay royalties or license fees.

The term OER is mostly synonymous as- Open CourseWare (OCW), although the latter may be used to refer to a specific, more structured subset of OER. An Open CourseWare is defined by the OCW Consortium as 'a free and open digital publication of high-quality university-level educational materials. These materials are organized as courses, and often include course planning materials and evaluation tools as well as thematic content'.

OER has emerged as a concept with great potential to support educational transformation, while its educational value lies in the idea of using resources as an integral method of communication of curriculum in educational courses (i.e. resource-based learning), its transformative power lies in the ease with which such resources, when digitized, can be shared via Internet. Importantly, there is only one key differentiator between an OER and any other educational resource- its license.

Thus, an OER is simply an educational resource that incorporates a license that facilitates reuse, and potentially adapts without first requesting permission from the copyright holder.

Is the OER as same as e-learning?

The OER is not synonymous with online learning or e-learning, although many people make the mistake of using the terms interchangeably. Openly licensed content can be produced in any medium: paper-based text, video, audio, or computer-based multimedia. A lot of e-learning courses may harness OER, but this does not mean that OER is necessarily e-learning.

Is the OER the same as open learning/open education?

Although the use of OER can support open learning/open education, OER and open education are not the same. Making 'open education' or 'open learning' a priority has more significant implications than only committing to releasing resources as open or using OER in educational programmes. Open education requires a systematic analysis of assessment and accreditation systems, student support, curriculum frameworks, and mechanisms to recognize prior learning, and so on.

5.4 BENEFITS OF OPEN EDUCATION AND OERs

Benefits of Open Education and OER- The benefits of open education include the following:

- Education open to anyone.
- Affordable, ideally free.
- Students can try the course before signing up.
- Flexible study times not bound by weekly timetables or semester calendars.
- Students work at their own pace.
- Available from anywhere and not restricted by access to school or college.
- Access to a vast amount of study materials.
- Intellectual capital is available for reuse.

Benefits for Instructors-

Cost-saving is a major point in favour of adopting open educational resources, and instructors can utilize OER effectively without replacing paid resources at all. The freedom to adapt OER to instructional needs is often the most attractive aspect of OERs. Since OERs are openly licensed, educators are free to edit, reorder, and remix OER materials. as-

- Use, Improve, and Share- adapt and revise resources that have already been created to fit your course syllabus.
- Create an updated second edition of an existing OER.
- Tailor resources to fit your specific course context (e.g., translation, local examples).
- Network and Collaborate with Peers- access educational resources that have been peer-reviewed by experts in your field.
- Create a new open educational resource with a team of your peers.
- Explore user reviews for a more in-depth understanding of the resources available.
- Enable all students to have equal access to your course materials.
- Provide students with the opportunity to explore course content before enrolling.

5.5 CHALLENGES OF USING OERs

Despite, noble intentions behind OER, it turns out that using OER is not always straight forward. Practitioners face various challenges when it comes to harnessing OER as-

- Sourcing appropriate OER- This is an issue because there is no one-stop-shop for OER. They are scattered across the Internet.
- Understanding open licenses- Not everyone is familiar with different open licenses and what they permit.
- Adaptation of OER requires new skills- To adapt and repurpose OER, the practitioner needs more than basic ICT skills and needs practice in revising and remixing resources.
- Traditional mindsets predominate- Many educators feel it is wrong to use other people's work, and thus they protect, rather than sharing their own resources.
- Robust Internet connectivity and good ICT availability are essential to access and adapt OER.
- Schools and universities seldom incentivize lesson creation.

5.6 COPYRIGHT AND OPEN LICENSING

Have you ever written something original of your own? Do you realize that you own the copyright to everything that you write? While many of you studying this course may answer "yes" to both questions, you might have unanswered questions about copyright in writing educational materials.

Knowledge of copyright is essential for everyone who develops learning materials or is in the writing profession, particularly to avoid committing copyright infringement. With the emergence of OER, understanding copyright has become especially important, as you can use learning materials produced by others if they are made available under an open license.

Copyright is an exclusive, transferable right given by law to a creator/author for a fixed number of years to copy, print, publish, perform, film, record, or otherwise control the use of literary, musical, dramatic or artistic works. Copyright is a legal protection given to the original creator of a work, which may be in any form.

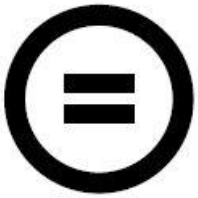
Over the last two decades, open-content licensing systems have been evolving and developing. Some were initially established to support the release of open software and expanded to support the licensing of open content others focus exclusively on either software or content. The following are some of the open licensing systems that you might encounter in your Internet searches, as- GNU General Public Licence (for software), GNU Free Documentation Licence (for manuals, texts), Open Publication Licence (content), Open Game Licence (computer games), Free Art Licence (art, images, graphics), Creative Commons (Content), etc.

In the area of OER, which focuses specifically on educational content, the Creative Commons licenses are the ones most extensively used. However, open education purists are quick to point out that not all Creative Commons licenses can be considered completely "open." We will discuss the Creative Commons license options and their degrees of openness.

The Creative Commons (CC) Licensing System-

In recent years, Creative Commons License (CC) has in education, become the most popular licensing system. Creative Commons has designed a collection of licenses to ensure a suitable license for sharing content under various conditions as-

Condition	Symbol	Explanation
Attribution		All CC licenses require that others who use your work in any way must attribute it– i.e., must reference the work, giving you credit for it– the way you request, but not in a way that suggests you endorse them or their use of the work. If they want to use your work without giving you credit or for endorsement purposes, they must first get your permission.
ShareAlike		You let others copy, distribute, display, perform, and modify your work, as long as they distribute any modified work on the same terms. If they want to distribute modified works under other terms, they must get your permission first.

NonCommercial		You let others copy, distribute, display, perform, modify (unless you have chosen NoDerivatives) and use your work for any purpose other than commercially. If they want to use your work commercially, they must get your permission first.
NoDerivatives		You let others copy, distribute, display, and perform only original copies of your work. If they want to modify your work, they must get your permission first.

The most popular combinations of Creative Commons (CC) rights or conditions make are-

[1] Attribution (CC BY)

This license lets others distribute, remix, tweak and build upon your work, even commercially, as long as they credit you for the original creation. This is the most accommodating of licenses offered recommended for maximum dissemination and use of licensed materials.

[2] Attribution-ShareAlike (CC BY-SA)

This license lets others remix, tweak and build upon your work, even for commercial purposes, as long as they credit you and license their new creations under the identical terms. This license is often compared to "copyleft" free and open-source software licenses. All new works based on yours will carry the same license, so any derivatives will also allow commercial use. This is the license used by Wikipedia, and it is recommended for materials that would benefit from incorporating content from Wikipedia and similarly licensed projects.

[3] Attribution- NoDerivatives (CC BY-ND)

This license allows for redistribution commercial and non-commercial as long as the work is passed along unchanged, in whole, and with credit to you.

[4] Attribution-NonCommercial (CC BY-NC)

This license lets others remix, tweak and build upon your work noncommercially, and although their new works must also acknowledge you and be non-commercial, they don't have to license their derivative works on the same terms.

[5] Attribution- NonCommercial- ShareAlike (CC BY-NC-SA)

This license lets others remix, tweak, and build upon your work noncommercially, as long as they credit you and license their new creations under the identical terms.

[6] Attribution- NonCommercial- NoDerivatives (CC BY-NC-ND)

This license is the most restrictive of the six main licenses, only allowing others to download your works and share them with others as long as they credit you, but they can't change them in any way or use them commercially.

5.7 USEFUL OER REPOSITORIES

[1] OER Commons & Open Education (www.oercommons.org)-

The worldwide OER movement is rooted in the human right to access high-quality education. This shift in educational practice is not just about cost savings and easy access to openly licensed content, it's about participation and co-creation. Open Educational Resources (OER) offer opportunities for systemic change in teaching and learning content through engaging educators in new participatory processes and effective technologies for engaging with learning. The move to open education practice (OEP) is more than a shift in content. It is an immersive experience in collaborative teaching and learning. OEP leverages open education resources (OER) to expand the role of educators, allowing teachers to become curators, curriculum designers, and content creators.

[2] Community College Consortium for OER (CCCOER, www.cccoer.org)-

CCCOER is a growing consortium of community and technical colleges committed to expanding access to education and increasing student success by adopting open educational policy, practices, and resources. We provide community and resources to learn about the evolving practice of open education.

[3] OER Metafinder (https://oer.deepwebaccess.com/oer/desktop/en/search.html)-

A single search engine of dozens of open access and open educational databases all in one. A Google for OER.

[4] MERLOT (https://www.merlot.org/merlot/index.htm)-

The MERLOT system provides access to curated online learning and support materials and content creation tools, led by an international community of educators, learners, and researchers.

[5] Open Course Library (http://opencourselibrary.org)-

Open Course Library is a collection of high quality, free-to-use courses that you can download and use for teaching. All content is stored in Google docs, making it easy to access, browse, and download.

[6] Open Research Library (https://openresearchlibrary.org/home)-

The Open Research Library includes all Open Access scholarly book content worldwide on one platform for user-friendly discovery, offering a seamless experience navigating more than 20,000 Open Access books.

[7] Open Knowledge Repository (https://openknowledge.worldbank.org)-

The World Bank is the largest single source of development knowledge. World Bank Open Knowledge Repository (OKR) is the World Bank's official open-access repository for its research outputs and knowledge products.

[8] National Science Digital Library (https://nsdl.oercommons.org)-

National Science Digital Library provides high quality online educational resources for teaching and learning, with current emphasis on the sciences, technology, engineering, and mathematics (STEM) disciplines. NSDL collection links to web-based educational resources held on other sites by their providers.

[9] Openly Available Sources Integrated Search (OASIS, https://oasis.geneseo.edu/index.php)-

The OASIS is a search tool developed by SUNY Geneseo, in consultation with Alexis Clifton, SUNY OER Services Executive Director, that aims to make the discovery of open content easier. OASIS currently searches open content from 73 different sources and contains 171,998 records.

[10] Live Lingua (www.livelingua.com)-

A collection of U.S. Government created public domain language eBooks and a/v resources for almost every language.

[11] Skills Commons (https://www.skillscommons.org)-

A repository of OER supported by the U.S. Department of Labor's Trade Adjustment Assistance Community College and Career Training (TAACCCT) program that lets you browse by material type, discipline, credential type, and more.

[12] Teaching Commons (https://teachingcommons.us)-

A showcase of high-quality open educational resources from leading universities. Curated by librarians and their institutions and hosted by bepress, the Teaching Commons includes open-access textbooks, course materials, lesson plans, multimedia, lectures, k-12 materials, and more.

[13] WikiEducator (https://wikieducator.org/Main_Page)-

An evolving online community intended for the planning of education projects linked with the development of free content and the development of free content on WikiEducator for free learning.

5.8 POINTS TO REMEMBER

- OER are 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 (OERs) are learning materials that can be modified and enhanced because their creators have permitted others to do so. Internet provides vast amounts of OER for use and reuse.
- Open education is a philosophy about the way people should produce, share, and build on knowledge.
- Government of India is keen to use the technological resources in helping its mission to make higher education accessible to all deserving students.
- Government of India launched its National Mission on Education through Information and Communication Technology (NMEICT) in 2009 to provide opportunity for all the teachers and experts in the country to pool their collective wisdom for the benefit of every Indian learner.
- OER is not synonymous with online learning or e-learning, although many people make mistake of using the terms interchangeably.
- Although, the use of OER can support open learning/open education, OER and open education are not the same. Making 'open education' or 'open learning' a priority has significantly bigger implications than only committing to releasing resources as open or using OER in educational programmes.
- Knowledge of copyright is essential for everyone who develops learning materials or is in the writing profession, particularly to avoid committing copyright infringement. With the emergence of OER, understanding copyright has become especially important, as you

can use learning materials produced by others if they are made available under an open license.

- Creative Commons License (CC) has, in education, become the most popular licensing system. Creative Commons has designed a collection of licenses to ensure that there is a suitable license for sharing content under most popular six conditions, e.g., CC BY, CC BY-SA, CC BY-ND, CC BY-NC, CC BY-NC-SA, and CC BY-NC-ND

5.9 GLOSSARY

- OER- Open educational resources.
- OECD- Organisation for Economic Co-operation and Development.
- UNESCO- United Nations Educational, Scientific, and Cultural Organization.
- NMEICT- National Mission on Education through Information and Communication Technology.
- OCW- Open CourseWare.
- CC- Creative Commons.

5.10 CHECK YOUR PROGRESS

Objective type questions-

a) The abbreviation OER stands for.

[A] open education resources. [B] open educational resources.

[C] open education roundtable. [D] open educational restrictions.

b) OER is a subset of the term

[A] open education. [B] open courseware.

[C] open access. [D] open software.

c) Two OER declarations, one in Cape Town the other in Paris, encouraged national governments to

[A] pass laws that made all educational content open.

[B] release publicly funded educational content as open.

[C] create a generic set of texts that all countries could share.

[D] ban publishing for profit.

d) The educational institution that has been releasing nearly all its teaching and learning content since 2002 is

[A] Oxford University. [B] The Sorbonne.

[C] Massachusetts Institute of Technology. [D] Tübingen University.

e) One of the benefits of OER that particularly appeals to education managers is

[A] tracking to see what students are doing online.

[B] automated systems that ease administration.

[C] using online communication channels to share data.

[D] cost savings in providing educational content.

f) One of the main challenges in encouraging educators to adopt OER is

[A] suspicion of other people's resources.

[B] concern over losing control of materials that have income-earning potential.

[C] lack of digital skills to exploit OER.

[D] all of the above.

g) One of the benefits to an institution that releases teaching materials as OER is

[A] safeguarding their materials from being copied.

[B] enabling prospective students to ascertain whether the university is right for them.

[C] cornering the market for a particular subject; everyone else appears to be copying.

[D] increasing enrolments.

h) Some OER encourage "repurposing," which means

[A] you can adapt the resource for new contexts.

[B] you must preserve the resource "as is."

[C] you must preserve the "purpose" of the resources.

[D] you must stipulate to the authors what you intend to do with the resource.

i) The term "free" means the same as "open." (True/false)

j) The Internet was one of the factors that made OER possible. (True/false)

Descriptive type questions-

a) What do you understand by open educational resources?

b) What do you understand by Copyright and Open Licensing?

c) What are the challenges of using OERs?

d) Define the most popular conditions of Creative Commons License types in brief.

e) Write down five benefits of using OERs.

f) List some useful OER repositories.

Answers (Objective type questions)-

[a] open educational resources [b] open education [c] release publicly funded educational content as open [d] Massachusetts Institute of Technology [e] cost savings in providing education content [f] all of the above [g] enabling prospective students to ascertain whether the university is right for them [h] you can adapt the resource for new contexts [i] False [j] True

5.11 BIBLIOGRAPHY/ REFERENCES

- https://iastate.pressbooks.pub/oerstarterkit/chapter/introduction
- https://www.library.umass.edu/oer/oer-repositories
- https://opentextbc.ca/oerdiscipline/chapter/general-oer-repositories
- Understanding Open Educational Resources, Commonwealth of Learning, 2015, ISBN 978-1-894975-72-8.
- A Basic Guide to Open Educational Resources (OER), Prepared by Neil Butcher for the Commonwealth of Learning & UNESCO, edited by Asha Kanwar (COL) and Stamenka Uvalic Trumbic (UNESCO), Published in 2011, 2015 by the United Nations Educational, Scientific and Cultural Organization and Commonwealth of Learning, ISBN 978-1-894975-41-4.

5.12 SUGGESTED READINGS

- Understanding Open Educational Resources, Commonwealth of Learning, 2015, ISBN 978-1-894975-72-8.
- A Basic Guide to Open Educational Resources (OER), Prepared by Neil Butcher for the Commonwealth of Learning & UNESCO, edited by Asha Kanwar (COL) and Stamenka Uvalic Trumbic (UNESCO), Published in 2011, 2015 by the United Nations Educational, Scientific and Cultural Organization and Commonwealth of Learning, ISBN 978-1-894975-41-4.

UNIT- 6

MASSIVE OPEN ONLINE COURSES (MOOCs)

6.1 INTRODUCTION

In this competitive era, learners and teachers want to learn more and more beyond his or her courses through technology-enabled learning. It should be beneficial for Massive Open Online Course (MOOC).

Using these techniques, learners can get using up-to-date information with simple, accessible technology. Concerned course runs on an easily-to-use learning platform available via Internet. Technology-Enabled Learning like MOOCs offers flexibility with options for learning the content. You can learn from readings, videos, discussions with other participants and instructors, meaningful exercises, quizzes, and short assignments. Many courses of MOOCs also provide a certificate for those who wish to complete all required exercises and quizzes.

6.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Get familiar about the Massive Open Online Course (MOOCs).

- Origin and History of MOOCs
- Role of MOOCs in today's perceptive
- MOOCs and Open and Distance Learning.
- Development process of MOOC programmes.

6.3 MASSIVE OPEN ONLINE COURSE

Massive open online courses (MOOCs) are one of the most popular trends in education in recent years. It represents open access, global, free, video-based instructional content, problem sets, and forums released through an online platform to a high volume of participants aiming to take a course or to be educated.

So, MOOCs are free, large-scale online courses offered and taught by accredited institutions of higher education and school in which anyone can enroll, regardless of age, location, or previous education.

History of MOOC-

The history of MOOCs is not too old. The term first appeared in 2008, by Stephen Downes and George Siemens based on the 'connectivist' distributed peer learning model. Later, in 2011, a few more educational videos were developed by professors from Stanford University and released through open online platforms supported with free web resources. It was not until 2011, that MOOCs would make a name for themselves in the media. Sebastien Thrun and Peter Norvig, professor at Stanford University and Research Director at Google respectively, announced that one of their courses would be given for free on the internet. Over 160,000 enrollees were ready to follow their first lesson in, "Introduction to Artificial Intelligence" within a few weeks.

Later, they established Coursera as an independent for-profit technology in early 2012. In the same year, other independent non-profit initiatives such as Udacity (set up Sebastian Thrum) and Udemy where established. Following it, MIT and Harvard incorporated their MITx platform into EdX.MIT developed the MITx platform for offering MOOCs, which was renamed edX.

Definition

MOOCs though defined by various authors can be classified into the following types.

International Context-

Selwyn, Bulfin, &Pangrazio (2015) state that "MOOCs are courses available to masses of online learners for little or no cost."

The Commonwealth of Learning (2015) proposes a definition that already includes some specification "A MOOC is an online course that requires no prior qualifications for entry, can be accessed by anyone who has an internet connection and includes large or very large numbers of learners."

European Context-

In the framework of the pedagogical research developed as a collaboration with different EU-funded MOOC projects, a more comprehensive definition was adopted "an online course designed for a large number of participants that can be accessed by anyone anywhere, as long as they have an internet connection, is open to everyone without entry qualifications and offers a full/complete course experience online for free" (Brouns et al., 2014).

Overall characteristics of MOOC definitions

Bates (2015) specifies the essential elements behind each acronym of MOOC. Common in these definitions are the following aspects to give meaning to the elements of a MOOC:

Massive: Designed for in theory, an unlimited number of participants. This means that the course is designed such that the effort of all services does not increase significantly as the number of participants increases.

- Open: access to the course is free without entry qualifications.
- Online: the full course is available through internet.
- Course: offers a complete learning experience, i.e., structured around a set of learning goals in a defined area of study and includes the course materials, quizzes, feedback, examination, and certificate of completion.

MOOCs can be seen as the latest sophisticated development in educational technology using electronic media and ICT (information and communications technology) to create VLEs (virtual learning environments).

"The central and dominant aim of education by ICT and MOOCs is to bring the world to the classroom, to make universally available the finest teacher's services."

According to the Cambridge dictionary, "MOOC is a course of study that is made available over the internet and that can be followed by a large number of people."

6.4 TYPES OF MOOCs

The terms "cMOOC" and "xMOOC" were coined by Stephen Downes, co-creator of the first MOOC, to hit the web. Launched in 2008, the course was called "Connectivism and Connective Knowledge."

cMOOCs are based on the learning theory of Connectivism, which emphasizes the power of networking with other individuals, gleaning from diverse opinions, and focusing on end-goals as the foundation of learning.

According to George Siemens, co-creator of that first MOOC, cMOOCs are "based on the idea that learning happens within a network, where learners use digital platforms such as blogs, wikis, social media platforms to make connections with content, learning communities and other learners to create and construct knowledge."

xMOOC stands for eXtended Massive Open Online Course. Instead of being structured as an open online community of learners, xMOOCs are based on a more traditional classroom structure. They are a combination of a pre-recorded video lecture with quizzes, tests, or other assessments. xMOOCs are centered around a professor rather than around a community of students.

Difference Between xMOOC and cMOOC	
XMOOC	cMOOC
xMOOC stands for eXtended Massive Open Online Course	The 'c' in cMOOC stands for connectivist
These MOOCs are based on traditional university courses.	cMOOCs are "based on the idea that learning happens within a network
Participant builds the objective of cMOOC .	Teacher builds the objective of xMOOC
xMOOC examples on platforms like edX, Coursera, and Udacity	cMOOCs often contain content and promote interaction through Blogs, Learning communities, Social media platforms.
Lecture is delivered by an instructor to the student.	In this environment, participants are all considered teachers AND learners.

6.5 ROLE OF MOOCs IN TODAY'S PERSPECTIVE

MOOC stands for "massive open online course." The term was coined by a group of Canadian academics in 2008 to represent an online class. But now day Massively Open Online Courses (MOOCs) are a hugely popular phenomenon in the online learning world. They are hailed by many as a solution for the developing world's lack of access to education because MOOCs can provide learning opportunities to a massive number of learners from anywhere in the world as long as they can access the course through the Internet. However, a close consideration of the ability of learners from most developing countries to make use of MOOCs seems to contradict this rhetoric.

Coursera, EdX, and Futurelearn have come up as the prominent platforms in exploring the possibilities and promotion of MOOCs programs. In 2018, for the first time, more than 100

million people learned with MOOCs (Class Central, 2018b) – and more than 50% used MOOCs to upgrade their labour-market relevant skills (Shah, 2018). The potential of MOOCs to deliver education around the globe has created great interest not only in academic circles but also in the news, making MOOCs a contemporary buzzword. The growing global demand for higher education places, especially in India, where 40 million additional university places are estimated to be required by 2025 (Everitt,2013), provides a strong case for MOOCs as an alternative to in-person university education.

Reasons for the growing popularity of MOOCs-

Why do colleges and universities want to get involved in MOOCs? What's more exciting than teaching tens of thousands of students all around the world? One common reason for doing a MOOC is that it can be taken by anyone, anywhere in the world. One can gain access to the course material and the professional direction from some of the best universities and professors in the world. The best part is that most of these courses are at no cost and you can take them at your own convenience and pace. You could take a class on a subject that is not available in your college, or you could just simply take a course to increase your knowledge base and check out another professor's view on a topic of your subject specializations. Let's have a look at some of these reasons in detail.

6.6 BENEFITS OF MOOCs

MOOCs have unique characteristics that distinguish them from traditional online courses. The following are the key features that act as characteristics differentiating learning in MOOCs

- Massiveness: platforms are scalable, where the courses can support massive numbers of learners.
- Openness: courses are open to anyone to participate at anytime and anywhere for free without commitment or prior requirements.
- Diversity (heterogeneity): participants are from various cultures, backgrounds, and have various motivations.

As with any learning strategy, MOOCs have advantages and disadvantages. The benefits of MOOCs include the following-

- Encourage lifelong learning and improve knowledge and skills.
- Provide a chance to exchange ideas, views, and knowledge with other participants who share the same interest.
- Offer the opportunity to join high-quality courses delivered by renowned professors in prestigious universities across the globe.
- Remove time and place constraints.

- Learners benefit from self-paced learning in MOOCs without the pressure of passing the course or obtaining good grades.

6.7 MOOCs AND OPEN AND DISTANCE LEARNING

The buzz world common in MOOCS and Open and Distance Learning (ODL) is open. The concept of open has birth to several strong movements in the world especially Open Source movement in computer software. Before going to know about the relation between ODL and MOOC, we must be known about ODL.

ODL is a general term for the use of telecommunication to provide or enhance learning. Around the world, the academic community is discovering and exploring the Internet, teleconferencing, and related means to achieve an extended classroom or learning experience.

'Distance Learning' term was first used in the 1970s and became more popular in 1982 after the International Council for Correspondence Education changed its name to the International Council for Distance Education (Holmberg, 2005). The organization is currently known as the International Council for Open Distance Education (ICDE) and promotes open, flexible, distance, and online education.

Michael Moore (1973) defined distance education as "The family of instructional methods in which the teaching behaviours are executed apart from the learning behaviours, includes those that in contiguous situations would be performed in the learner's presence so that communication between teacher and the learner must be facilitated by print, electronic, mechanical or other devices."

When Open University in the United Kingdom was established, it first Vice-Chancellor Lort Crowther said, the University will be open to people, place methods and ideas. This was a landmark in the history of openness in education. Thus, openness received new meaning beyond access as:

- No qualification requirement for entry.
- No physical boundary of the institution.
- Use of broadcasting and available technology to teach.
- Innovation with a focus to improve learning.

MOOCs, OERs, and ODL-

As sharing of information on the web became easy, more universities and institutions started depending on what is available on the web. This led to the emergence of open content in 1998, and MIT open courseware was announced in 2001. The MIT OpenCourseWare released its first set of 50 courses in 2002. During the same year, UNESCO organized a forum on the

impact of the open courseware for Higher Education in Developing Countries that created the term Open Education Resources (OER).

The Forum defined OER as "the provision of educational resources enables by information, use, and adaption by a community of users for non-commercial purposes. There are several OER initiatives that deserve mention apart from the widely known MIT OpenCourseWare. Some of these are Connexion, OpenLearn, Japan Open Courseware, Consortium the China Open Resources for Education, NPTEL, the Indian Governments OER project through IITs, and the Vietnam Foundation.

The emergence of Massive Open Online Courses (MOOCs) in 2008, followed by several for-profits and not-for-profit initiatives in the recent past, has supported a scenario, where teaching and learning can be served by anyone and any organization not necessarily by University alone.

MOOCs truly take advantage of the digital world and Internet to deliver teaching and learning to a large number of students, and are based on the principles of economies of scale of ODL. In addition, these are courses open to anyone with access to internet and interest to study a course or subject.

6.8 MOOC PLATFORMS IN INDIA

In recent years, the enrolment in Massive Open Online Course (MOOC) has increased tremendously. India, after the US, is dominating the global growth in enrolments. Seeing the growth of enrolment from the country and to satisfying the need for education India has started various projects to offer MOOC courses. Currently, NPTEL, mooKIT, IITBX, and SWAYAM are the platforms used in India for offering courses.

Many initiatives have been taken by the Indian government to provide and support the concept of open education. Initially, the objective was to provide open resources in terms of repositories, libraries, educational media files, e-books, etc. These were made accessible to everybody. Some of the efforts in this direction started as National Digital Repository of IGNOU, Sakshat providing e-content, Shishya for XI-XII Standards by CBSE Board, and Vidya Vahini integrating IT into the curriculum of rural schools by providing interactive training and developmental communication. Most of these initiatives started with establishing a dedicated department to make education reachable to many learners as much as possible.

NPTEL

NPTEL stands for National Programme on Technology Enhanced Learning. It is a project funded by MHRD, initiated in 2003. It is a joint initiative of seven Indian Institute of Technology (IITs) and Indian Institute of Science (IISC) for offering courses on engineering and science, initially. NPTEL has started online courses on computer science- electrical, mechanical, and ocean engineering; management, humanities, music, etc. It offers a free course with nominal fees for certification. Anybody from anywhere can join their course.

MooKIT

MooKIT is a lightweight MOOC management system built entirely using open-source technologies by Indian Institute of Kanpur (IITK), in 2014. It is so designed that if the current bandwidth is low, it can easily run. These features help learners from rural areas not having smartphones, laptops, internet connectivity, and high bandwidth. It just needs a dumb or basic phone. One more special feature of MooKIT is support of a very powerful analytics interface.

IITBombayX

IITBombayXis a non-profit MOOC platform developed by IIT Bombay using the open-source platform Open edX, in 2014.

SWAYAM

SWAYAM stands for "Study Webs of Active Learning for Young Aspiring Minds." It is a MOOC platform MOOC launched by the Ministry of Human Resource Development (MHRD), the government of India, to bind online and offline education together. It is started with an expectation of launching 2,000 courses, to make its largest course catalogue, among all provided so far. For SWAYAM, an independent platform is developed.

Currently, SWAYAM offers courses for school, certificate, diploma, undergraduate, and postgraduate.

6.9 POINTS TO REMEMBER

- Technology-Enabled Learning like MOOCs offers flexibility with options for learning the content.
- In recent years, Massive open online courses (MOOCs) are one of the most popular trends in education. It represents open access, global, free, video-based instructional content, problem sets, and forums released through an online platform to a high volume of participants aiming to take a course or to be educated.
- The MOOC term firstly appeared in 2008 by Stephen Downes and George Siemens based on the 'connectivist' distributed peer learning model.
- A MOOC is an online course that requires no prior qualifications for entry, can be accessed by anyone who has an Internet connection, and includes large or very large numbers of learners.
- The central and dominant aim of education by ICT and MOOCs is to bring the world to the classroom, to make universally available the services of the finest teacher.
- The terms "cMOOC" and "xMOOC" were coined by Stephen Downes, co-creator of the first cMOOC, to hit the web. Launched in 2008, the course was called "Connectivism and Connective Knowledge."

- cMOOCs are based on the learning theory of Connectivism, which emphasizes the power of networking with other individuals, gleaning from diverse opinions, and focusing on end-goals as the foundation of learning.
- xMOOC stands for eXtended Massive Open Online Course. Instead of being structured as an open online community of learners, xMOOCs are based on a more traditional classroom structure.

6.10 GLOSSARY

- MOOC – MOOC stands for Massive Open Online Course. They typically include collection of many learning objects: video lectures, online readings, problem sets, quizzes, and student interaction.
- SPOC – SPOC stands for a Small Private Online Course. In contrast to MOOCs, SPOCs represent a blended teaching approach that utilizes the power of online platforms in more intimate, traditional course settings.
- xMOOC - xMOOC stands for eXtended Massive Open Online Course. These MOOCs are based on traditional university courses.
- cMOOC - The 'c' in cMOOC stands for connectivist, which represents the nature of cMOOCs.
- Rather than being delivered by an individual instructor, as in traditional university courses, cMOOCs involve groups of people learning together.
- FutureLearn - FutureLearn is a platform developed by the UK's Open University in 2012 that delivers MOOCs.
- Coursera - Coursera is a for-profit platform for online courses developed by Stanford University's Andrew Ng and Daphne Koller.
- Udacity - Udacity is a for-profit organization developed by Sebastian Thrun, David Stavens, and Mike Sokolsy that offers MOOCs.
- edX - edX is a platform for online learning that provides MOOCs. It was founded as a non-profit with open-source software in 2012 by MIT and Harvard University.
- Pedagogy – Pedagogy refers to the science of education, including the design of learning environments and study of their relative effectiveness. It is also used to define different approaches to teaching and learning, e.g. a connectivist or constructivist pedagogy.
- Constructivism – Constructivism is a theory that argues that learning occurs as a dialogue between prior knowledge and new material.

- OER – OER stands for Open Educational Resources, which refers to free teaching resources, such as documents and media files. Since OERs are openly licensed, they are free and limitlessly distributed.

6.11 CHECK YOUR PROGRESS

Objective type questions-

a) xMOOC stands for ....

b) The 'c' in cMOOC stands for ....

c) The full form of OER is ....

d) .... declared 2012 to be the year of the MOOC

e) The term MOOC was first coined in 2008 by .... and ....

f) Coursera is a fee and governmental MOOC platform. (True/False)

g) Generally, it seems that MOOCs attract students who already have college degrees. (True/False)

h) Can MOOCs assist in on-boarding employees? (True/False)

i) Online learning material sites and MOOCs are the same? (True/False)

j) SWAYAM is a programme initiated by the Government of India and designed to achieve the three cardinal principles of Education Policy viz., access, equity, and quality. (True/False)

k) World's largest course provider

[A] Coursera [B] FutureLearn [C] Udacity [D] mooKIT

l) Which of following MOOC platform is also provides the courses in Hindi

[A] Unacademy [B] Udacity [C] FutureLearn [D] Coursera

m) MOOC stand for

[A] Myrind Open online course [B] Media Open Online course

[C] Massive Open Online course [D] Massachusetts Open online course

n) The statement "the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware" refers to

[A] Information Technology (IT) [B] Information and Collaborative Technology (ICT)

[C] Information and Data Technology (IDT) [D] Artificial Intelligence (AI)

Descriptive type questions-

a) How exactly does a MOOC work?

b) How long has distance learning been around?

c) Why are MOOCs valuable for society?

d) How are MOOCs different from on-demand eLearning?

e) How long have MOOCs been around in their current form?

f) What is SWAYAM?

g) What are the benefits of MOOC participants?

h) Why should I study a MOOC?

Answers (Objective type question)-

[a] eXtended Massive Open Online Course [b] connectivist [c] Open Educational Resources [d] The New York Times [e] Dave Cormier and Bryan Alexander [f] True [g] True [h] True [i] False [j] True [k] Coursera [l] Unacademy [m] Massive Open Online course [n] Information Technology (IT).

6.12 BIBLIOGRAPHY/ REFERENCES

- https://www.ugc.ac.in/pdfnews/3885329_MOOCs-Guideline-(Development--Funding).pdf
- http://ugcmoocs.inflibnet.ac.in/ugcmoocs/download/Guidelines.pdf
- https://www.ugc.ac.in/deb/pdf/RecognitionODLInstitutionsHandbook2009.pdf

6.13 SUGGESTED READINGS

- Open Education: from OERs to MOOCs: Springer, By Mohamed Jemni, Kinshuk, Mohamed Koutheair Khribi
- Library and Information Science in the Age of MOOCs, IGI Global, By Kaushik, Anna
- Massive Open Online Courses (MOOCs) For Everyone, By Pethuraja.S

UNIT- 7

E-REPOSITORIES

7.1 INTRODUCTION

E-repository is a mechanism for managing and storing digital content. E-repositories or digital repositories may include a wide range of content for a variety of purposes and users. A repository can support research, learning, and administrative processes. Typically, content can include research outputs such as journal articles or research data, e-theses, e-learning objects and teaching materials, and administrative data. Repositories use open standards to ensure that the content is accessible and can be searched and retrieved for later use. The use of these agreed international standards allows mechanisms to be set up, importing, exporting, identifying, storing, and retrieving the digital content within the repository.

7.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Know about the National Digital Library and resources available.
- Understand the benefits of e-repositories.
- Explore National Academic Depository.

- Explore the Open Government Data Platform.

7.3 BENEFITS OF E-REPOSITORIES

- Opening up outputs of the institution to a worldwide audience.
- Maximizing the visibility and impact of the content stored in repositories.
- Showcasing the institution to interested constituencies – prospective staff, prospective students and other stakeholders;
- Collecting and curating digital output.
- Managing and measuring research and teaching activities.
- Providing a workspace for work-in-progress and for collaborative or large-scale projects;
- Enabling and encouraging interdisciplinary approaches to research.
- Facilitating the development and sharing of digital teaching-learning materials and aids.
- It supports student endeavors, provides access to theses and dissertations, and a location for the development of e-portfolios.

Role of e-repositories in e-learning

There are tremendous benefits of e-repositories in managing and sharing of e-learning resources. E-repository can be highly effective from an institution's viewpoint and management strategy. However, we should try to accommodate institutional repositories for achieving the e-learning goals. We should use repository software designed for academic publications, which makes it available for learning resources.

7.4 NATIONAL DIGITAL LIBRARY OF INDIA (NDLI)

Ministry of Human Resource Development (MHRD), under its National Mission on Education through Information and Communication Technology (NMEICT), has initiated the National Digital Library of India (NDLI) project to develop a framework of virtual repository of learning resources with a single-window search facility. Filtered and federated searching is employed to facilitate focused searching so that learners can find out the right resource with least effort and in minimum time. NDLI is designed to hold content of any language and provides interface support for leading vernacular languages, (currently Hindi, Bengali and several other languages are available). It is designed to provide support for all academic levels including researchers and life-long learners, all disciplines, all popular forms of access devices and differently-abled learners. It is being developed to help students to prepare for entrance and competitive examinations, to enable people to learn and prepare from best practices from all over the world

and to facilitate researchers to perform inter-linked exploration from multiple sources. It is being developed at the Indian Institute of Technology Kharagpur.

Figure 7.1 National Digital Library of India (http://ndl.iitkgp.ac.in)

Why should I recommend NDLI?

NDLI will provide a single window search facility to act as a one-stop shop for all digital educational resources. Information can be personalized based on the education level, choice of language, difficulty level, media of content and such other factors while other Digital libraries may not include all these choices. NDLI provides interface support for the leading vernacular languages and thus one can select the language of his/her choice to search or browse through

NDLI. In other words, it is like a 'customised service' provided in a 24x7 integrated environment to suit a user's requirement and will be like a single 'go-to' shop for any requirement.

How can I register on NDLI?

An individual or institute can simply type in the URL (https://ndl.iitkgp.ac.in or https://www.ndl.gov.in) into a common web browser's address bar to access the NDLI website. However, for better user experience on mobile devices, it is highly recommended to use the NDLI mobile application, available for the respective mobile platform (Google play store or Apple store).

The NDLI system is accessible to all users for general browsing and viewing full text contents. However, one needs to register with a user id and password and login using those credentials for accessing the full text contents of any item under National Licensing (contents with the sign NDLI as in South Asia Archive, World eBook Library etc.)

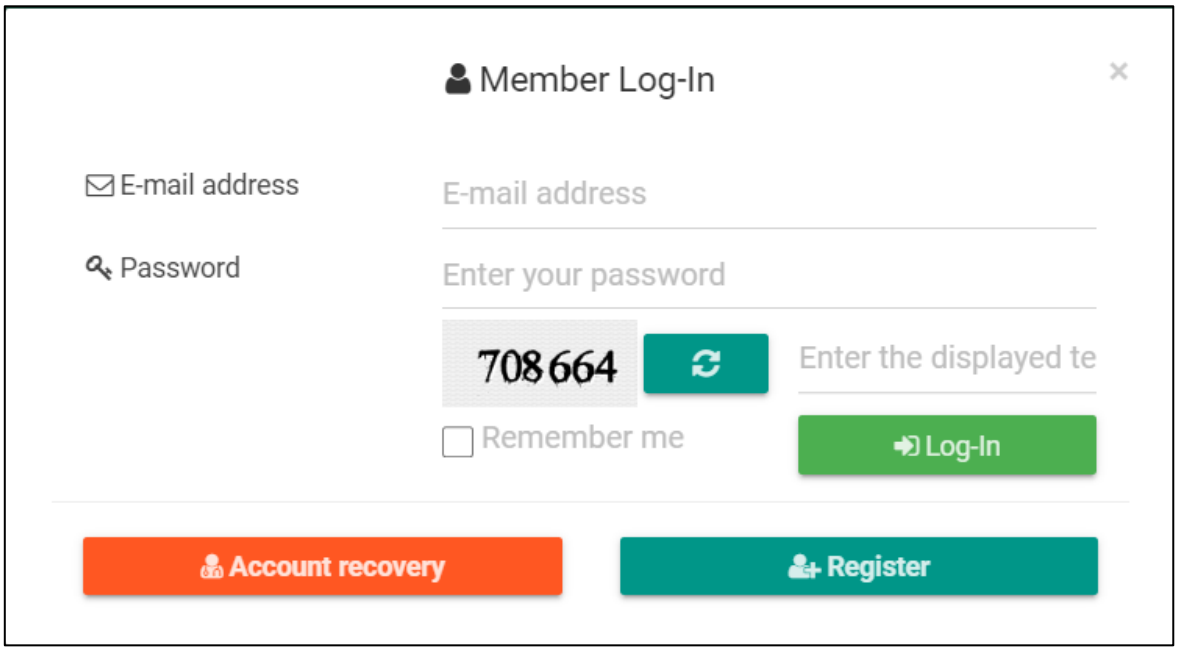


Figure 7.2 Member login window.

If you are a new user than click on the Homepage and you will find a Log-In tab (see figure 7.2) on the top right-hand corner. Click on the tab whereby a window will open with options for Member log-in, Register or Account recovery. Click on the 'Register' button whereby a Registration form will open. Fill up all the details on the form, tick the box on 'I have read, understood and agree to the Terms and Conditions of using NDLI' and submit. You will soon get a validation link in your mailbox. Click the link and validate and then you can start using NDLI. From next time onwards, you can simply use the Log-In option on the Home page for accessing NDLI.

Resources type availability by-

[1] School-

This collection is for school students. Text books of NCERT and 20 other school boards, question papers, video lectures, materials for exam preparation, solutions to questions of JEE Main and JEE Advanced and several other study materials are available.

[2] CBSE Examination Preparation Contents-

This specially curated collection is for the students appearing for Class-X and Class-XII examination. It contains books, notes, questions, solutions, video lectures, etc.

[3] Engineering-

This collection contains lecture videos and notes of NPTEL/SWAYAM courses, presentations used by faculties in classes, online class lectures, questions/solutions of common subjects for students of all engineering discipline.

[4] Science

This contains lecture videos and notes of NPTEL/SWAYAM courses, online class lectures, some books and questions/solutions for undergraduate students across all science discipline.

[5] Humanities

This collection contains books, questions/solutions, video lectures, articles, and notes for undergraduate students of humanities and social science.

[6] Literature

This collection is for undergraduate and postgraduate students of language and literature and also for general readers. This collection contains literary works as well as study materials on English, Hindi, Sanskrit, Urdu, and Bengali languages.

[7] Law & Management

"Law" section is for law students and practitioners. It contains lecture videos, acts, judgments, articles and notices. The "Management" section contains management and accounting questions and solutions, video lectures and some books, notes, articles and thesis relevant for accounting, commerce and management students.

Resources searched by-

[1] Content type-

The following types of contents available to search e.g. Text, Video, Image, Audio, Presentation, Simulation, Application, Animation

[2] Subject type-

Click on First level subject and select one from the list. To refine your search, click on the Second level subject (if available) and select one from the list; And to refine more your search click on Third level subject (if available) and select one from the list.

[3] Source type-

Joint Admission Board of IITs, Graduate Aptitude Test in Engineering, Spoken Tutorial, NPTEL, NCERT and other source organizations.

[4] learning Resources type-

Articles, Audio Lectures, Book, Question Paper, Thesis, Video Lecture and other types.

7.5 NATIONAL ACADEMIC DEPOSITORY (NAD)

Indian Higher Education system is a large and growing system with approximately 55 school boards, 359 state universities, 123 deemed universities, 47 central universities and 260 private universities. Apart from these, there are 107 other institutions such as IISc/IITs/IIMs/NITs/IISERs/IIITs/NITIE and 12 other centrally funded institutions. These institutions issue academic awards to students including degrees, diplomas, and certificates along with mark sheets and evaluation reports.

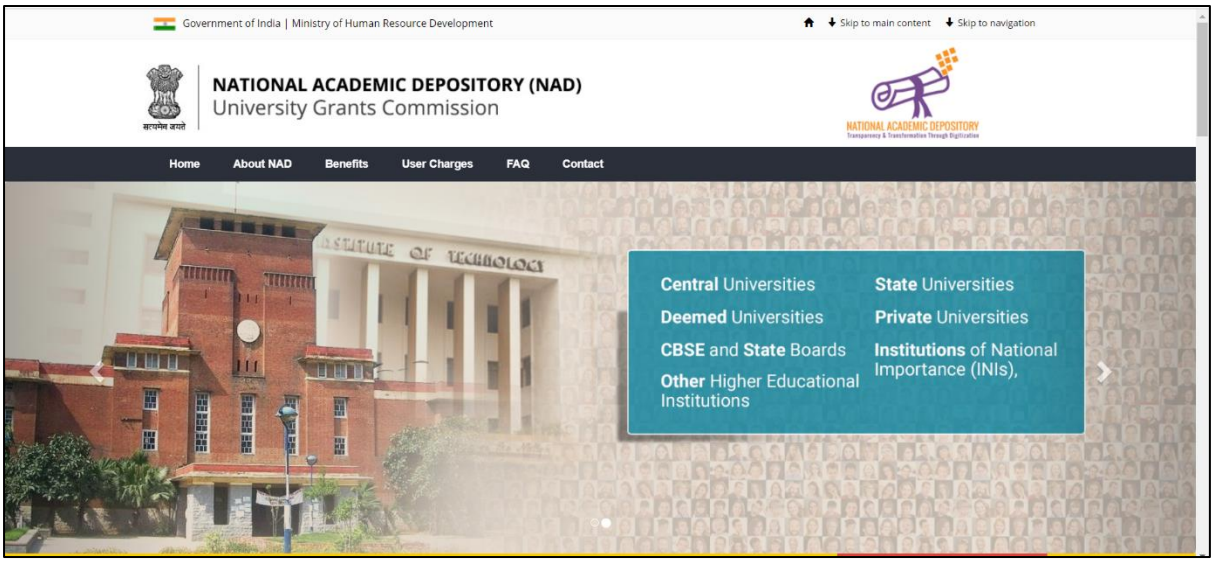


Figure 7.3 The national Academic Depository ((www.nad.gov.in)

Maintaining academic awards in an electronic depository would provide benefits to educational institutions, students, and employers by enabling online access of academic awards, which will eliminate the need for persons to approach educational institutions for obtaining transcripts of such awards or marks-sheets for verification. It would also eliminate fraudulent practices such as forging certificates and mark-sheets, by facilitating online verifications thereof. The National Academic Depository aims at ensuring a credible and convenient mechanism for online lodging, verification, and authentication of the academic awards issued by various educational institutions.

The National Academic Depository (www.nad.gov.in) comprises of two interoperable digital depositories viz. CDSL Ventures Limited (CVL) and NSDL Database Management Limited (NDML). These digital depositories have ensured hardware, network facilities, and software of prescribed quality for smooth and secured operationalisation of NAD.

The vision of the National Academic Depository (NAD) is born out of an initiative to provide an online storehouse of all academic awards. National Academic Depository (NAD) is a 24X7 online storehouse of all academic awards viz. certificates, diplomas, degrees, mark-sheets, etc duly digitized and lodged by academic institutions/boards/eligibility assessment bodies. NAD not only ensures easy access to and retrieval of an academic award but also validates and guarantees its authenticity and safe storage.

Benefits of NAD

There are the following benefits for academic institutions, for students and for verification, as-

For academic institutions:

- Permanent and safe record of keeping all academic awards issued.
- No need for issuing duplicate academic awards, students can get it from NAD.
- Effective deterrence to fake and forged paper certificates.
- All academic awards verification needs can be addressed by NAD.
- Efficient, effective and transparent administration.

For students:

Immediate availability of academic awards upon upload by academic institutions.

Online, permanent record of academic awards.

No risk of losing, spoiling, damaging the academic awards.

Anytime, anywhere, and convenient access to academic awards.

For verification Users (Employer Companies, Banks etc.)

- Online, quick, and reliable verification of academic awards (with prior consent of the student concerned)
- Access to authenticated copy of academic awards
- No risk of fake and forged Certificates.
- Reduction in cost, time, and efforts for verification

Roles & Responsibilities of Academic Institutions-

- Enter into SLA with either of the two depositories.
- Provide certificate templates, data masters etc to the depositories.
- Provide data of academic awards for lodging the academic awards on NAD.
- Is responsible for accuracy of data of academic awards.
- Identify staff to be trained in NAD system.
- Edge Awards – Upload awards and seed with Aadhaar / NAD ID.
- Verified & digitally signed data in prescribed formats – maker / checker.
- Data format with certificate template / digitally signed images with data.
- Include student identity with Aadhaar / Unique NAD ID.
- Update Aadhaar / Unique NAD ID in a certificate record.

Roles & Responsibilities of Students

- Register on either of the depositories by providing Aadhar details.
- Avails Unique NAD ID in case of non-availability of Aadhar.
- Submits Aadhaar / Unique NAD ID to AI for verification and seeding into award data.
- Views & accesses all awards online at any time in single account.
- Student can View / download digitally signed awards.
- Request printed copy of the certificate.
- Approve / reject request of any verifier for access to his / her certificate.
- Send copy of certificate to any verifier.

7.6 OPEN GOVERNMENT DATA (OGD) PLATFORM, INDIA

Open Government Data (OGD) Platform India (https://data.gov.in) is a platform for supporting Open Data initiative of Government of India. The portal is intended to be used by Government of India Ministries/ Departments their organizations to publish datasets, documents, services, tools and applications collected by them for public use. It intends to increase transparency in the functioning of Government and also open avenues for many more innovative uses of Government Data to give different perspective.

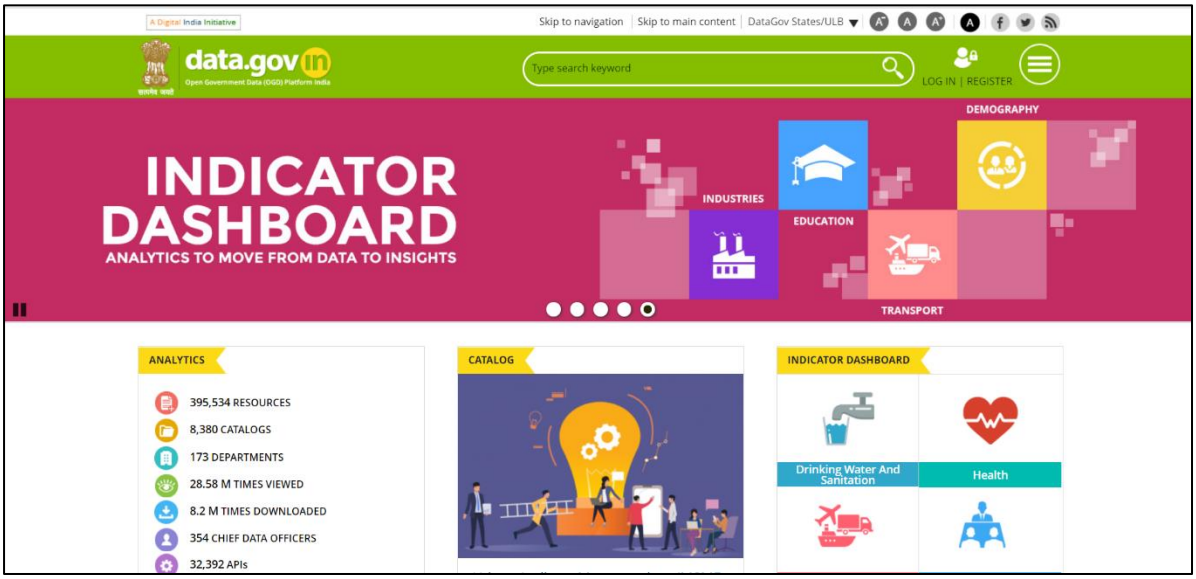


Figure 7.4 Open Government Data (OGD) Platform India (https://data.gov.in)

The Open Government Data Platform India is a joint initiative of Government of India and US Government. Open Government Data Platform India is also packaged as a product and made available in open source for implementation by countries globally. The entire product is available for download at the Open Source Code Sharing Platform "GitHub".

Open Government Data Platform India has 4 (four) major modules, as detailed below, implemented on a single Drupal instance – An Open Source based Content Framework Solution.

Data Management System (DMS)–

Module for contributing data catalogues by various government agencies for making those available on the front-end website after a due approval process through a defined workflow.

Content Management System (CMS)–

Module for managing and updating various functionalities and content types of the Open Government Data Platform India Platform.

Visitor Relationship Management (VRM)–

Module for collating and disseminating viewer feedback on various data catalogues.

Communities–

Module for community users to interact and share their zeal and views with others, who share common interests as that of theirs.

Figure 7.5 Sample diagram of availability of open data set indicators (https://data.gov.in)

7.7 POINTS TO REMEMBER

- E-repository is a mechanism for managing and storing digital content. E-repositories or Digital repositories may include a wide range of content for a variety of purposes and users.
- A repository can support research, learning, and administrative processes.
- Repositories use open standards to ensure that the content they contain is accessible in that it can be searched and retrieved for later use.

- E-repositories facilitates the development and sharing of digital teaching-learning materials and aids.
- E-repository can be a highly effective from institutions viewpoint and management strategy for achieving the e-learning goals of the institution.
- Ministry of Human Resource Development (MHRD) under its National Mission on Education through Information and Communication Technology (NMEICT) has initiated the National Digital Library of India (NDLI) project to develop a framework of virtual repository of learning resources with a single-window search facility.
- NAD maintains academic awards in an electronic depository which provides benefits to educational institutions, students and employers by enabling online access of academic awards; And also, eliminates the need for persons to approach educational institutions for obtaining transcripts of such awards or marks-sheets for verification.
- Open Government Data (OGD) portal is intended to be used by Government of India Ministries/ Departments their organizations to publish datasets, documents, services, tools and applications collected by them for public use.

7.8 GLOSSARY

- VRM– Visitor Relationship Management.
- CMS- Content Management System.
- DMS– Data Management System.
- OGD- Open Government Data.
- NAD- National Academic Depository
- CDSL- Central Depository Services (India) Ltd.
- NITIE- National Institute of Industrial Engineering.
- NSDL- National Securities Depository Limited.
- NPTEL- National Programme on Technology Enhanced Learning.
- SWAYAM- Study Webs of Active-Learning for Young Aspiring Minds.
- NDLI- National Digital Library of India.
- JEE- Joint Entrance Examination.
- NCERT- National Council of Educational Research and Training.
- IISER- Indian Institutes of Science Education and Research.
- IIIT- Indian Institute of Information Technology.

- IISc- Indian Institute of Science.
- IIT- Indian Institute of Technology.
- IIM- Indian Institute of Management.
- NIT- National Institute of Technology.

7.9 CHECK YOUR PROGRESS

Descriptive type questions-

a) Define the role of Open GOVERNMENT DATA (OGD).

b) What are the benefits of National Academic Depository (NAD)?

c) What are the roles & responsibilities of Academic Institutions in terms of NAD?

d) How can we search resources available on NDLI? Explain.

e) How many types of resources available on NDLI for their users?

f) Define the role of e-repositories in terms of e-learning.

7.10 BIBLIOGRAPHY/ REFERENCES

- https://qcc.libguides.com/c.php?g=301716&p=2019401
- https://data.gov.in/
- http://ndl.iitkgp.ac.in
- https://nad.gov.in/

7.11 SUGGESTED READINGS

- https://data.gov.in/
- http://ndl.iitkgp.ac.in.
- https://nad.gov.in/

UNIT- 8

TECHNOLOGY ENABLED EDUCATION- INSTITUTIONAL INITIATIVES- I

8.1 INTRODUCTION

ICT as a tool in education is available to us at this juncture, and we wish to fully utilize it to enhance the current enrollment rate in higher education. The National Mission on Education through ICT, launched in the year 2008, provides a momentous opportunity for all teachers and experts in the country to pool their collective wisdom for the benefit of every Indian learner and, thereby, reducing the digital divide. This mission was proposed and planned to make a proper balance between content generation, research in critical areas relating to the imparting of education and connectivity for integrating our knowledge with the advancements in other countries is to be attempted. In this unit, we will briefly discuss the SAKSHAT project and the learning resources available here.

8.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Define National Mission on Education through ICT.
- Explore the learning resources available on SAKSHAT for different categories of learners.

- Know Govt. of India's massive initiative towards Technology-Enabled Education.

8.3 ABOUT SAKSHAT PROJECT

SAKSHAT project (launched on October 30, 2006) initiated by the Ministry of Human Resource Development (MHRD), Govt. of India, is a one stop solution to facilitate lifelong learning for students, teachers and those in employment or in pursuit of knowledge free of cost to them. The content development task for 'SAKSHAT' was looked after the kind approval of Content Advisory Committee (CAC) for the respective subject, which consisted of representatives from educational institutions like IGNOU, Delhi University, Kendriya Vidyalaya Sangthan (KVS), Navodyaya Vidyalaya Sangthan (NVS), National Institute of Open Schooling (NIOS) and National Council for Educational Research and Training (NCERT) and prominent academicians in the field.

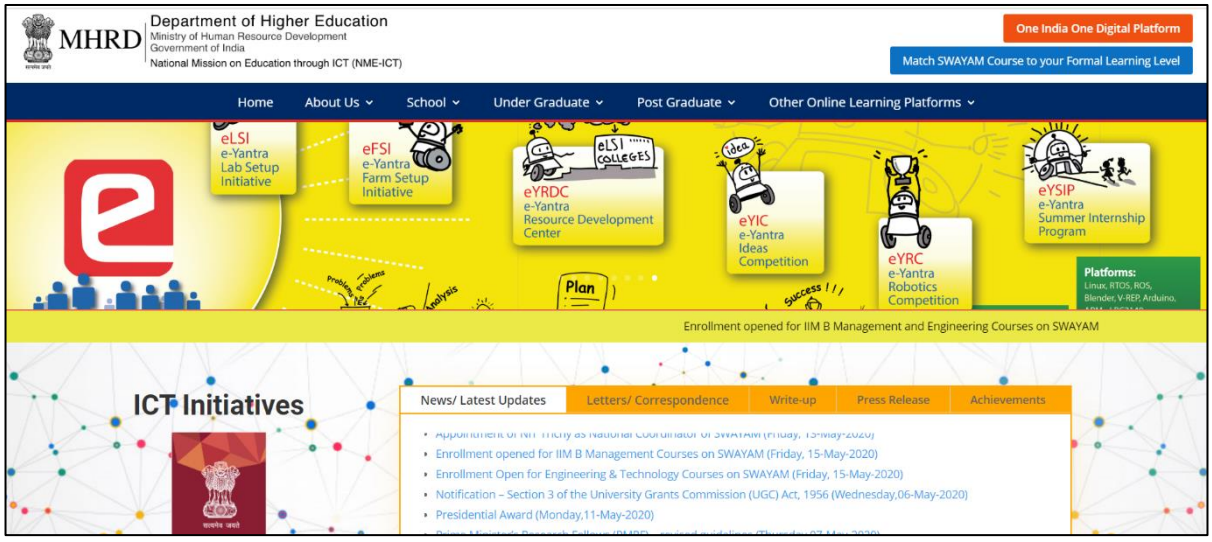


Figure 6.1 Home page of SAKSHAT (Source: www.sakshat.ac.in)

The project 'SAKSHAT' caters to the learning needs of more than 50 crore people through a proposed scheme of 'National Mission in Education through Information and Communication Technology (NMEICT). The portal boldly seeks to address many of the shortcomings in our education system by bringing together the best experts in the country in their respective fields and best available knowledge resources on the web in public domain. It also seeks to standardize curriculum and learning materials across the country and keep them in tune with the latest trend world over so that Indian learners do not lag behind. Teacher- independent modules could work wonders in remote areas where the learner does not have access to good quality teachers or wants to study independently.

In order to bolster the knowledge resources, to obtain and maintain a competitive edge in the world, we require a system of identification and nurturing of talent and lifelong learning. The knowledge modules should be based on the personalized needs of the learner that would need to be delivered to him/her at the right time with the right content interactively to take care of the aspirations of the learners.

This mission mode project (NMEICT) seeks the effective utilization of intellectual resources, minimizing wastage of time in scouting for opportunities or desired items of knowledge appropriate to the requirement. Here, we mainly focused on SAKSHAT, which is a one-stop educational portal for pan India. There are several learning resources for the different target groups of learners.

8.4 TYPES OF LEARNING RESOURCES AVAILABLE ON SAKSHAT

There are numerous resources available for various kinds aspirant learners, such as- refer the figure 8.2 which shows the menu list e.g. School, Under Graduate, Post Graduate and Other online learning resources.

Figure 8.2 Menu List as per Learning resources on SAKSHAT (Source: www.sakshat.ac.in)

Learning resources available on SAKSHAT for the following categories of learners, As-

[1] School Learners-

In order to find the learning resources for school learners on SAKSHAT portal, there are the following bunch of resources available, e.g. Swayam, Swayam Prabha, NDLI, Spoken Tutorial, NISHTHA and etc.

[a] Swayam learning resources for School Learners- Under the Swayam learning resources some of the key learning resources for School learners are-

- Secondary and Senior Secondary (NIOS)- Access link- http://mooc.nios.ac.in/mooc/
- NCERT Text books- Access link- https://epathshala.nic.in//
- E-Books (I to XII)- Access link- https://diksha.gov.in/
- Secondary and Senior Secondary (NCERT)- Access link- https://ciet.nic.in/swayam_courses.php

[b] Swayam Prabha learning resources for School Learners- Under the Swayam Prabha learning resources some of the key learning resources for School learners are-

- Education Channel- Access link- https://swayamprabha.gov.in/
- Channel Schedule- Access link- https://www.swayamprabha.gov.in/index.php/program/current/1

[c] NDLI learning resources for School Learners- Under the National Digital Library of India (NDLI) learning resources some of the key learning resources for School learners are-

- Read e-books- Access Link- https://ndl.iitkgp.ac.in/

[d] Spoken Tutorial learning resources for School Learners- Under the Spoken Tutorial learning resources some of the key learning resources for School learners are-

- Learn Programming- Access Link- https://spoken-tutorial.org/

[e] NISHTHA learning resources for School Learners- Under the National Initiative for School Heads' and Teachers' Holistic Advancement (NISHTHA) learning resources some of the key learning resources for School learners are- Access Link- https://itpd.ncert.gov.in//

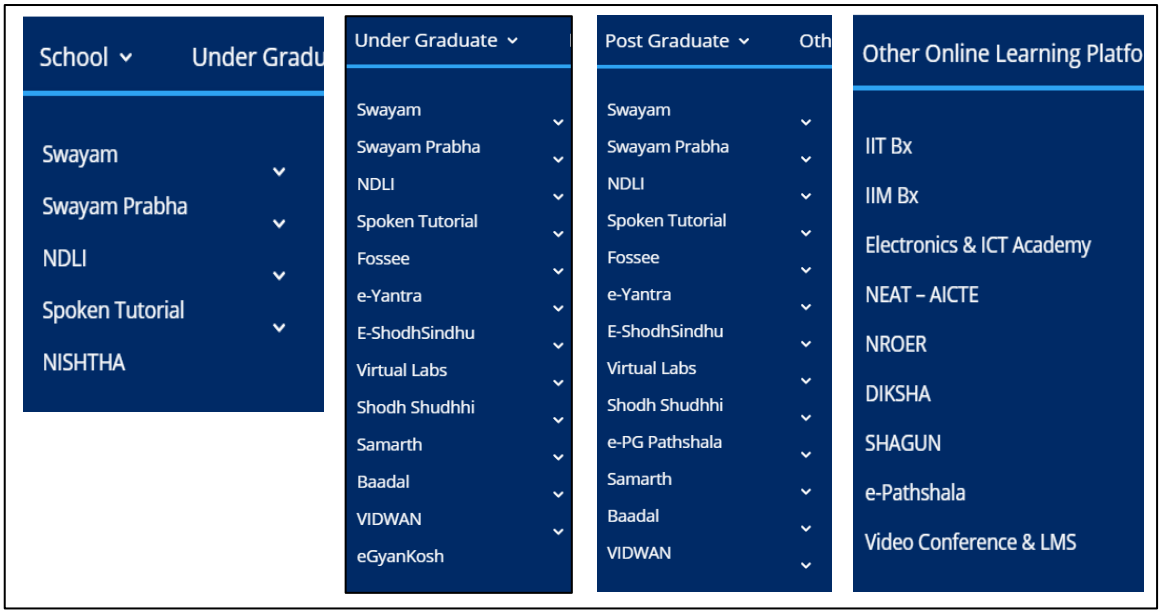


Figure 8.3 List of Learning Resources available on SAKSHAT (Source: www.sakshat.ac.in)

[2] Under Graduate Learners-

In order to find the learning resources for Under Graduate learners on SAKSHAT portal, there are the following bunch of resources available, e.g. FOSSEE, e-Yantra, e-Shodhsindhu, Virtual Labs, Shodh Shudhhi, Samarth, Baadal, VIDWAN, e-Gyankosh, Swayam, Swayam Prabha, NDLI and Spoken Tutorial.

[3] Post Graduate Learners-

In order to find the learning resources for Post Graduate learners on SAKSHAT portal, there are the following bunch of resources available, e.g. FOSSEE, e-Yantra, e-Shodhsindhu, Virtual Labs, Shodh Shudhhi, Samarth, Baadal, VIDWAN, e-Gyankosh, Swayam, Swayam Prabha, NDLI and Spoken Tutorial.

See below the list of learning resources available at SAKSHAT portal for Under Graduate and Post Graduate (but not limited) as-

[a] Swayam learning resources for Graduate and Post Graduate Learners- Under the Swayam learning resources some of the key learning resources for Graduate and Post Graduate learners (but not limited) are-

- Engineering- Access Link- https://nptel.ac.in/
- Non- Engineering- Access Link- http://ugcmoocs.inflibnet.ac.in/ugcmoocs/moocs_courses.php
- Certificate and Diploma Courses (IGNOU)- Access Link- http://egyankosh.ac.in/handle/123456789/54865

[b] Swayam Prabha learning resources for Graduate and Post Graduate Learners- Under the Swayam Prabha learning resources some of the key learning resources for Graduate and Post Graduate learners (but not limited) are-

- Education Channel- Access link- https://swayamprabha.gov.in/
- Channel Schedule- Access link- https://www.swayamprabha.gov.in/index.php/program/current/1

[c] NDLI learning resources for Graduate and Post Graduate Learners- Under the National Digital Library of India (NDLI) learning resources some of the key learning resources for Graduate and Post Graduate learners (but not limited) are-

- Read e-books- Access Link- https://ndl.iitkgp.ac.in/

[d] Spoken Tutorial learning resources for Graduate and Post Graduate Learners- Under the Spoken Tutorial learning resources some of the key learning resources for Graduate and Post Graduate learners (but not limited) are-

- Learn Programming- Access Link- https://spoken-tutorial.org/

[e] FOSSEE learning resources for Graduate and Post Graduate Learners- Under the FOSSEE resources some of the key resources for Graduate and Post Graduate learners (but not limited) are-

- FOSSEE (Free/Libre and Open Source Software for Education)- Access Link- https://fossee.in/

[f] E-yantra learning resources for Graduate and Post Graduate Learners- Under the E-yantra resources some of the key resources for Graduate and Post Graduate learners (but not limited) are-

- Learn Robotics- Access Link- https://www.e-yantra.org

[g] E-ShodhSindhu learning resources for Graduate and Post Graduate Learners- Under the E-ShodhSindhu resources some of the key resources for Graduate and Post Graduate learners (but not limited) are-

- E-Journals- Access Link- https://ess.inflibnet.ac.in

[h] Virtual Labs learning resources for Graduate and Post Graduate Learners- Under the Virtual Labs resources some of the key resources for Graduate and Post Graduate learners (but not limited) are-

- Scientific Experiments- Access Link- http://www.vlab.co.in

[i] Shodh Shudhhi learning resources for Graduate and Post Graduate Learners- Under the Shodh Shudhhi resources some of the key resources for Graduate and Post Graduate learners (but not limited) are-

- Plagiarism Detection Software- Access Link- https://pds.inflibnet.ac.in

[j] Samarth learning resources for Graduate and Post Graduate Learners- Under the Samarth resources some of the key resources for Graduate and Post Graduate learners (but not limited) are-

- E-Government Suit- Access Link- https://samarth.edu.in

[k] Baadal learning resources for Graduate and Post Graduate Learners- Under the Baadal resources (initiative of NME-ICT Cloud for academic purpose) some of the key resources for Graduate and Post Graduate learners (but not limited) are-

- Free Academic Cloud- Access Link- https://baadal.nmeict.in/

[l] VIDWAN learning resources for Graduate and Post Graduate Learners- Under the VIDWAN resources some of the key resources for Graduate and Post Graduate learners (but not limited) are-

- India Research Information Network System (IRINS)- Access Link- http://irins.org/irins/

[m] E-Gyankosh learning resources for Graduate and Post Graduate Learners- Under the egyankosh resources some of the key resources for Graduate and Post Graduate learners (but not limited) are-

- India Research Information Network System- Access Link- http://egyankosh.ac.in

[n] E-PG pathshala learning resources for Graduate and Post Graduate Learners- Under the e-PG pathshala learning resources some of the key learning resources for Graduate and Post Graduate learners (but not limited) are-

- E-PG Pathshala- Access Link- https://epgp.inflibnet.ac.in

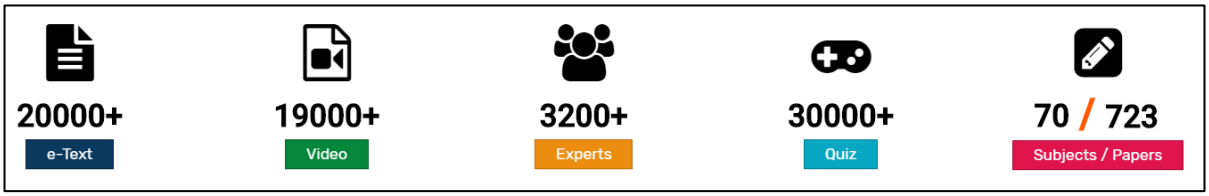
[4] Miscellaneous Learners-

In order to find the learning resources for Miscellaneous learners on SAKSHAT portal, there are the following bunch of resources available, e.g. IIT Bx, IIM Bx, Electronics and ICT Academy, NEAT-AICTE, NROER, DIKSHA, SHAGUN, e-pathshala, Video Conference and LMS. Some of the learning resources with their access link are listed below.

- IIT BombayX- Access Link- https://www.iitbombayx.in
- IIM Bx- Access Link- https://www.iimbx.edu.in
- Electronics and ICT Academy- Access Link- http://eict.iitg.ac.in
- National Educational Alliance for Technology (NEAT)and AICTE- Access Link- https://neat.aicte-india.org
- National Repository of Open Educational Resources- Access Link- https://nroer.gov.in
- Digital Infrastructure for Knowledge Sharing (DIKSHA)- Access Link- https://diksha.gov.in/
- SHAGUN- Access Link- https://seshagun.gov.in/shagun
- Epathshala- Access Link- https://epathshala.nic.in

8.5 A BRIEF INTRODUCTION TO E-PG PATHSHALA

e-PG Pathshala is an initiative of the MHRD under its National Mission on Education through ICT (NME-ICT) being executed by the UGC. The content and its quality being the key component of education system, high quality, curriculum-based, interactive e-content in 70 subjects across all disciplines of social sciences, arts, fine arts and humanities, natural & mathematical sciences. You can access and explore all the learning resources free of cost.



explore are resources as per your choice.

Figure 8.4 Learning resources available on e-PG Pathshala (Source: https://epgp.inflibnet.ac.in)

Note: to access resources on e-PG Pathshala, click on this link- https://epgp.inflibnet.ac.in. After clicking on this link, you will get the home page of this website (refer figure 8.5). as-

Figure 8.5 Home page of e-PG Pathshala (Source: https://epgp.inflibnet.ac.in)

8.6 POINTS TO REMEMBER

- The SAKSHAT project was launched in the year 2006, initiated by Ministry of Human Resource Development (MHRD), Govt. of India.
- e-PG Pathshala is an initiative of the MHRD under its National Mission on Education through ICT (NME-ICT) being executed by the UGC.
- The SAKSHAT project is one stop solution to facilitate lifelong learning for students, teachers and those in employment or in pursuit of knowledge free of cost to all of them; the access link is- www.sakshat.ac.in
- Content development for the 'SAKSHAT' was consisted of the representatives from educational institutions like IGNOU, Delhi University, Kendriya Vidyalaya Sangthan (KVS), Navodyaya Vidyalaya Sangthan (NVS), National Institute of Open Schooling (NIOS) and National Council for Educational Research and Training (NCERT) and prominent academicians in the field.
- The project SAKSHAT contains numerous learning resources for its various kinds of aspirant learners, such as- School learners, Under Graduate learners, Post Graduate learners and Other type of miscellaneous learners.

8.7 GLOSSARY

- MHRD- Ministry of Human Resource Development (govt. of India).

- NMEICT-National Mission in Education through Information and Communication Technology.
- UGC- University Grant Commission.
- KVS- Kendriya Vidyalaya Sangthan.
- NVS- Navodyaya Vidyalaya Sangthan.
- NIOS- National Institute of Open Schooling.
- NCERT- National Council for Educational Research and Training.
- NROER- National Repository of Open Educational Resources.
- NEAT- National Educational Alliance for Technology.
- AICTE- All India Council for technical Education.
- IRINS- India Research Information Network System.
- FOSSEE- Free/Libre and Open Source Software for Education.
- NDLI- National Digital Library of India.
- NISHTHA- National Initiative for School Heads' and Teachers' Holistic Advancement.

8.8 CHECK YOUR PROGRESS

Descriptive Type Questions-

a) Define briefly about the resources available on e-PG pathshala.

b) List the available learning resources on SAKSHAT under miscellaneous learning resources.

c) Define the role of SAKSHAT portal in your words.

d) An engineering aspirant is looking for some learning resources in his/her field. What should be the perfect choice to get resources on the SAKSHAT?

e) How many types of learning resources available on SAKSHAT? Define briefly.

8.9 BIBLIOGRAPHY/ REFERENCES

- www.sakshat.ac.in
- https://epgp.inflibnet.ac.in
- https://www.iitbombayx.in
- https://www.iimbx.edu.in
- http://eict.iitg.ac.in
- https://neat.aicte-india.org

- https://nroer.gov.in
- https://diksha.gov.in/
- https://seshagun.gov.in/shagun
- https://epathshala.nic.in
- http://egyankosh.ac.in
- http://irins.org/irins/
- https://samarth.edu.in
- https://baadal.nmeict.in/
- https://pds.inflibnet.ac.in
- http://www.vlab.co.in
- https://ess.inflibnet.ac.in
- https://www.e-yantra.org
- https://fossee.in/
- https://spoken-tutorial.org/
- https://ndl.iitkgp.ac.in/
- https://swayamprabha.gov.in/
- http://ugcmoocs.inflibnet.ac.in/ugcmoocs/moocs_courses.php
- https://itpd.ncert.gov.in//
- https://ciet.nic.in/swayam_courses.php

8.10 SUGGESTED READINGS

- https://sakshat.ac.in/wp-content/uploads/2020/04/documents/ Mission%20Document/ Missiondocument.pdf
- www.sakshat.ac.in

UNIT- 9

TECHNOLOGY ENABLED EDUCATION- INSTITUTIONAL INITIATIVES- II

9.1 INTRODUCTION

From the development of the Internet in 1980s and the invention of the World Wide Web in 1995, there has been considerable growth in the adoption of technology within educational institutions, for both distance and on-campus teaching and learning. The adoption of technologies has now spread, to a greater or lesser extent, to almost all parts of the world. Technology-Enabled Education is taken to refers to the application of some form of digital technology to teaching and/or learning in an educational context.

9.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Explore Institutional Initiatives of Technology Enabled Education.
- Define the Shodhganga initiatives.
- Explore e-resources available under Inflibnet, and NCERT.

9.3 BRIEF OVERVIEW OF TECHNOLOGY ENABLED EDUCATION

The term Technology-enhanced Education (TEE) is used to describe the application of technology to teaching and learning. It is a broad category that isn't particularly defined, but, in short, TEE is any technology that enhances the learning or teaching experience. The term can be used to describe both analog and digital technologies, but more recently, we see that digital TEE is taking over education in the form of different types of educational software. TEE is transforming and enhancing education and educational institutions beyond recognition. Therefore, it is impossible to be ignored! Let's explore why TEE is important for educators. Technology-Enhanced Education is important for many reasons. It is not only important because it is the standard of education that is expected today, but it can also improve education. This section explores TEE's importance in more detail. As-

- Students can learn at their own pace- Technology in education enables children to adjust to their own pace of learning. Students who need extra time can spend more time going over exercises until they understand, whilst students who need less support can continue ahead. It also frees up the teacher to help kids who need more support on an individual level.
- More resources- With TEE, educators are no longer limited to the textbooks that their institutions provide. By using other resources such as video, audio, and interactive learning, students have many different ways to learn. Teachers can find creative ways to teach their students in an engagingly. Technology has changed the learning environment so that learning is more hands-on.
- Technology keeps kids engaged- Children often struggle to stay on task or interested, particularly if it is not interactive. TEE can make school tasks more engaging, which will help your students to stay focused.
- Technology is necessary to succeed in the real world- The reality is that it is almost impossible to survive the working world without technology. Therefore, it is better if children learn how to use tech sooner rather than later. Arguably, being computer literate is more important than some of the more traditional skills that are taught in schools.

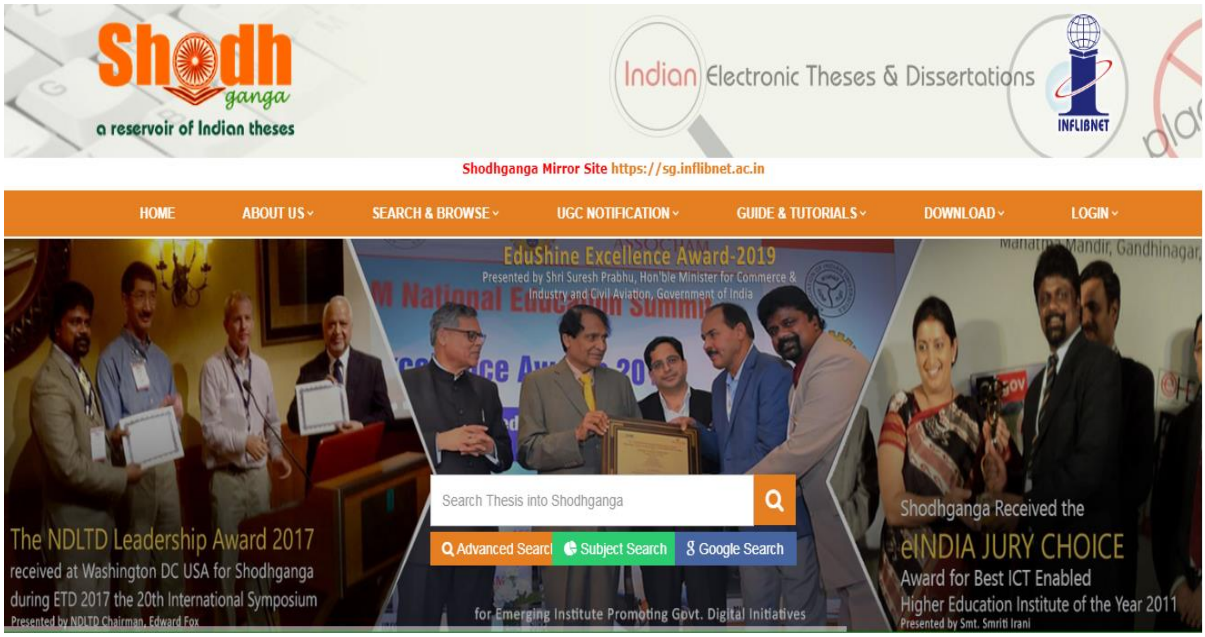
In India, Department of Higher Education, Ministry of Education is administering a programme 'National Mission on Education through Information and Communication Technology' (NMEICT) to leverage the potential of ICT to make the best quality content accessible to all learners in the country, free of cost.

9.4 BRIEF INTRODUCTION TO SHODHGANGA- INFLIBNET

All the theses and dissertations are the rich and unique source of information, often the only source for research work that does not find its way into various publication channels. As such, theses and dissertations remain an un-tapped and under-utilized asset, leading to unnecessary duplication and repetition that, in effect, is the anti-ethics of research and wastage of huge resources, both human and financial. The UGC Notification (Minimum Standards & Procedure for Award of M.Phil./ Ph. D Degree, Regulation, 2009 and amendment made on 5th May 2016 mandates submission of electronic version of theses and dissertations intending to facilitate its open access to the academic community world-wide. Online availability of electronic theses through centrally maintained digital repository not only ensures easy access and archiving of Indian doctoral theses but also helps in raising the standard and quality of research. The open access to theses and dissertations would overcome the serious problem of duplication of research and poor quality resulting from the "poor visibility" and the "unseen" factor in research output. As per the Regulation, the responsibility of setting-up, hosting and maintaining the digital repository and making it accessible to all institutions and universities, is assigned to the INFLIBNET Centre. Shodhganga" is the name coined to denote digital repository of Indian Electronic Theses and Dissertations (ETD) set-up by the INFLIBNET Centre as per UGC notification 2009/2016. Shodhganga stands for the reservoir of Indian intellectual output stored in a repository hosted and maintained by the INFLIBNET Centre. The word "Shodh" originates from Sanskrit and stands for research and discovery, Ganga is a holy and popular river with its root in Indian culture and civilization.

Shodhganga- INFLIBNET Centre

The Shodhganga centre is setup using DSpace, an open-source digital repository software, initially developed by MIT and HP, now updated and maintained by DuraSpace, a non-profit Organization. The DSpace uses internationally recognized protocols and interoperability standards. The Shodhganga INFLIBNET Centre provides a platform for research scholars to deposit their Ph.D. theses and make it available to the entire scholarly community in open access. The repository can capture, index, and store, disseminate and preserve ETDs submitted by the researchers. Shodhganga Repository at INFLIBNET replicates the academic structure of each university in terms of Departments/Centres and Colleges each university has. This structure facilitates research scholars from universities to deposit their theses in the respective Department / Centre/ College.



URL- https://shodhganga.inflibnet.ac.in

Features of Shodhganga-

- Open access repository of Indian theses for world-wide access;
- Customized ingestion interface for ease of submission of theses using DSpace;
- Integration with Theses Database of IndCat (with 2.74 Lakh bibliographic data); and
- Multi-lingual support for theses hosted in the repository. Hindi, Gujarati, Tamil, Sanskrit, Malayalam, Urdu, Marathi already enabled.

9.5 *BRIEF DESCRIPTION OF RESOURCES AVAILABLE AT INFLIBNET*

Information and Library Network (INFLIBNET) Centre, Gandhinagar is an Autonomous Inter-University Centre (IUC) of University Grants Commission, New Delhi (Ministry of Education, Govt. of India). It is a major National Programme initiated by the UGC in March 1991 as a project under the IUCAA; it became an independent Inter-University Centre in June 1996. INFLIBNET is involved in modernizing university libraries in India using the state-of-art technologies for the optimum utilization of information. The technology being a driving force in the contemporary education system, the Centre has taken-up several initiatives for the benefit of the academic community in India. These initiatives are categorized into various phenomenon's as mentioned below:

1-Library Automation-

INDCAT-Union Catalogue of Indian Universities (IndCat) is a by-product of the library automation of the INFLIBNET Centre wherein universities that are signatory to the MoU on library automation contribute the bibliographic records of documents that are available in their libraries. The scope of the IndCat has now been extended to invite contributions from

universities and other institutions that have not signed MoU with INFLIBNET Centre on library automation.

SOUL 2.0-The SOUL 2.0 (Software for University Libraries) is state-of-the-art integrated library management software designed and developed by the INFLIBNET Centre based on requirements of colleges, universities and other academic libraries. The software is compliant to international standards for bibliographic formats and circulation protocols. It is compliant to international standards such as MARC 21 for the bibliographic format, Unicode based Universal Character Sets for multilingual bibliographic records and NCIP 2.0 and SIP 2 based protocols for RFID, electronic surveillance and control.

2- E-Consortium

E-SHODHSINDHU-e-ShodhSindhu is an initiative of Consortium for Higher Education Electronics Resources by Ministry of Education. It provides access to e-resources (10000+ full-text journals, 164300+ e-Books and 4 databases through e-ShodhSindhu and 600000 e-Books through NDL) to Universities, Colleges and Centrally Funded Technical Institutions in India.

N-LIST-The Project entitled "National Library and Information Services Infrastructure for Scholarly Content (N-LIST)", graduated as a regular scheme of UGC under UGC-INFONET Digital Library Consortium as college component, is merged into e -ShodhSindhu: Consortia for Higher Education E-Resources. The N-LIST provides access to 6,000+ journals, 1,64,300+ ebooks under N-LIST and 6,00,000 ebooks through NDL to all Govt., Govt.-aided as well as non-aided colleges through a proxy server / shibboleth.

INFISTATS-The Centre has developed a software called InfiStats, for monitoring the usage statistics of various e-resources made accessible to the member institutions. The InfiStats portal imports the usage data from the publisher's website automatically and store it is a database on InfiStats platform. The InfiStats interface provides title-level COUNTER-compliant reports to member institutions. The member institutions can also log-on to this portal for monitoring the usage of their respective e-resources.

INFED-INFLIBNET Access Management Federation (INFED) was setup which uses Shibboleth, standard-based open-source software, for authenticating authorized users from colleges and universities and provide them seamless access to e-resources from anywhere, anytime. Shibboleth offers a mechanism for users to access multiple resources within a federated single sign-on framework.

SHODHSHUDDHI-The Govt. of India was to provide Plagiarism Detection Software to all Indian Universities/Institutions including Central Universities, State Universities, deemed to be Universities, Private Universities, Centrally Funded Technical Institutions (CFTIs), Institute of National importance (INIs), Inter University Centres of UGC (IUCs). The INFLIBNET

Centre is a nodal agency to execute the project/initiative under the aegis of Ministry of Education.

INFISTATS-The Centre has developed software called InfiStats, for monitoring the usage statistics of various e-resources made accessible to the member institutions. The InfiStats portal imports the usage data from the publisher's website automatically and store it is a database on InfiStats platform. The InfiStats interface provides title-level COUNTER-compliant reports to member institutions. The member institutions can also log-on to this portal for monitoring the usage of their respective e-resources.

3-OPEN ACCESS INITIATIVE

SHODHGANGA-Shodhganga is a digital repository set-up for submission of electronic versions of theses and dissertations by students / research scholars in universities in India and makes them available in open access to the world-wide academic community in response to the UGC Notification (Minimum Standards & Procedure for Award of M.Phil. / Ph.D Degree, Regulation, 2009 and amendment made in 2016) where-in the responsibility of maintaining the digital repository of Electronic Theses and Dissertations (ETDs) is assigned to the INFLIBNET Centre.

SHODHGANGOTRI-Under this initiative, research scholars/research supervisors in universities could deposit an electronic version of approved synopsis submitted by research scholars to the universities for registering themselves under the PhD programme. Synopses in Shodhgangotri would later be mapped to full text thesis in Shodhganga. As such, once the full-text thesis is submitted for a synopsis, a link from the synopsis in Shodhgangotri to the full-text theses in Shodhganga will be provided.

INSTITUTIONAL REPOSITORY-The Centre has established an institutional repository called IR@INFLBNET using DSpace, opensource software. The papers published in the proceedings of the CALIBER and PLANNER is uploaded into the repository. The Repository also includes course materials, newspaper clippings, etc.

INFOPORT-INFOPORT: INFLIBNET Subject Gateway for Indian Electronic Resources is designed to facilitate registering of an Internet resource into the portal and extending its access to users. INFOPORT supports browsing of Internet resources by Dewey Decimal Classification (DDC) Scheme.

RESEARCH PROJECT DATABASE-The Research Project Database provides details of completed and ongoing projects carried out by faculty members working in universities and institutions across the country. The Centre gets project details along with the project reports in print/digital formats from the project investigators of Minor Research Projects (MRP) funded by the UGC.

9.6 BRIEF OVERVIEW TO NCERT E-INITIATIVES

The National Council of Educational Research and Training (NCERT) is an autonomous organisation set up in 1961 by the Government of India to assist and advise the Central and State Governments on policies and programmes for qualitative improvement in school education. The major objectives of NCERT and its constituent units are to: undertake, promote and coordinate research in areas related to school education; prepare and publish model textbooks, supplementary material, newsletters, journals and develops educational kits, multimedia digital materials, etc. organise pre-service and in-service training of teachers; develop and disseminate innovative educational techniques and practices; collaborate and network with state educational departments, universities, NGOs and other educational institutions; act as a clearing house for ideas and information in matters related to school education; and act as a nodal agency for achieving the goals of Universalization of Elementary Education. In addition to research, development, training, extension, publication and dissemination activities, NCERT is an implementation agency for bilateral cultural exchange programmes with other countries in the field of school education.

Website- www.ncert.nic.in

DIKSHA (www.diksha.gov.in)-

DIKSHA (Digital Infrastructure for Knowledge Sharing) is a national platform for school education, an initiative of National Council for Education Research and Training (NCERT), MHRD. DIKSHA was developed based on the core principles of open architecture, open access, open licensing diversity, choice and autonomy as outlined in the Strategy and Approach

Paper for the National Teacher Platform released by the government in May, 2017. DIKSHA itself was launched by the Hon' Vice President of India on Sept 5th, 2017 and has since been adopted by 35 states/UT's across as well as CBSE and NCERT and by crores of learners and teachers.

DIKSHA is built on open-source technology, made in India and made for India, which incorporates internet scale technologies and enables several use-cases and solutions for teaching and learning. DIKSHA is built using MIT licensed open-source technology called Sunbird, which is a digital infrastructure for learning and is designed to support multiple languages and solutions and offers over a 100 micro services as building blocks for the development of platforms and solutions.

DIKSHA, as mentioned earlier, is available for the use of all states and UTs of India. Each state/UT leverages the DIKSHA platform in its own way, as it has the freedom and choice to use the varied capabilities and solutions of the platform to design and run programs for their teachers and learners. DIKSHA policies and tools make it possible for the education ecosystem (educationist, experts, organizations, institutions - government, autonomous institutions, non-govt and private organizations) to participate, contribute and leverage a common platform to achieve learning goals at scale for the country.

DIKSHA can be accessed by learners and teachers across the country and currently supports 18+ languages and the various curricula of NCERT, CBSE and SCERTs across India. The platform is being leveraged and developed for school education, foundational learning programs and to support inclusive learning for underserved and differently-abled communities of learners and teachers.

NROER (www.nroer.gov.in)-

NROER (National Repository of Open Educational Resources) is a collaborative platform, which brings together everyone interested in school and teacher education. Initiated by the Department of School Education and Literacy, Ministry of Human Resource Development, Government of India and managed by the Central Institute of Educational Technology, National Council of Educational Research and Training, the Repository runs on the MetaStudio platform, an initiative of the Knowledge Labs, Homi Bhabha Centre for Science Education.

NISHTHA (National Initiative for School Heads' and Teachers' Holistic Advancement**)-**

(www.itpd.ncert.gov.in)

NISHTHA is a capacity building programme for "Improving Quality of School Education through Integrated Teacher Training". It aims to build competencies among all the teachers and school principals at the elementary stage. The functionaries (at the state, district, block, cluster level) shall be trained in an integrated manner on learning outcomes, school-based assessment, learner- centre pedagogy, new initiatives in education, addressing diverse needs of children

through multiple pedagogies, etc. This is being organized by constituting National Resource Groups (NRGs) and State Resource Groups (SRGs) at the National and the State level who will be training 42 lakhs teachers subsequently. A robust portal/Management Information System (MIS) for delivery of the training, monitoring and support mechanism has been infused with this capacity building initiative.

ePathshala (www.epathshala.nic.in)

ePathshala is a portal/app developed by the CIET, and NCERT. It was initiated jointly by the Ministry of Human Resource Development, CIET, and NCERT, and launched in November 2015. It hosts educational resources for teachers, students, parents, researchers and educators, can be accessed on the Web, and is available on Google Play, App Store and Windows. The content is available in English, Hindi and Urdu.

The platform offers a slew of educational resources, including NCERT textbooks for classes 1-12, audio-visual resources by NCERT, periodicals, supplements, teacher training modules and a variety of other print and non-print materials. These materials can be downloaded by the user for offline use with no limits on downloads. The app supports flip book format to provide a more realistic experience.

Tamanna- (Try And Measure Aptitude And Natural Abilities)

(www.ncert.nic.in/tamanna)

Under the aegis of Ministry of Human Resource Development, Govt. of India, the Central Board of Secondary Education (CBSE) and National Council of Educational Research and Training (NCERT), New Delhi have developed Tamanna - An Aptitude Test for Senior School Students to enable stakeholders know the aptitude of students of classes IX and X. Details about use of aptitude test, dimensions measured in the test, construction and standardization of the test, administration and scoring and understanding the meaning of aptitude test scores are available in the test manual. As a collaborative work, piloting of the aptitude test was done by the CBSE with 17,000 students studying in classes IX and X through its affiliated schools across different parts of the country.

e-Kalpa

An integrated android based mobile app ‘e- kalpa’ enabling technology delivery, interactive learning and real time data recording was developed for better reaching out to farming communities. It has GPS enabled platform, developed to connect stakeholders of plantation sector with emphasis to coconut, arecanut and cocoa. e-kalpa is the integration of five major services *viz*., farmers issue reporting and supporting, synchronized farming, farmer diary, knowledge base and notifications and is available in English, Hindi, Malayalam and Kannada languages. It provides the farmer, latest CPCRI technologies and farming practices for

increasing yield. It has online reporting facility for any type of issues related on farming which needs immediate solutions from experts.

e-Yantra (www.e-yantra.org)

e-Yantra is a robotics outreach project, an initiative of the Department of Computer Science and Engineering at the Indian Institute of Technology, Bombay (IIT Bombay). It is funded by the Ministry of Education, Government of India, under the National Mission on Education through ICT (NMEICT). The goal of e-Yantra is to complement existing Higher Education systems worldwide and solve local problems across a variety of domains such as: Agriculture, Disaster, Manufacturing Defense, Home, Smart Cities and Service Industries through technology. The mission of this project is to create the next generation of engineers with a practical outlook to help in providing pragmatic solutions to real-world problems. The initiative seeks to provide hands-on learning-infrastructure to engineering students who have limited access to labs and mentors.

9.7 POINTS TO REMEMBER

- Shodhganga" is the name coined to denote digital repository of Indian Electronic Theses and Dissertations (ETD) set-up by the INFLIBNET Centre as per UGC notification 2009/2016.
- Information and Library Network (INFLIBNET) Centre, Gandhinagar is an Autonomous Inter-University Centre (IUC) of University Grants Commission, New Delhi (Ministry of Education, Govt. of India).
- The National Council of Educational Research and Training (NCERT) is an autonomous organisation set up in 1961 by the Government of India to assist and advise the Central and State Governments on policies and programmes for qualitative improvement in school education.

9.8 GLOSSARY

- Tamanna- Try And Measure Aptitude And Natural Abilities.
- NCERT- National Council of Educational Research and Training.
- NISHTHA- National Initiative for School Heads' and Teachers' Holistic Advancement.
- NROER- National Repository of Open Educational Resources.
- DIKSHA- Digital Infrastructure for Knowledge Sharing.

9.9 CHECK YOUR PROGRESS

a) How do you define technology enabled learning initiatives by several institutions for one's overall learning enhancement?

b) List the various e-resources under Inflibnet.

c) How e-educational initiatives of NECRTs' are beneficial for teacher's development? Explain.

d) List 5 key characteristics of DIKSHA.

9.10 BIBLIOGRAPHY/ REFERENCES

- Alruwais N, Wills G, Wald M (2018) Advantages and challenges of using e-assessment. Int J InfEduc Technol 8(1)
- Balacheff, N., Ludvigsen, S., Jong, T. de, Lazonder, A., & Barnes, S. (Eds). (2009).
- Baran, E., Correia, A.-P., & Thompson, A. (2011). Transforming online teaching practice:
- Bates, T. (2012). What's right and what's wrong about Coursera-style MOOCs? Retrieved from http://www.tonybates.ca/2012/08/05/whats-right-and-whats-wrong-about-courserastyle-
- mooc
- Becker, R., & Jokivirta, L. (2007, Spring). Online learning in universities: Selected data from the 2006 Observatory Survey. Retrieved from http://www.obhe.ac.uk/documents/view_details?id=15
- https://www.col.org/programmes/technology-enabled-learning
- https://inflibnet.ac.in/downloads/brochure/shodhganga.pdf
- https://diksha.gov.in/about/
- https://nroer.gov.in/welcome
- https://itpd.ncert.gov.in/
- https://epathshala.nic.in/
- https://link.springer.com/referenceworkentry/10.1007%2F978-3-319-60013-0_72-1
- http://cpcri.gov.in/index.php/rti/9-uncategorised/677-e-kalpa-android-app
- https://www.e-yantra.org/
- https://vidwan.inflibnet.ac.in/

9.11 SUGGESTED READINGS

- www.col.org/programmes/technology-enabled-learning
- Inflibnet, www.inflibnet.ac.in
- Diksha, www.diksha.gov.in
- NROER, www.nroer.gov.in
- www.itpd.ncert.gov.in
- www.epathshala.nic.in

UNIT- 10

TECHNOLOGY ENABLED LEARNING TOOLS / PLATFORMS- I

10.1 INTRODUCTION

Technology-Enabled Education (TEE) refers to the use of technology (especially Information and Communication Technology, e.g., Smartboard, computers, smartphones, interactive whiteboards, etc.) in teaching-learning. TEE can be used alongside face-to-face learning as blended learning to make a better learning experience. The TEE improves learning performance through the appropriate learning environment.

We will discuss and elaborate the two massive online learning platforms, e.g., SWAYAM and NPTEL, supported by the Ministry of Human Resource and Development (MHRD), Govt. of India to enhance the National Mission on Education through Information and Communication Technology (NMEICT).

10.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Know about SWAYAM initiatives regarding Technology Enabled Education
- Explore courses on the SWAYAM portal.

- Know about NPTEL initiatives and access of quality course content by IIT and IIMs.
- Explore courses on the NPTEL portal.

10.3 SWAYAM- AN INTRODUCTION

SWAYAM (www.swayam.gov.in) is a programme initiated by the Government of India and designed to achieve the three cardinal principles of Education Policy viz., access, equity, and quality. This effort aims to take the best teaching-learning resources to all, including the most disadvantaged. SWAYAM seeks to bridge the digital divide for students who have hitherto remained untouched by the digital revolution and have not been able to join the mainstream of the knowledge economy.

This is done through a platform that facilitates hosting of all the courses, taught in classrooms from Class 9 till post-graduation to be accessed by anyone, anywhere at any time. All the courses are interactive, prepared by the best teachers in the country, and are available, free of cost to any learner. More than 1,000, specially chosen faculty and teachers from across the country have participated in preparing these courses.

The courses hosted on SWAYAM are available in 4 quadrants, as-

- video lecture
- specially prepared reading material that can be downloaded/printed
- self-assessment tests through tests and quizzes and
- online discussion forum for clearing the doubts.

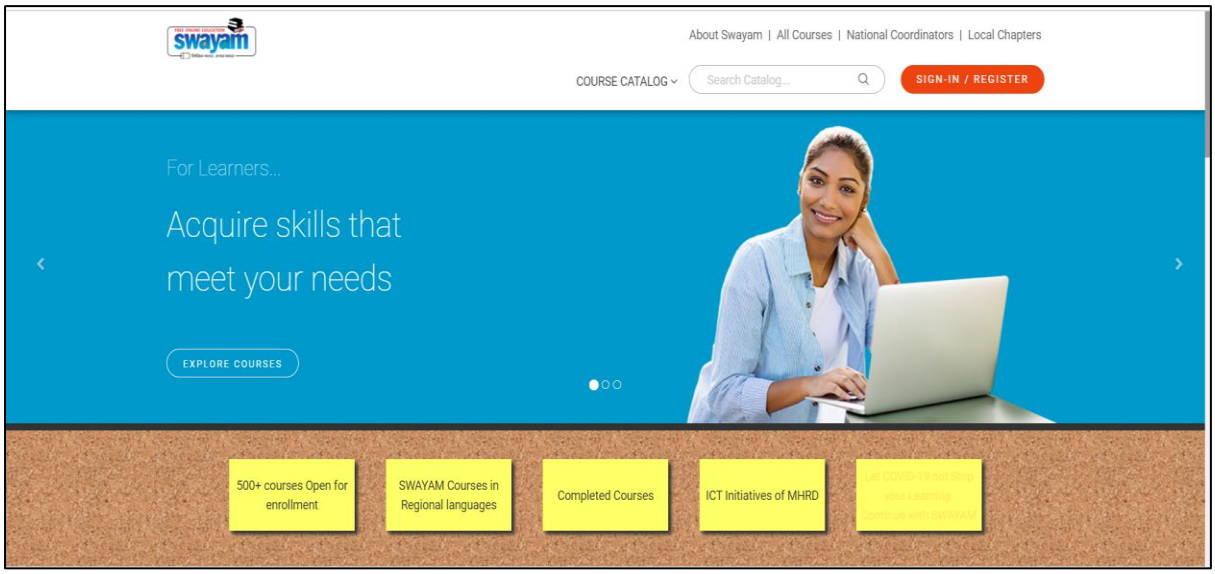


Figure 10.1 The Home page of SWAYAM platform (Source: www.swayam.gov.in)

All these steps have been taken to enrich the learning experience by using audio-video and multi-media and state of the art pedagogy / technology. In order to ensure best quality content is produced and delivered, nine National Coordinators have been appointed. They are:

- AICTE (All India Council for Technical Education) for self-paced and international courses
- NPTEL (National Programme on Technology Enhanced Learning) for Engineering
- UGC (University Grants Commission) for non-technical post-graduation education
- CEC (Consortium for Educational Communication) for under-graduate education
- NCERT (National Council of Educational Research and Training) for school education
- NIOS (National Institute of Open Schooling) for school education
- IGNOU (Indira Gandhi National Open University) for out-of-school students
- IIMB (Indian Institute of Management, Bangalore) for management studies
- NITTTR (National Institute of Technical Teachers Training and Research) for Teacher Training programme.

Courses delivered through SWAYAM are available free of cost to the learners, however learners wanting a SWAYAM certificate should register for the final proctored exams that come at a fee and attend in-person at designated centres on specified dates. Eligibility for the certificate will be announced on the course page and learners will get certificates only if these criteria is matched. Universities/colleges approving credit transfer for these courses can use the marks/certificate obtained in these courses for the same.

10.4 ACCESSING COURSES ON SWAYAM

Explore Courses on SWAYAM-

To explore the courses on SWAYAM one should visit the website (www. swayam.ac.in). There are various courses available on the SWAYAM portal, such courses are categorized into the following-

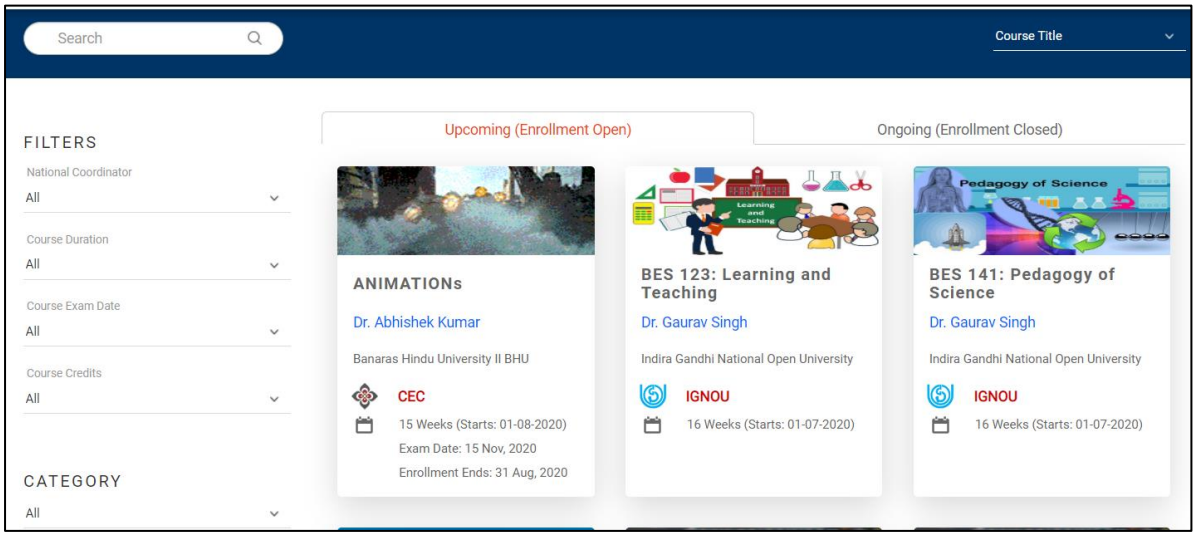


Figure 10.2 Course Categories and Course Filters for Searching Courses on SWAYAM portal (Source: www.swayam.gov.in)

Upcoming Courses (enrollments Open)-

The courses those are on offer are listed under "upcoming courses" in such courses anyone interested can register for participation as well also can search the course of his/her interest.

Ongoing Courses (Enrollments Closed)-

The courses those are available, but currently not on offer for enrollments are listed under "Ongoing courses". Anyone interested can participate in these courses in future, when they will open for enrollments.

Search your courses on SWAYAM-

There are the following filters to refine your search for courses of your interest, as-

[1] National Coordinators wise

You can find the courses of his/her interest on SWAYAM portal by enabling the filter (see figure 10.2) as National Coordinator wise. Currently there are the following National Coordinators on the SWAYAM portal, as- AICTE, NPTEL, UGC, CEC, NCERT, NIOS, IGNOU, IIMB and NITTTR.

[2] Course Duration Wise

You can find the courses of his/her interest on SWAYAM portal by enabling the filter (see figure 10.2) as Course Duration wise. Currently there are 4 to 24 weeks of courses available on the SWAYAM portal.

[3] Course Exam Date Wise

You can find the courses of his/her interest on SWAYAM portal by enabling the filter (see figure 10.2) as Course Exam Date wise. Generally, there are two sessions of conducting examinations in between September - October and March – April, each year.

[4] Course Credit Wise

You can find the courses of his/her interest on SWAYAM portal by enabling the filter (see figure 10.2) as Course Credit wise.

[5] Subject Category Wise

You can find the courses of his/her interest on SWAYAM portal by enabling the filter (see figure 10.2) as Subject Category wise. Currently there are the following subject categories available on the SWAYAM portal, as- AICTE-NITTTR Courses, Annual Refresher Program in Teaching, Architecture and Planning, Education, Engineering and Technology, Humanities and Arts, Law, management and Commerce, Maths and Sciences, NPTEL Domain and School courses

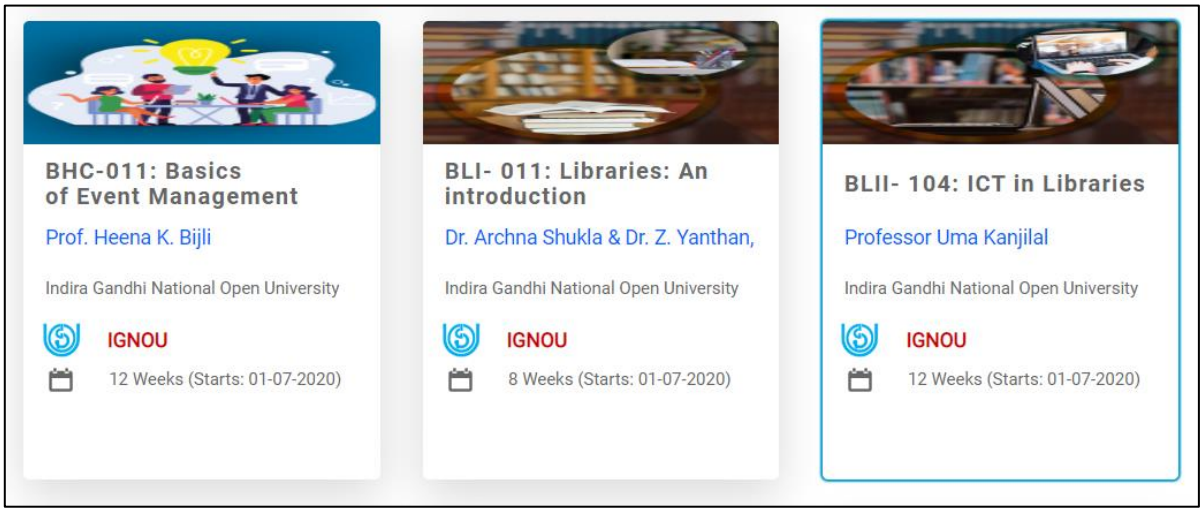


Figure 10.3 List of courses available on SWAYAM portal (Source: www.swayam.gov.in)

Register on Course(s) available at SWAYAM portal-

First, search the course of your interest available on SWAYAM portal (see figure 10.3).

For example-

I am interested in the course "BLII- 104: ICT in Libraries", which is a which is 12 Week course and offered by Indra Gandhi National Open University (IGNOU) (refer the figure 10.3). To join this course, click over the course name, then you will see the course details, as- (See figure 10.4).

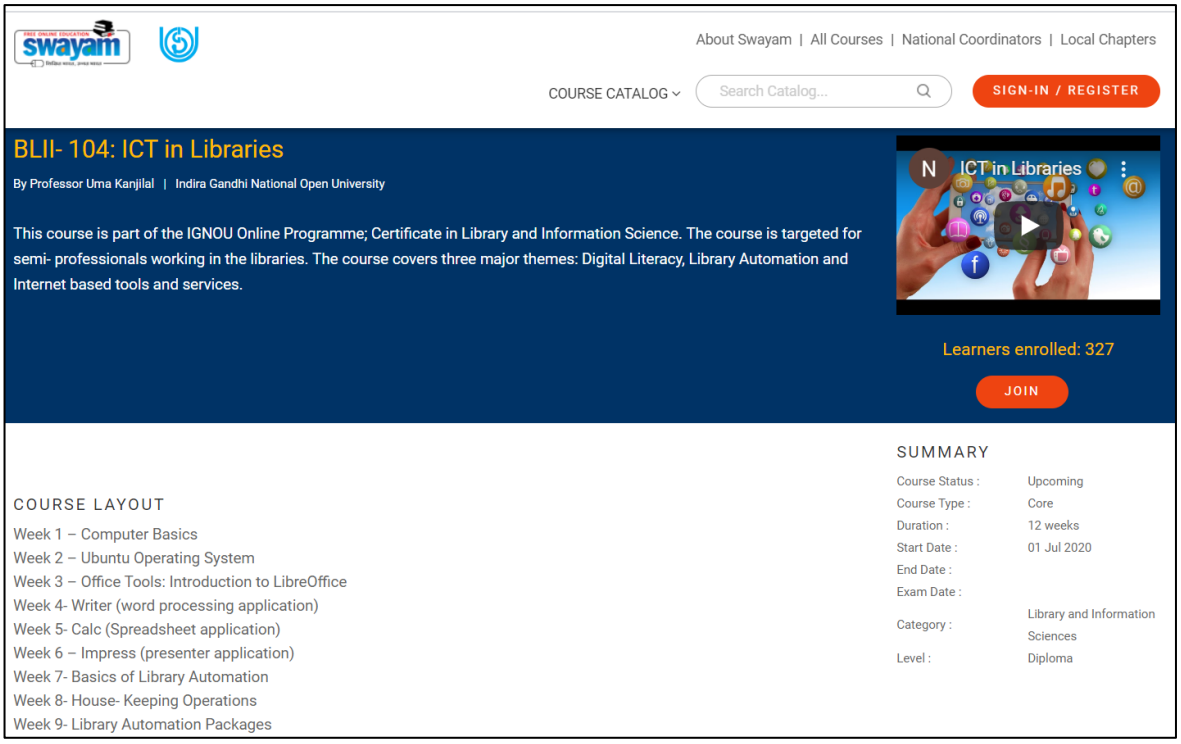


Figure 10.4 Courses details (Source: www.swayam.gov.in)

After getting all the details about the course of your choice, click on the "Join" button (see figure 10.4), then it will ask for "Login". For login, (see figure 10.5) you can use your existing Microsoft account ID or Google (popularly known as Gmail ID) ID or Facebook ID. If you do not have any such IDs than you can click on "Sign up now" to create a new login ID and fill the necessary details as needed to fill the form and get register on the course of your interest.

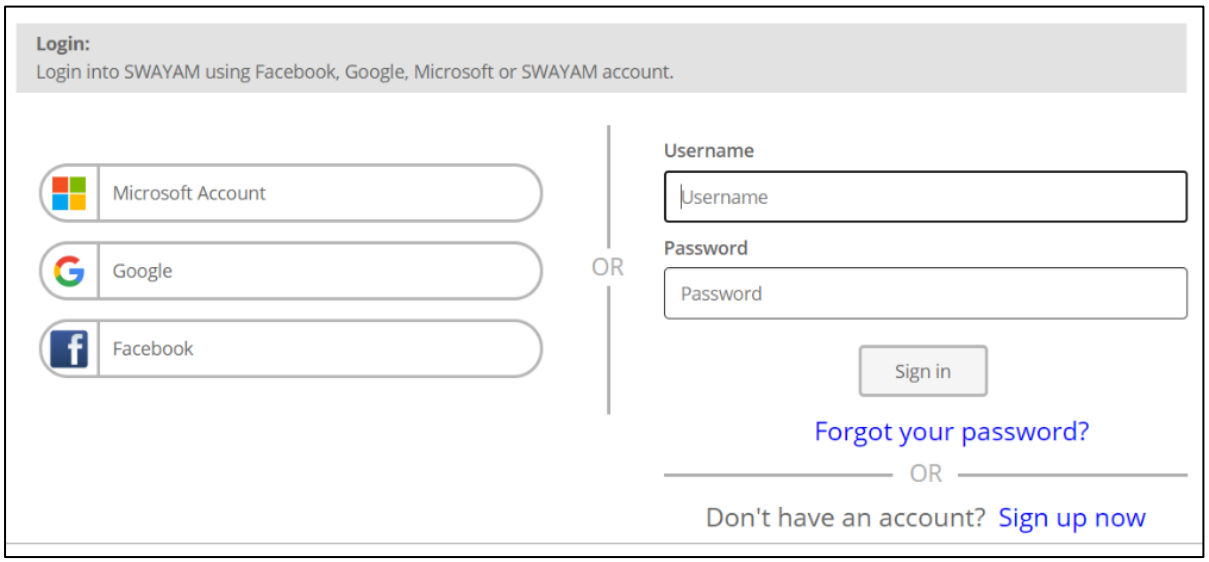


Figure 10.5 Login window (Source: www.swayam.gov.in)

Note: (1) Author of this unit personally requests to all the learners of this course kindly visit the SWAYAM portal by using the URL (www.swayam.ac.in), and search a variety of courses

available on the portal. (2) ID refers to identification. ID is a popularly known term in the Internet world. This refers to the kind of address which is not physically bounded.

10.5 NPTEL- AN INTRODUCTION

National Programme on Technology Enhanced Learning (NPTEL, www.nptel.ac.in) was initiated by seven Indian Institutes of Technology (Bombay, Delhi, Kanpur, Kharagpur, Madras, Guwahati and Roorkee) along with the Indian Institute of Science, Bangalore in 2003. At that time five core disciplines identified were, namely, civil engineering, computer science and engineering, electrical engineering, electronics and communication engineering, and mechanical engineering to design and develop courses in web/video format. The contents for the courses were based on the model curriculum suggested by All India Council for Technical Education (AICTE) and the syllabi of major affiliating Universities in India. This project was funded by Ministry of Human Resource and Development (MHRD), Govt. of India.

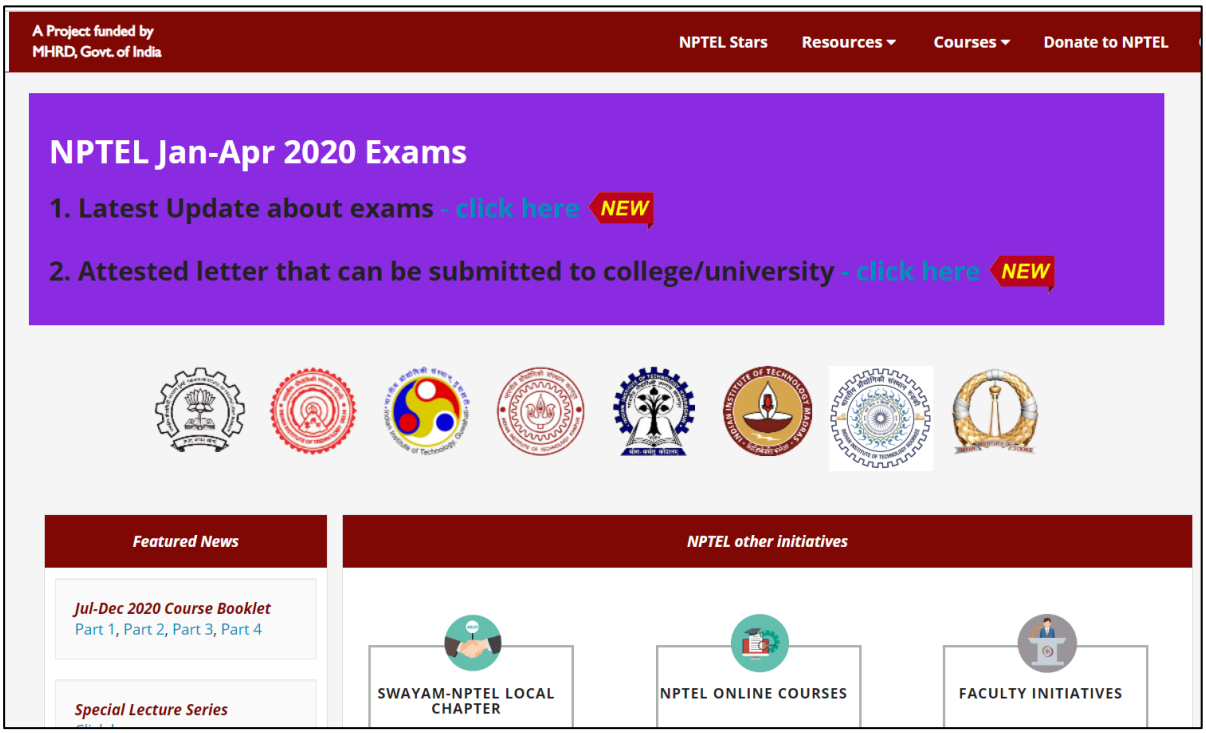


Figure 10.6 Home page of NPTEL (Source: www.nptel.ac.in)

Now, NPTEL is the largest online repository in the world of courses in engineering, basic sciences and selected humanities, and social sciences subjects. It has more than 56000 hours of video content and 52000+ hours of transcribed content for the learners. The NPTEL becomes most accessed library of peer-reviewed educational content in the world.

NPTEL began offering open online courses in March 2014 along with certificates from the IITs/IISc for those who completed the course successfully. This is the golden opportunity for all the learners those are not a part of IITs/IIMs system to do an online certification course from NPTEL and get a certificate from the IITs/IIMs. IITs and IIMs are reaching out and taking education to the homes of people through this auspicious initiative.

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Why was this initiative through the model of Open Online Courses?

Massive Open Online Courses (MOOC) is essentially an asynchronous platform and a process for teaching through pre-recorded lectures, resource video materials, lecture notes, assignments, and quizzes, which are usually online and provide self-assessment in regular intervals during learning.

Learning through scheduling of fixed time duration for completion of courses and, therefore, the simultaneous participation of teachers and a large number of students may be termed synchronous and is thus similar to a classroom, albeit on the Internet being much larger in size.

When offered with consideration for students in non-urban and rural areas through supplementary DVDs and mobile delivered content, they enable quality and equitable access to a much larger population of students and can lead to a significant rise in the Gross Enrollment Ratio.

The courses offered by NPTEL are open for anyone to access at no cost. So, anyone who is interested in learning gets access to quality content, which also includes a discussion with the content creator and access to assignments for self-testing. The contents of the courses offered

are useful for teachers training and through them, improving the quality of students. In addition, the course materials (both web and video) are freely accessible and independent of their geographic location. These courses can be used by professionals to update their academic background. Open and distance education using NPTEL contents are long term prospects for IITs. The contents will hopefully help evolve criteria for focused learning and a common set of standards for professional education in India through participation by everyone concerned under this platform. The faculty who are currently offering courses are from the IITs or from other reputed institutions.

How to search for courses on NPTEL?

To search desirous courses on NPTEL, one should click on the course menu (see figure 10.6) and then click on NPTEL courses. You will get a list of all the courses on offer. To refine your search, you can do the following-

Note- NOC stands for NPTEL Online Certification.

[1] Search by Discipline-

Sub-search categories, such as- Aerospace engineering, Agriculture, Architecture, Atmospheric Science, civil engineering, computer science and engineering, electrical engineering, electronics and communication engineering, mechanical engineering, etc.

[2] Search by Content type-

Sub-search categories, such as- Video courses and web courses. Video courses means the course content available in video format too whereas web courses mean the course content is only available in web/text format.

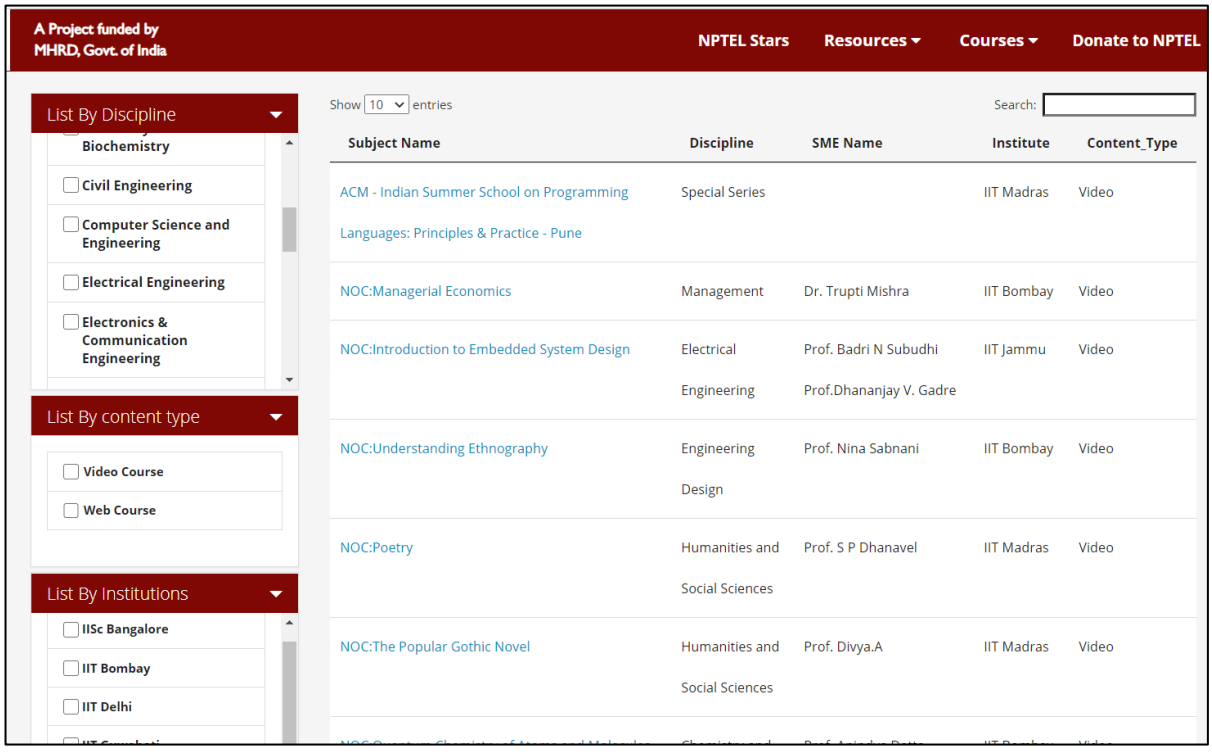


Figure 10.7 Searching courses on NPTEL (Source: www.nptel.ac.in)

[3] Search by Institution-

Sub-search categories, such as- IISc Bangalore, IIT Bombay, IIT Delhi, IIT Kanpur, IIT Kharagpur, IIT Madras, IIT Guwahati and IIT Roorkee.

Some highlights of NPTEL-

Table 10.1 Courses offered by NPTEL discipline wise

S. No.	Discipline	No. of Courses	S. No.	Discipline	No. of Courses
1	Aerospace Engineering	37	14	Humanities and Social Sciences	47
2	Atmospheric Science	4	15	Management	33
3	Basic courses (Sem 1 and 2)	38	16	Mathematics	57
4	Biotechnology	24	17	Mechanical Engineering	132
5	Chemical Engineering	71	18	Metallurgy and Material Science	31
6	Chemistry and Biochemistry	34	19	Mining Engineering	2
7	Civil Engineering	100	20	Multidisciplinary	1
8	Computer Science and Engineering	81	21	Nanotechnology	5
9	Electrical Engineering	68	22	Ocean Engineering	19
10	Electronics & Communication Engineering	74	23	Physics	38
11	Engineering Design	11	24	Special Series	6
12	Environmental Science	3	25	Textile Engineering	16
13	General	3			
Total Courses- 935					

NPTEL offers courses for science and engineering in all major disciplines as well as specialized and newly developing interdisciplinary subjects for which there is very little academic expertise in private colleges. It is one of the fundamental goals of the NPTEL project to bring in all the best teachers in the country under the umbrella of NPTEL and record their lectures/seek their collaboration with IITs/IISc and make their courses available for the community under free and open sources agreement. Anyone can download the course content free of cost either in video format or in PDF text format as well.

10.6 POINTS TO REMEMBER

- Technology-Enabled Education (TEE) refers to the use of technology (especially Information and Communication Technology, e.g., Smartboard, computers, smartphones, interactive whiteboards) in teaching-learning.

- SWAYAM is a programme initiated by the Government of India and designed to achieve the three cardinal principles of Education Policy viz., access, equity, and quality.
- The SWAYAM portal facilitates hosting of all the courses, taught in classrooms from Class 9 till post-graduation to be accessed by anyone, anywhere at any time free of cost.
- To ensure the best quality content is produced and delivered by the nine National Coordinators, e.g., AICTE, NPTEL, UGC, CEC, NCERT, NIOS, IGNOU, IIMB, and NITTTR.
- The National Programme on Technology Enhanced Learning (NPTEL) was initiated by seven Indian Institutes of Technology (Bombay, Delhi, Kanpur, Kharagpur, Madras, Guwahati, and Roorkee) along with the Indian Institute of Science, Bangalore in 2003.

10.7 GLOSSARY

- NOC- NPTEL Online Certification.
- IIT- Indian Institute of Technology.
- IIM- Indian Institute of Management.
- IISc- Indian Institute of Science.
- MOOC- Massive Open Online Courses.
- NPTEL- National Programme on Technology Enhanced Learning.
- AICTE- All India Council for Technical Education
- UGC- University Grants Commission.
- CEC- Consortium for Educational Communication.
- NCERT- National Council of Educational Research and Training.
- NIOS- National Institute of Open Schooling.
- NITTTR- National Institute of Technical Teachers Training and Research.
- MHRD- Ministry of Human Resource and Development.
- TEE- Technology Enabled Education.

  NMEICT- National Mission on Education through Information and Communication Technology.

10.8 CHECK YOUR PROGRESS

Descriptive type questions-

a) List the National coordinators of SWAYAM.

b) How can you find the courses on the SWAYAM portal?

c) How can you explore the NPTEL courses?

10.9 BIBLIOGRAPHY/ REFERENCES

- https://mhrd.gov.in/ict-initiatives
- https://nptel.ac.in/
- www.swayam.gov.in

10.10 SUGGESTED READINGS

- www.swayam.gov.in
- www.nptel.ac.in

UNIT- 11

TECHNOLOGY ENABLED LEARNING TOOLS / PLATFORMS- II

11.1 INTRODUCTION

Technology-enabled education aims to focus on increasing access to quality teaching and learning by supporting policy formulation and innovation in the application of ICT in education, and the development of ICT skills. Technology-enabled education has a transformative effect on teaching and learning. Technology-enabled education works with a range of technologies for teaching and learning, including mobile devices, online learning, and low-cost technologies such as audio and video, radio, and TV.

Technology-Enabled education initiatives-

- Use ICT and open educational resources in education helps to strengthen educational policy implementation.
- It supports the research on technology-enabled learning for evidence-based advocacy and decision-making.
- Works with government, industry, and academic institutions to develop relevant and innovative courses, teaching-learning methods, etc.
- Helps Institutions to use technology-enabled education for program delivery.
- Implements tested models at scale and develop new models for teaching and learning, using emerging technologies.

11.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Define various technology supported learning platforms.
- Explore several portals/resource platforms used for technology enhanced learning, i.e. Virtual labs, MookIT, NIELIT, Swayam Prabh, etc.

11.3 OVERVIEW OF TECHNOLOGY ENABLED LEARNING PLATEFORMS

Technology-Enhanced Learning (TEL) is concerned with using technologies to support learning whether the learning is on campus or remotely. Technologically, TEL supported by instructional films, radio, and television (Westera 2010), animated films, educational videos, etc. Currently, TEL pertains more tools where one can use computer-based technologies, including smartphones and other smart devices.

Learning can be considered as a process whereby the learner accesses concepts and ideas, assimilating these through practice and ultimately demonstrating mastery. Enhancements of learning seek to improve parts of this practice and process. With the progress of technologies, such enhancements are achieved through the facilitations of fundamental activities of learning by technology in various forms. Thus, what technology-enhanced learning ultimately offers are scalability, flexibility, and new methods of learning. Several tools/platforms are used by the learners to take the advantage of Technology-Enhanced Learning, as-

- Virtual Labs (www.vlab.co.in)
- Swayam Prabha (www.swayamprabha.gov.in)
- Spoken Tutorial (www.spoken-tutorial.org)
- Consortium for Educational Communication (www.cec.nic.in/cec)
- World Initiatives of Open Learning (www.oedb.org)
- OER Commons (www.oercommons.org)
- VIDWAN (www.vidwan.inflibnet.ac.in)
- FOSSEE (www.fossee.in)

- Quantum and Nano Computing Virtual Center (www.dei.ac.in/dei/quantumNano)
- OSCAR (www.oscar.iitb.ac.in)
- IRINS (www.irins.org/irins)
- ILearn Online Education (www.ilearn.gov.in)
- National Institute of Electronics & Information Technology (www.nielit.gov.in/content/online-classes-page)
- MOOKIT (www.mookit.in)

11.4 VIRTUAL LABS

Key objectives of the virtual labs are- (www.vlab.co.in)

- To provide remote-access to Labs in various disciplines of Science and Engineering. These Virtual Labs would cater to students at the undergraduate level, post graduate level as well as to research scholars.
- To enthuse students to conduct experiments by arousing their curiosity. This would help them in learning basic and advanced concepts through remote experimentation.
- To provide a complete Learning Management System around the Virtual Labs where the students can avail the various tools for learning, including additional web-resources, video-lectures, animated demonstrations and self-evaluation.
- To share costly equipment and resources, which are otherwise available to limited number of users due to constraints on time and geographical distances.

11.5 SWAYAM PRABHA

The SWAYAM PRABHA is a group of 34 DTH channels devoted to telecasting of high-quality educational programmes on 24X7 basis using the GSAT-15 satellite. Every day, there will be new content for at least (4) hours which would be repeated 5 more times in a day, allowing the students to choose the time of their convenience. The channels are uplinked from BISAG, Gandhinagar. The contents are provided by NPTEL, IITs, UGC, CEC, IGNOU, NCERT and NIOS. The INFLIBNET Centre maintains the web portal. (www.swayamprabha.gov.in)

11.6 SPOKEN TUTORIAL

Spoken Tutorial is a multi-award-winning educational content portal. Here one can learn various Free and Open-Source Software all by oneself. Our self-paced, multi-lingual courses ensure that anybody with a computer and a desire for learning, can learn from any place, at any time and in a language of their choice. All the content published on this website are shared under the CC BY SA license.

All courses are simple and easy to follow even for a beginner but they also meet the growing needs of the learner. All digital content ensures that learning happens at all levels - Basic,

Intermediate and Advanced. All the content mandates side-by-side practice thereby ensuring that learners are actively learning. Many of the software taught, are used in various disciplines of Engineering, pure Sciences and several other Under-Grad and Post-Grad studies, and can be extended to Commerce, Arts and Management streams as well. Alongside these, there are some courses relevant at School level, too, which help school students to visualize difficult concepts of Math and Science. These can also be used by Teachers to prepare lesson plans, explain abstract concepts and give digital assignments to students. (www.spoken-tutorial.org)

11.7 CONSORTIUM FOR EDUCATIONAL COMMUNICATION

The Consortium for Educational Communication, popularly known as CEC, is one of the Inter University Centres set up by the University Grants Commission of India. It has been established with the goal of addressing the needs of Higher Education through the powerful medium of Television along with appropriate use of emerging Information Communication Technology (ICT). Realizing the potential and power of television to act as a means of educational knowledge dissemination, UGC started the Countrywide Classroom Programmes in the year 1984. For production of such programmes, Media Centres were set up at 6 Universities. Subsequently CEC emerged in 1993 as a nodal agency to coordinate, guide & facilitate such educational production at the National level. Today 21 Media Centres work towards achieving this goal under the umbrella of CEC. (www.cec.nic.in/cec)

11.8 MISCELLANEOUS TOOLS

World Initiatives of Open Learning (www.oedb.org)

OEDb is a comprehensive online education directory for both free and for credit learning options. We offer up-to-date, detailed program information from accredited online colleges, along with a categorized list of over 8000 free online college courses from well-known universities.

OER Commons (www.oercommons.org)

The worldwide OER movement is rooted in the human right to access high-quality education. This shift in educational practice is not just about cost savings and easy access to openly licensed content; it’s about participation and co-creation. Open Educational Resources (OER) offer opportunities for systemic change in teaching and learning content through engaging educators in new participatory processes and effective technologies for engaging educators in new participatory processes and effective technologies for engaging with learning.

VIDWAN (www.vidwan.inflibnet.ac.in)

VIDWAN is the premier database of profiles of scientists / researchers and other faculty members working at leading academic institutions and other R & D organization involved in teaching and research in India. It provides important information about expert's background,

contact address, experience, scholarly publications, skills and accomplishments, researcher identity, etc. The database developed and maintained by Information and Library Network Centre (INFLIBNET) with financial support from the National Mission on Education through ICT (NME-ICT). The database would be instrumental in selection of panels of experts for various committees, taskforce, established by the Ministries / Govt. establishments for monitoring and evaluation purposes.

FOSSEE (www.fossee.in)

FOSSEE (Free/Libre and Open-Source Software for Education) project promotes the use of FLOSS tools to improve the quality of education in our country. We aim to reduce dependency on proprietary software in educational institutions. We encourage the use of FLOSS tools through various activities to ensure commercial software is replaced by equivalent FLOSS tools. We also develop new FLOSS tools and upgrade existing tools to meet requirements in academia and research. The FOSSEE project is part of the National Mission on Education through Information and Communication Technology (ICT), Ministry of Education (MoE), Government of India.

Quantum and Nano Computing Virtual Center (www.dei.ac.in/dei/quantumNano)

The Quantum-Nano Centre is a multidisciplinary centre at Dayalbagh Educational Institute, Agra set up under MHRD National Mission on Education through ICT, with partners as IIT Kanpur, IIT Delhi and IIT Madras, besides several international collaborators. With a focus on the rapidly growing area of quantum-nano computing and quantum information sciences, the Quantum-Nano Centre provides an environment for scientists and mathematicians to explore the fundamental physical characteristics of quantum systems, to devise and implement prototype quantum computers, and to develop quantum algorithms and novel applications. Through a vigorous program of lectures, seminars, and workshops, the Centre stimulates intellectual exchange among students, faculty, and academic partners. The mission of Quantum and Nano Computing Virtual Center is to aggressively explore and advance the application of quantum-nano systems to a vast array of relevant information processing techniques. We will accomplish this by creating a truly unique environment that fosters cutting-edge research and collaboration between researchers in the areas of computer science, engineering, mathematical, chemical and physical sciences.

OSCAR (www.oscar.iitb.ac.in)

The main goal of Project OSCAR (Open-Source Courseware Animations Repository) is to build a large repository of web-based, interactive animations and simulations, referred to as learning objects (LOs), for teaching and learning concepts in science and technology. These could be useful not only for a classroom environment but also for enabling independent learning and distance education. The current goal is to develop LOs for topics in various subjects at the Undergraduate and Postgraduate levels. A learning object is a digital resource

that contains an objective, a learning activity and an assessment. Examples of learning objects are educational animations, simulations, and webpages for e-learning that contain text, images and media.

IRINS (www.irins.org/irins)

IRINS is web-based Research Information Management (RIM) service developed by the Information and Library Network (INFLIBNET) Centre. The portal facilitates the academic, R&D organizations and faculty members, scientists to collect, curate and showcase the scholarly communication activities and provide an opportunity to create the scholarly network. The IRINS is available as free software-as-service to the academic and R&D organizations in India. The IRINS would support to integrate the existing research management system such as HR system, course management, grant management system, institutional repository, open and commercial citation databases, scholarly publishers, etc. It has integrated with academic identity such as ORCID ID, ScopusID, Research ID, Microsoft Academic ID, Google Scholar ID for ingesting the scholarly publication from various sources.

ILearn Online Education (www.ilearn.gov.in)

The initiatives of Government of India, under the Third India-Africa Summit announced as the e-VidyaBharti network project which offers certificate, diploma, undergraduate, and postgraduate degree courses. The students and professionals in Africa can pursue courses offered by premier Indian institutions in emerging areas. The reputed public and private universities can offer short-term, undergraduate and postgraduate courses on the iLearn portal. Such online courses are offered as a four-quadrant approach: e-Tutorial, e-Content, discussion forums, and assessments.

Only learners who are nationals of countries in Africa participating in the e-VBAB (e-Vidyabharati and e-Aarogyabharati) Network Project residing in those countries are eligible to register for Programmes/ Courses on the iLearn Portal

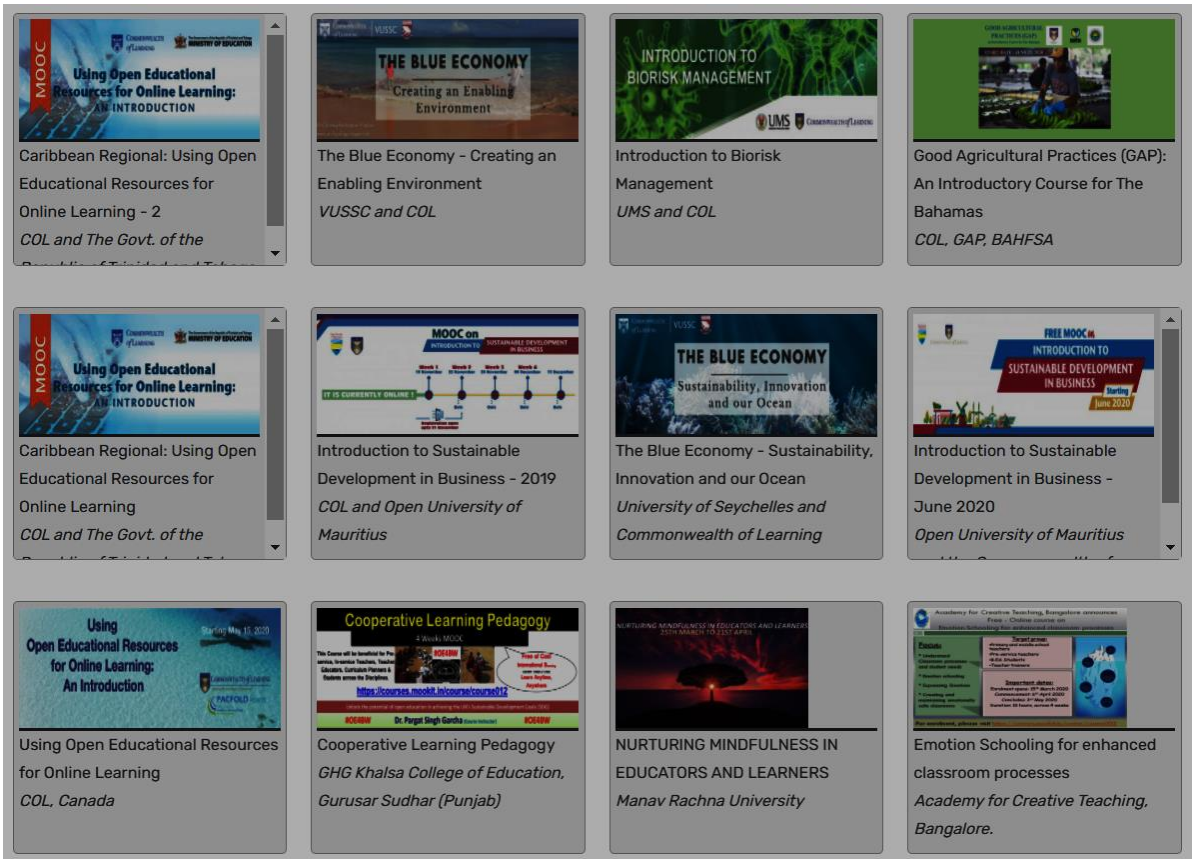
National Institute of Electronics & Information Technology
(www.nielit.gov.in/content/online-classes-page)

National Institute of Electronics & Information Technology (NIELIT), is an autonomous scientific society under the Ministry of Electronics & Information Technology (MoE&IT), Government of India. NIELIT is engaged both in Formal and Non-Formal education in the area of Information, Electronics and Communications Technology (IECT). Currently, NIELIT has forty-three (43) centers across India. Several online courses are offered by the NIELIT.

MOOKIT (www.mookit.in)

In today's knowledge society, MOOC is a buzzword; the first requirement to deliver a MOOC effectively is a powerful platform. MooKIT is an open-source and lightweight MOOC Management software designed and developed at IIT Kanpur. MooKIT is a system that

instructors, learners, and system administrators find easy to work. Currently, more than 60 MOOCs are offered by this unique platform.



Glimpse of courses on MookIT Platform

11.9 POINTS TO REMEMBER

- Technology-enabled education aims to focus on increasing access to quality teaching and learning by supporting policy formulation and innovation in the application of ICT in education, and the development of ICT skills.
- Technology-enhanced learning (TEL) is concerned with using technologies to support learning whether the learning is local (i.e., on campus) or remote (at home or in the workplace).

11.10 GLOSSARY

- NIELIT- National Institute of Electronics & Information Technology.
- INFLIBNET- Information and Library Network.
- OSCAR- Open-Source Courseware Animations Repository.
- IRINS- Indian Research Information Network System.
- FOSSEE- Free/Libre and Open-Source Software for Education.
- CEC- Consortium for Educational Communication.

11.11 CHECK YOUR PROGRESS

Descriptive Type Questions-

a) What are the benefits of Technology Enabled Education?

b) List the tools used for technology enhanced learning.

c) Shortly define the use of Virtual Labs for the learners.

d) What is the use of ILearn protal? Define.

Objective Type Questions-

a) The main goal of Project OSCAR (Open-Source Courseware Animations Repository) is to build a large repository of web-based, interactive animations and simulations, referred to as learning objects (LOs), for teaching only. (True/False)

b) IRINS is web-based Research Information Management (RIM) service developed by the Information and Library Network (INFLIBNET) Centre. (True/False)

c) FOSSEE (Free/Libre and Open-Source Software for Education) project promotes the use of FLOSS tools to improve the quality of education in our country. (True/False)

d) VIDWAN is the premier database of profiles of scientists / researchers and other faculty members working at leading academic institutions and other R & D organization involved in teaching and research in India. (True/False)

Answers (Objective Type Question)

[a] False [b] True [c] True [d] True

11.12 BIBLIOGRAPHY/ REFERENCES

- Alruwais N, Wills G, Wald M (2018) Advantages and challenges of using e-assessment. Int J InfEduc Technol 8(1)
- Balacheff, N., Ludvigsen, S., Jong, T. de, Lazonder, A., & Barnes, S. (Eds). (2009). Technology-enhanced learning: Principles and products. Heidelberg: Springer.
- Baran, E., Correia, A.-P., & Thompson, A. (2011). Transforming online teaching practice: Critical analysis of the literature on the roles and competencies of online teachers.
- Bates, T. (2012). What's right and what's wrong about Coursera-style MOOCs? Retrieved from http://www.tonybates.ca/2012/08/05/whats-right-and-whats-wrong-about-courserastyle-mooc
- Becker, R., & Jokivirta, L. (2007, Spring). Online learning in universities: Selected data from the 2006 Observatory Survey. Retrieved from http://www.obhe.ac.uk/documents/view_details?id=15

- Jones, C., Ramanau, R., Cross, S., & Healing, G. (2010). Net generation or digital natives: Is there a distinct new generation entering university? Computers & Education, 54, 722–732.
- https://www.col.org/programmes/technology-enabled-learning
- https://link.springer.com/referenceworkentry/10.1007%2F978-3-319-60013-0_72-1
- https://www.e-yantra.org/
- https://vidwan.inflibnet.ac.in/
- https://en.wikipedia.org/

11.13 SUGGESTED READINGS

- National Institute of Electronics & Information Technology, www.nielit.gov.in/content/online-classes-page
- MOOKIT, www.mookit.in
- ILearn Online Education, www.ilearn.gov.in
- IRINS, www.irins.org/irins
- OSCAR, www.oscar.iitb.ac.in
- Quantum and Nano Computing Virtual Center, www.dei.ac.in/dei/quantumNano
- FOSSEE, www.fossee.in
- VIDWAN, www.vidwan.inflibnet.ac.in
- World Initiatives of Open Learning, www.oedb.org
- OER Commons, www.oercommons.org

UNIT- 12

INTRODUCTION TO SOCIAL NETWORKING TOOLS

12.1 INTRODUCTION

Social networking refers to the gathering of a group of people and organizations together to a certain extent to share thoughts, interests, and activities. Social networking is a web-based way of communication, allowing users to chat, share information, and create content. There are many social media sites such as blogs, social networking sites, instant messaging, photo sharing sites, video sharing sites, and more. A large number of people around the world use social networking sites to share and make connections on a personal level.

There are many web-based communication services available such as Facebook, Twitter, LinkedIn, Google+, etc. They provide easy-to-use interface and interaction with people from overseas. There are also mobile social networking services for apps such as WhatsApp, hike, line, etc.

12.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Know about Social Networking.
- Know about Pros & Cons of Social Networking.

- Know an overview of various Social Networking Tools.

12.3 WHY SOCIAL NETWORKING IMPORTANT?

Social networking keeps people in touch easily, and reconnects with people they may have known but have lost contact with. These sites also make it easy to connect with people who share your interests, even if you are not physically located next to each other. You can also use these sites to plan events quickly and easily in a very short time.

Social networking is becoming increasingly important in education, organization, marketing, business, and more. As more and more people in these networks, businesses find they provide a very powerful marketing team that can disseminate news about their products or word of mouth promotion, at no extra cost.

Some of other benefits of Social Networking are-

- It's free to use.
- Simple setup for starting.
- Speed up the broadcast of information.
- Improves organizational communication.
- Increase participation in organizational processes.
- It influences how people communicate in organizations.
- Supports open discussions between peoples & Groups.
- Social networking is becoming increasingly important in the field of Education.
- Teachers often take advantage of a student's social media skills to create class blogs, discussion forums, videos, and more.
- It Enables Customer Feedback.

12.4 PROS & CONS OF SOCIAL NETWORKING TOOLS

With latest social networking tools for connecting and sharing information, such platforms are used for many different purposes. Most people still use social media for "social" purpose, while many use it for business purpose. Government, security agencies, researchers, etc. also use social media for legitimate purposes. Although users usage and behavior on different social media sites may vary, there are general advantages and disadvantages of all social media sites or social media platforms.

Advantages (Pros) of Social Networking Tools

- Social media carry and pass information faster than any other media.
- Law enforcement agencies use social media to arrest and prosecute criminals.
- Social networks help students do better in school.

- Social media allows people to improve their relationships and make new friends.
- Social media helps develop women's businesses.
- Networking helps employers find workers and job seekers find work.
- Being a part of social networking sites can increase one's health and reduce your risk of health problems.
- Social media facilitates face-to-face interaction.
- Social media is increasing voter participation.
- Social media facilitates political change.
- Social media is good for the economy.
- Social media sites empower people to make social change and do good in society at the community level.
- Social media helps senior citizens feel connected to the community.
- Social media helps people who are socially isolated or shy to communicate with other people.
- Social media allows for quick, easy dissemination of public health and safety information from popular sources.
- Social media can help break down social pornography.
- Crowdsourcing and refunds on social media allow people to collaborate to achieve a goal.
- Social media provides case studies to a broader audience, allowing more people access to educational resources previously unavailable.
- Organizations and small businesses use social media to benefit themselves and consumers.
- Social media provides teachers with a platform for interacting with other teachers and connecting with students outside the classroom.
- Social media provides a way for artists and musicians to build viewers even if they don't have a company contract.
- Colleges and universities use social media to recruit and retain students.
- Social media allows for instant communication during catastrophic events.

Disadvantages (Cons) of Social Networking Tools

- Social networking exposes us to a lot of information.

- There are privacy issues to consider with social networks.
- Cyber-bullying and peer pressure are significant issues.
- Some people substitute online interactions for their offline relationships.
- Social networking can become a severe distraction for some people.
- It can disrupt your sleep cycle.
- Using social networking, all of the time, can lead to a sedentary lifestyle.
- Social networking can spread false or unreliable information quickly.
- Students who use social networking too often have lower grades.
- Social media creates more time-wasting opportunities throughout the day.
- Use of social networking is correlated with brain and personality disorders.
- It can be more difficult to find a job with your social media presence.

12.5 BRIEF OVERVIEW OF SOCIAL NETWORKING TOOLS

Here we will discuss some of the world's most popular social networking sites. You can find out if your favorite social media platform is part of this list and even learn about some of the best social platforms you can start using today.

[1] Facebook

Headquarters: Menlo Park, CA

Founded: 2004

Active Monthly Users: 2.45 billion

This is the best social networking site in the world and one of the most used. Also, Facebook was probably the first to surpass the billionth mark of history.

In addition to the ability to network with friends and relatives, you can also access various Facebook resources to sell them online. You can sell or promote your business, brand, and products through paid Facebook ads.

Some of the leading industries on Facebook include financial services, e-commerce, sales, gaming, entertainment, media, telecom, technology, consumer goods, and automotive businesses. Consider joining (or creating) groups, using a Facebook Messenger Chabot, or using a live video to boost your marriage.

[2] Twitter

Headquarters: San Francisco, CA

Founded: 2006

Active Monthly Users: 330 million

This social network enables you to send short messages (called tweets), containing a limited number of characters (up to 280), to send your message to the world. With the growing online shopping experience, Twitter enables us to promote your businesses and shop directly with tweets. If your business is related to entertainment, sports, politics, or advertising, you can stand to gain a lot on Twitter.

On Twitter, brands have the opportunity to be creative and make their voice - there is an intellectual and personal space that is educational and helpful. Skip threads, assign value, share your content with others, and join my private conversation.

[3] LinkedIn

Headquarters: Mountain View, CA

Founded: 2003

Active Monthly Users: 310 million

LinkedIn is one of the most popular social networking sites or apps available in over 20 languages. It is used worldwide by all types of professionals and serves as an ideal platform for networking with various businesses, finding and hiring candidates, and more.

If you are looking for decision-makers who have the power to hire your company, your brand, or partner with you, LinkedIn is the place to be. Did you know that 44% of LinkedIn users have a national income? Or that more than 50% of Americans with a college degree use LinkedIn?

It may not be the most widely disseminated social network still, it has unlimited potential to connect with a team of qualified people who can make a difference.

[4] Instagram

Headquarters: Menlo Park, CA

Launched: 2010

Active users: 1 billion

Instagram was launched as a unique social media platform that was based entirely on sharing photos and videos. This social photo-sharing app allows you to capture the best moments of your life, with your phone camera or any other camera, and convert yourself to works of art.

This is possible because Instagram allows you to apply multiple filters to your photos, and you can easily post them to other popular social media sites, such as Facebook and Twitter. It is now a part of Facebook.

[5] WhatsApp

Headquarters: Menlo Park, CA

Founded: 2009

Active Monthly Users: 1.5 billion

Although acquired by Facebook in 2014, this instant messaging platform exists as a private enterprise. It came to a very long place before Facebook. Still, it managed to capture the imagination of millions of people worldwide by empowering them to communicate and instantly share with people and groups.

[6] Snapchat

Headquarters: Los Angeles, CA

Founded: 2011

Active Monthly Users: 360 million

This is a messaging forum that lets you chat with friends through photos. It enables you to browse news and check out live news from around the world. If your target value is small, you definitely want to get into Snapchat.

The most active users of Snapchat are 13 years old, and spend 30 minutes a day on the app. Snapchat is a platform for user-generated content, behind-the-scenes videos, special offers, and influencer engagement.

[7] Pinterest

Headquarters: San Francisco, CA

Founded: 2010

Active Monthly Users: 322 million

This is a photo-sharing and bookmark view of a social site or application that lets you get new ideas for your projects and save them. You can do DIY tasks or home improvement projects, plan your travel agenda, and more by using Pinterest.

Pinterest's most popular content includes fashion, food, decoration, wedding, use, and DIY related pins.

[8] Reddit

Headquarters: San Francisco, CA

Founded: 2005

Active Monthly Users: 430 million

This social media platform enables you to submit content and vote on content later. Voting determines whether the content moves up or down, ultimately edited based on areas of interest (known as redistribution).

Reddit introduces itself as "the front page of the internet." According to Alexa rankings, Reddit is one of the top 20 most visited sites. Reddit has a unique combination of content and community, with over 150,000 communities dedicated to every topic imaginable.

[9] Skype

Headquarters: Palo Alto, California, United States

Founded: 2003

Active Monthly Users: 300 million

Skype is owned by Microsoft and is one of the most widely used social media platforms. It allows you to connect with people by voice calls, video calls (using the webcam), and text messages. You can also continue the conference call. The best part is that Skype-to-Skype calls are free and can be used to communicate with anyone, available in any part of the world, on Internet.

12.6 FUTURE OF SOCIAL NETWORKING

Social media is continuously evolving, and it's exciting to think about what it will be like in a few years. The social media monitoring world will have to keep up with social media users' demands as brands continue to revise their strategies after new trends emerge. So, what does the future of social media look like from a consumer, brand, and social media monitoring perspective? Let's take a look at a number of trends we can see soon next year.

[1] More Privacy and Security-

In the current social media, it is more important than ever, for brands to find and implement practices that build consumer confidence. It begins with how they connect with the audience. Privacy concerns are growing as social media users gain more insight into how they use their data. Thus, the future of social media sees the rise of so-called "dark social" users. This includes any online social interaction that takes place privately, for example, messaging apps, email, and other outlets for private sharing. 84% of users outbound sharing from websites now occurs through private and dark social channels, and we expect this to increase over the next few years.

[2] More Video-

It's no secret that video usage through social media is on the rise. It is estimated that people watch five times more videos than static content such as text and images on both Facebook and Instagram. For this reason, we expect to see more videos on social media in the future, including live videos, which have gained great popularity in recent years.

[3] Less personal content, but more memes-

Facebook said it posted a 21% decrease in original and personal updates, as users now communicate only on shared articles and memes. Social media users, in general, tend to share less personal information on major networks and prefer to display external content, such as exciting video or funny memes to their friends.

[4] Premium Services and Fewer Ads-

Ads have long been a plague of social media, and social media users are starting to get frustrated. However, many are willing to sacrifice unintended experiences for free, ad-saturated ones as social media users prefer high-quality images, videos, and audio, premium services are on the rise. They have become accustomed to in recent years, but only time will tell if they are willing to spend the money for it.

[5] Mobile-centric experiences-

The future of social media is mobile. It is estimated that 3 billion people will have access to mobile phones by 2020. Additionally, more and more people are using their smartphones as their primary source of access to social platforms. Therefore, future platforms will be designed with a focus on smartphones from scratch.

[6] Less Typing-

According to research, at least 50% of online searches will be done by image and voice by 2020. With the growing popularity of voice and image search and audio snippet messaging, social media typing activity is becoming increasingly obsolete in the future.

[7] More Visuals-

With the rise of social media platforms such as Instagram and Snapchat, we have seen a considerable increase in visual-based content. With camera access now easier than it was a few years ago, with virtually every phone having a built-in camera, photos and videos continue to saturate social media

[8] A.R. and V.R. The effect has just begun-

Over the next two years, the marketing world will introduce more and more practical applications of Virtual Reality (V.R.) and Augmented Reality (A.R.). The same applies to social media platforms. Technology is one of the fastest-growing industries today, and A.R. and V.R. not an exception.

12.7 POINTS TO REMEMBER

- Social networking keeps people in touch easily, and reconnects with people they may have known but have lost contact with.

- There are several web-based communication services, such as Facebook, Twitter, LinkedIn, Google+, etc. They provide easy-to-use interface and interaction with people from overseas.
- Social networking is becoming increasingly crucial in Education, organization, marketing, business, and more.
- Although the usage and behaviour of users on different social media sites may vary, there are general advantages and disadvantages of all social media sites or social media platforms.
- 84% of users outbound sharing from websites now occurs through private and dark social channels, and we expect this increase over the next few years.
- The future of social media is mobile. It is estimated that 3 billion people will have access to mobile phones by 2020.
- According to research, at least 50% of online searches will be done by image and voice by 2020.

12.8 GLOSSARY

- Bitmoji– a mobile application that allows you to create your own personalized cartoon avatar, which can be used on various social networks or messaging services such as Snapchat.
- Boosted posts – without paid advertising, only 0.02% of jobs are seen. This means that Facebook content from brands is often 'boosted' to increase its visibility.
- Chat– live/real-time text-based communication between two or more people using a service available on the Internet.
- Connections– are people you connect with on LinkedIn. Connections are similar to Facebook friends but are more likely to be made with people you have worked with, or would like to do business with, rather than friends or family members.
- Dark posts– were once an invisible advertising tactic that brands used to target a specific set of people. Facebook announced that it plans to disclose what groups and companies paid for ads on its platform, with ads running on Facebook being readily viewable by everyone.
- D.M. (direct message)– a private message between social media users.
- Facebook Live– Live lets people, public figures, and pages share live video with their followers and friends on Facebook.

- Flickr– an image and video hosting website and web services suite. Calls itself the "best online photo management and sharing application in the world."
- Geotag– a tag that indicates the geographical location of a photo/video published on a social network.
- Handle– on Twitter, a handle is a name you choose to represent yourself. It starts with "@"
- Hashtag– a single word or phrase preceded by the # symbol to define messages relating to a particular topic.
- Live Stories– are a curated stream of user-submitted Snaps (via Snapchat) from various locations and events.
- Banner Ad– a popular type of digital image ad that can be placed across various websites.
- Blog– short for "weblog", a blog is a web page or a website that is regularly updated with new written content. Blogs are an important section of a website in digital marketing. They offer fresh new content on a regular basis, which can help attract new visitors, engage existing visitors, and give authority signals to Google.
- Bot– an automated program that visits websites, sometimes also referred to as a "crawler" or a "spider." Search Engines like Google uses bots to crawl websites so that they can be ranked and added to search indexes.
- Campaign– a series of advertising messages that share a theme, and market a product or service.

12.9 CHECK YOUR PROGRESS

Descriptive type questions-

a) What is Social Networking?

b) Name and Explain any two tools of Social Networking.

c) Why is LinkedIn used? Explain in your own words.

d) Why privacy is an issue in Social Networking? Explain.

e) What are memes? Give an example to support your answer.

f) How is Facebook important to our business?

g) What is meant by Chat-Bot?

h) How can we make a Social Media optimized website?

i) How to become good Social Media Marketing?

j) What are the pros & cons of Social Networking?

Objective type Questions-

a) Which of the following is a video site?

[A] Facebook [B] Daily Motion

[C] EventBrite [D] None of These

b) Who founded Facebook?

[A] Mark Zukerberg [B] Bill Gates

[C] Steven Chen [D] Matt Mullenweg

c) Where is the headquarter of WhatsApp Located?

[A] Menlo Park, CA [B] Los Angeles, USA

[C] San Francisco [D] Palo Alto, California, United States

d) In which Year LinkedIn Came into existence

[A] Year 2000 [B] Year 2005

[C] Year 2003 [D] Year 2004

e) Full-Form of A.R. is-

[A] Augmented Reality [B] Audio Reality

[C] Audio – Radio [D] Augmented Radio

Answers (objective type Question)-

[A] Daily Motion [B] Mark Zukerberg [C] Menlo Park, CA

[D] Year 2003 [E] Augmented Reality

12.10 BIBLIOGRAPHY/ REFERENCES

- https://blog.logograb.com/social-media-future/
- https://konnectinsights.com/
- https://blog.hootsuite.com/books-social-media-manager-read/
- https://www.martechadvisor.com/articles/social-media-marketing-2/top-social-media-marketing-books/
- Inbound Marketing: Get Found Using Google, Social Media, and Blogs (The New Rules of Social Media) , by Brian Halligan, Dharmesh Shah
- eMarketing Strategies for the Complex Sale , by Ardath Albee

12.11 SUGGESTED READINGS

- The New Rules of Marketing and PR: How to Use News Releases, Blogs, Podcasting, Viral Marketing and Online Media to Reach Buyers Directly 1st Edition, by David Meerman Scott
- The Zen of Social Media Marketing: An Easier Way to Build Credibility, Generate Buzz, and Increase Revenue, by Shama Kabani (Author), Chris Brogan (Foreword)
- Socialnomics: How social media transforms the way we live and do business, by Erik Qualman

UNIT- 13

SMART DEVICES AND TECHNOLOGY ENABLED LEARNING

13.1 INTRODUCTION

As the name suggests, a smart device is an electronic gadget that can connect, share, and interact with its user and other smart devices. Though small in size, smart devices are generally capable of calculating a few gigabytes.

Smart Devices are electronic gadgets that understand simple instructions sent by users and assists in daily activities. Some of the most used devices are smartphones, tablets, smartwatches, smart glasses, and other electronic devices. While most smart devices are small, personalized portable electronics, they are actually defined by their ability to connect to the network and interact remotely. Most T.V. sets and refrigerators are also considered smart devices.

13.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Know about Smart Devices.

- Know about Pros & Cons of Smart Devices.
- Know the overview of the advanced concept of Smart Devices.

13.3 ROLE OF SMART DEVICES

Smart devices for all day-to-day things are made with computing technology's power and connected to the Internet. A smart device is an electronic device that can connect, share, and interact with its user and other smart devices. A smart device can operate independently to some extent.

In ever-evolving development, the use of emerging technologies is increasing daily - from smartphones and personal devices to smart homes, smart cars, and smart cities - becoming a part of many consumers' everyday lives. These technologies are changing the way we live, work, and interact.

The need for smart devices in our daily lives-

In the chaotic and overcrowded state of modern life, many important issues have been left unresolved. It is very difficult to manage healthily with busy schedules. It is essential to have a plan and to plan things to make our lives better.

Smart devices are one of the most important devices that can manage an individual process. They keep track of various activities, such as meeting reminders, store data, files, and much more.

Benefits of Smart Devices in our daily life

In everyday life, due to a busy time, we need helpers, but smart assistants/devices can help us in many ways with simple instructions. Smart Devices are useful at -

- **Security-** With the introduction of smart home technology and home automation security products, you can control home operations anywhere in the world. Safe devices such as a smart camera, Sensors make life safer.
- **Availability**- Smart devices allow users to access a wide variety of information with a simple touch. Users can access the computer, T.V., and other smart home devices with one touch of the pocket screen from anywhere in the world.
- **Easy to use-** Smart devices are very easy to use, and even novices can use Smart devices for less information.
- **Comfort-** Smart devices play an important role in making life more comfortable. The user can use the voice command to perform household chores without needing to go there, such as turning off / turning off the lights and other electrical components with the voice command.

- **Health Alerts-** Health is another important part of our health that needs to be monitored regularly, but due to lack of time, we cannot visit doctors regularly and neglect our health. With the help of smart health devices, we can gain awareness of our health in a busy schedule and tell us how much time to visit a doctor. Smart devices can track our movements inside or outside the body, such as heartbeat, walking steps, and calorie counting, etc.
- **Fun-** Users can enjoy Smart devices in many ways such as playing your favourite music, streaming their favourite video on smart T.V., etc.
- **Smart homes-** Smart homes include many devices or not to mention smart devices that provide user comfort, convenience, and usability. These devices include smart speakers, smart lights, smart cameras, smart plugs, smart thermostats, smart spaces, smart locks, and more.

13.4 TYPES OF SMART DEVICES

There are various types of smart devices available in the day-to-day. We will discuss some of the highly available devices here-

[1] Smart Lighting Solutions

You may not notice it, but good technology has integrated almost every aspect of home life, including lighting. If you are able to control the lights in your home from anywhere in the world, organize them, and automatically turn on them as you arrive, why not come back?

We explored some of the best home lighting solutions and came across a list of the most innovative, efficient, and useful products for our students. You want to read your listing to get familiar with how your home will be illuminated in the future.

[2] Smart Entertainment Home Devices

With wireless technology, smartphones, and the Internet of Things are becoming part of everyday lives, our own homes are turning into portable computer spaces. This includes, of course, your entertainment devices. We wanted to sort out what's available based on smart home entertainment devices, listing some of the best, most easy-to-use apps out there.

When it comes to smart home automation, your entertainment devices are probably the first obvious step to take. Your existing electronic equipment may be ready for communication if purchased recently. Whether you're looking for a central hub to control them all, a smart way to connect to your phone or tablet, or home automation, this list is the place to be.

[3] Smart Home Test Cameras

When you think of the best technology that improves health at home, cameras may not be your first idea. We're here to open your mind for the convenience and security possible of smart

home camera solutions. So, let's get out a big idea right away: home technology has been proven to improve almost every aspect of your home's operation. However, when it comes to security, good technology brings it to many homes where it was never thought of before.

[4] Smart Doors

When your security comes with the technology in your home, everyone wins. Yes, everyone but thieves succeed. We enjoyed covering many new examples of home technology that provides convenience, security, communication, and peace of mind to homeowners, but none felt as important and life-changing as these new clean keys.

[5] Smart Remote Controls

These devices are a real part of the smart home ecosystem. With a suite of smart home devices and interior features installed in your home, the final step is to work. This is where remote control comes in.

Anyone who had to deal with a complicated home entertainment system knows that a good remote control equals its weight in gold. The same thing happens with good home technology, even more.

[6] Amazon Echo Voice Controller

Amazon Echo Voice Control is a popular and reliable smart tool. It is capable of running songs, making calls, setting timers and alarms, asking questions, providing information, checking the weather, managing shopping lists and shopping lists, managing real estate, and many other things.

[7] Amazon Dash Button

The Amazon Dash Button is basically a tool that is connected to the Internet's portal and ensures that the user does not dispose of essential household items such as soft drinks, food items, medical and personal care, children, and any recreational animal items.

[8] Smoke Alarm

Smoke Alarm is a handy smart tool. It is a smoke alarm that communicates and warns your mobile phone about any unwanted emergencies in your home. It tests itself.

13.5 ADVANCED CONCEPTS

Smart devices are ‘things' that are connected to other 'things' through the internet. Together, they make up the Internet of Things (or IoT for short). Smart devices share and store information (data) using cloud technology. You can control your smart devices using apps on your tablet or cell phone (which are also smart devices). Sensors used in IoT, Cloud, Big data & A.I. are some advanced technologies that make devices smart. Let's see these technologies one-by-one.

What are the sensors?

A sensor measures the physical value and converts it into a signal. Sensors translate measurements from the real world into digital domain data. There are endless variations of parameters that can be measured, such as residence, transport, mobility, sound frequency, temperature, pressure, humidity, energy level, camera images, colour, chemical composition, etc.

The goal is to detect events or changes in the environment. Advanced chip technology enables us to integrate all the required functions at low cost, with low volume and low power consumption. Estimates vary, but many expect that by 2020 more than 50 billion sensors will be connected to each other through the Internet of Things (IoT).

IoT (Internet of Things)

IoT can be defined as the expansion of the Internet and other network connections to various sensors and devices - or "objects" - to provide simple things, such as headlights, keys, and vents, high computing power, and analytics.

Collaboration is one of the key aspects of IoT, contributing to its growing popularity. Connected devices or "wise" - as "things" in the IoT are often referred to - capable of collecting and sharing information from their other devices and networks. Through data analysis and analysis, devices can perform their tasks with little or no human interaction.

Sensors in (IoT

Devices including the Internet of Things (IoT), are equipped with sensors. With these sensors, devices collect data about their use and the environment. The information collected can be as simple as temperature or as complex as a full video feed. They also consider the sensory data in terms of location, sound or humidity, and the different dimensions of our machines or bodies. These devices have a built-in (wireless) connection connected to the Internet and exchange information. Billions of connected devices are part of the IoT. A major disadvantage of IoT is that all connected devices produce a large amount of data (Big Data).

Big Data from IoT sensors

IoT is growing dramatically: there are more and more devices that are collecting, storing, and exchanging data. In addition, consumers, organizations, governments, and companies themselves generate additional data, for example, on social media. The amount of data is growing exponentially. People talk about Big Data when working with one or more large databases that can be stored with standard data management systems.

You mostly hear that Big Data describes development. It has two features: First is computer technology: increasing software and software that enables us to collect process and store many data. The second part is a statistic that allows us to get an explanation of different data sets.

Big data, in this definition, refers to the opportunity to analyze and use a growing amount of data.

The relationship between IoT and the cloud

IoT produces an unprecedented amount of Big Data, which is very expensive for Internet infrastructure. On average, by 2020, there will be 5,200 gigabytes of data for the entire world's population. To support the billions of paired devices expected at that time, we will have to deploy 340 application servers per day (or 120,000 servers per year). Cloud computing provides a way to meet these hacking needs.

Cloud computing availability of hardware, software, and data is possible through the network you request. When you work on the Cloud, you store and receive hardware, software, and data in a different environment than yours. Because this repository is invisible and visible, the name Cloud is used. It's all stored on a server you don't know. Cloud represents a network that connects to all the computers connected to it that form a cloud, where the end-user does not know where the software is running, and where those computers are located. The user has his / her disability, a highly visible infrastructure. Except for measurement opportunities, an online service is not related to cloud computing.

The future with IoT and A.I.

Big data analysis consists of a series of advanced technologies designed to work with large volumes of high-quality data. To realize the full benefits of IoT data, we need to improve the speed and accuracy of Big Data analysis. This includes using advanced quantitative techniques such as Artificial Intelligence (A.I.), including machine learning, data analysis, communication, and patterns. In order to identify potential problems, information must be analyzed according to what is normal and what is wrong. Contracts, communications, and deviations must be identified immediately based on real-time data streams. In case of IoT, A.I. can help bring down billions of data points to what makes sense. It is not possible to analyze and understand all Big Data in traditional ways. It takes a lot of time.

It is generally accepted that IoT and A.I. are very important in each other's future. A.I. will make IoT successful at scale, and with IoT, the lives of many people will be influenced daily by A.I. The power of highly regulated services is endless and will drastically change the way people live.

Smart devices - IoT, Big Data and A.I., are inseparable.

In short, IoT incorporates sensors installed on all types of devices and transmits data streaming through Internet connectivity to one or more locations (central) that data can be updated. These results are used to improve user’s life. All IoT devices follow these five necessary steps: measure, send, store, analyze, and operate. What makes an IoT app worth buying is (or doing)

the last step of that tablet, "doing." Taking action can mean an infinite number of things, from physical action to detail. No matter what the look may look like, its value depends entirely on "critique." And A.I. (or rather machine learning) plays an essential role in this analysis. For machine learning, patterns can be seen in the data. When machine learning is used in the "update" step, this can drastically change what is done (or cannot be done) to the next "capture" action.

13.6 POINTS TO REMEMBER

- A smart device is a small electronic gadget that can connect, share, and interact with its user and other smart devices.
- Smart devices can keep track of various activities, such as meeting reminders, store data, files, and much more.
- Smart devices share and store information (data) using cloud technology.
- Smart homes include many devices or not to mention smart devices that provide user comfort, convenience, and usability
- Sensors translate measurements from the real world into digital domain data.
- The devices, including the Internet of Things (IoT), are equipped with sensors. With these sensors, devices collect data about their use and the environment.

13.7 GLOSSARY

- 3-Way Lighting Switches - A lighting system that consists of three terminals so that the circuit can be controlled by two different switches.
- Actuator - A mechanical or electrical device for moving or controlling something.
- Alexa Voice Service (AVS) - Alexa is Amazon’s suite of services built around its voice-controlled artificial intelligence assistant for the home and other environments.
- Amazon Echo - (shortened and referred to as Echo) is a brand of smart speakers developed by Amazon.com.
- Assistive Technology (AT) - Any device that helps a person with a disability achieve a more independent and productive life.
- Bluetooth - A wireless Protocol (defined way of communicating) that is popular among smart home and consumer electronic devices.
- Cortana - Cortana is an intelligent personal assistant created by Microsoft for Windows 10, Windows 10 Mobile, Windows Phone 8.1, Microsoft Band, Xbox One, iOS, Android, and Windows Mixed Reality.

- Dimmer - A wireless controlled Device that controls the brightness, as well as the On/Off state of local light.
- Ethernet - A common system to create a computer network using cables (wired network).
- Group - A collection of individual Devices, which can be controlled as a group.

13.8 CHECK YOUR PROGRESS

Descriptive type questions-

a) What is Smart Device?

b) Name & Explain two smart Devices.

c) Why is Dimmer used? Explain.

d) Why Privacy is an issue in Smart Devices? Explain.

e) What is IoT? Give an example to support your answer.

f) How are smart devices important to our business? Explain

g) What is meant by ALEXA?

h) How can we make a smart home?

i) How is A.I. used in IoT? Explain in detail.

j) What are the pros & cons of Smart devices?

13.9 BIBLIOGRAPHY/ REFERENCES

- eBook: Guidebook to Smart-home Technology Volume 1, by Tom Kolnowski
- http://pervasivecomputing.se/M7012E_2014/material/Wiley.Ubiquitous.Computing.Smart.Devices.Environments.And.Interactions.May.2009.eBook.pdf
- A Safer Internet of Things Gemalto's Guide To Making the Internet of Things A Safe Place To Connect
- https://www.tutorialspoint.com/internet_of_things/index.htm
- https://hacks.mozilla.org/2018/02/how-to-build-your-own-private-smart-home-with-a-raspberry-pi-and-mozillas-things-gateway/
- https://developer.ibm.com/technologies/iot/tutorials/iot-smart-home-01/
- https://www.the-ambient.com/how-to/get-started-with-the-smart-home-199

13.10 SUGGESTED READINGS

- "Smart devices" by Tero Moisio
- Smart Devices A Complete Guide - 2020 Edition, by Gerardus Blokdyk
- Smart Home Industry in 2018/2019: Trends, Perspectives, Forecasts, by Alexey Pelykh

UNIT- 14

TECHNOLOGY ENABLED LEARNING FOR EFFECTIVE ASSESSMENT SYSTEM

14.1 INTRODUCTION

The term technology-enabled learning refers application of information and communication technology to teaching and learning to process. It can add value to the learning and teaching processes. This term sometimes used interchangeably with technology-enhanced learning. The technology-enabled Learning and assessment system is increasingly being used in almost all the areas and levels of education. Technology-enabled Teaching-Learning process is an effort to enhance the quality of education.

E-Assessment is the use of technology to manage and deliver the assessment. E-assessment describes a range of learning and assessment activities that have distinct meanings in their own contexts, e.g., electronic marking, online assessment, computer-aided assessment, and direct on-screen testing are all referred to as e-assessment. E-Assessment itself can be diagnostic, formative, or summative. Some of the most widely-used forms of e-assessment are:

- Online tests, quizzes, and exams.
- E-submission and E-marking.
- Self- and peer-assessment.
- Student response systems.

14.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Understand the importance of e-assessment.
- Explore the pros and cos of e-assessment.

14.3 IMPORTANCE OF E-ASSESSMENT SYSTEM

Examinations are the prevalent assessment and evaluation tool in universities, and there are many types of examination questions. This explanation contains a brief description of seven types of examination questions, as well as tips for using each of them: 1) multiple choice, 2) true/false, 3) matching, 4) short answer, 5) essay, 6) oral, and 7) computational. Remember that some exams can be conducted effectively in a secure online environment in a proctored computer lab or assigned as a paper-based or online "take-home" examination.

E-assessment or computer-assisted or computer-based assessment is the use of information technology in various forms of assessment, such as educational assessment, health assessment, psychiatric assessment, and psychological assessment. This may utilize an online computer connected to a network. This definition embraces a wide range of student activities, ranging from using a word processor to on-screen testing. Specific types of e-assessment include computerized adaptive testing and computerized classification testing. The advantages of e-assessment can include:

- Immediate feedback tailored to help students improve their knowledge and performance.
- Access for students in different geographical locations and at different times.
- Sophisticated reporting, allowing you to refine the exercise or identify areas in which more instruction is needed.
- Students undertake online tests many times to assess and re-assess their knowledge.

14.4 CONCEPT OF ONLINE EXAMINATION

Examinations check our subject expertise and skills; they are an essential criterion for assessment. If you are learning something, you can judge the outcome of that learning online or offline through an examination. Online examination is a new approach to conduct an examination through the internet. There are basically two methods of conducting an examination: offline and online. Online examinations are easy to conduct and maintain accuracy and fewer resources.

In an online examination system, examinees get their user id and password with his/her admit card. This id is already saved in the examination server computer. When the examinee logins to the server computer, he/she gets his/her profile is already registered. On a fixed time, the examinee gets a message to start the examination. All answers given by examinees are saved into the server computer with his/her profile information. The online examination system also allows to correct the answers if the examinee needs to change any answer during the examination. However, after the examination, changes are not be allowed. This also makes checking the answer easy, and error-proof as computers are more accurate than human main power and provide fast results. The benefits of online examination system are discussed below-

Easy Process- Online examination process is easy both for the host and the candidates. We only need a working computer and an internet connection. Even if an organization doesn't have enough number of computers, the exam can be organized in shifts.

Fast Process- In online examination, checking and result processing is entirely online performed by a computer that makes it faster and accurate so that the results of an online examination can be declared within a few days of the examination. Whereas, the traditional examination takes many days or months to display the result of the examination as the copies are checked manually.

Remote Access- Another special feature of online examination is that it can be conducted from anywhere in the world. Since, the internet is in the reach of everyone, an online exam can be accessed easily from anywhere.

High Accuracy- As the results of online exams are checked by a Computer, accuracy level is automatically high. A person can make mistakes while checking examination copies, but with a computer, the probability is very low. In a traditional exam pattern, we may need to get our copies rechecked in the case of any dispute, but we will never need this with an online examination process as the probability of mistakes is very low.

Resources- An online examination needs more I.T. (information Technology) resources than a traditional examination, but these resources are reusable. In an online examination, we will need to use a computer and the internet, which we need not purchase as we can find one on rent. In the traditional examination, we use papers and pens/pencils, which are wasted after the examination. We cannot use an examination paper again for another purpose. This way, we can make better use of the resources through online examination.

Online examination system features-

- The login system is present and secured by a password.
- Ability to save the answer given by the candidate, along with the question.
- An answer checking system should be available.

- Could Update Candidate Profile.
- Log out after the examination is over.
- Administrator Panel.

14.5 ONLINE EXAM VS. CONVENTIONAL EXAMS

Pros of Online Examinations-

- Less resource required- Organizations conducting online tests require fewer resources eliminating the need for costly resources as well. The more students work off-site via the Internet, the fewer students will use the physical campus facilities. This results in a reduced need for faculty and staff. The nature of online testing also reduces the printing of tests and other materials required for teaching.
- Offers access to students with disabilities- A great advantage of online testing is its accessibility to students with disabilities. Computers can be customized to cater to those with various physical disabilities in order to place them on a level playing field with other students.
- Easy Grading- Giving grades for online tests is easier than the conventional way of examination and is a time-saving advantage for educators. Depending on the type of test given, instructors may be able to enter an answer key into the system once and instantly grade all incoming tests. Even on tests that require grading essay type questions, the submitted exams are organized and easy to read for quicker grading.
- Immediate feedback tailored to help students improve their knowledge and performance.
- Access for students in different geographical locations and at different times
- Sophisticated reporting, allowing you to refine the exercise or identify areas in which more instruction is needed.
- Students undertake online tests many times to assess and re-assess their knowledge.

Cons of Online Examinations-

- Internet connectivity issues- Connectivity can be a serious disadvantage of online testing. A student's internet connection, either in a school lab or at home, can drop anytime for various reasons. In some cases, this could cause the student to lose work or inadvertently submit tests that are incomplete.
- Cheating- The chances of cheating during an online test are tough to eliminate. In fact, unless an instructor is physically watching someone take the test, it is almost impossible to remedy.

Pros of Offline examination-

- Development of interpersonal skills- When in a classroom, students are required to speak their minds. They are required to give presentations or speeches. They also have to work in groups with all kinds of people with many differing viewpoints. Online courses require none of that. Traditional style learning teaches these things.
- Development of memory and learning- While preparing for the traditional ways of examination, a student has to learn and has to memorize the teachings of the class. Doing this regularly develops their memory power and also enhances their ability to learn and imbibe the teachings fast and effectively. When someone does not have to study and memorize material, it does not embed in his or her long-term memory the way it does when they do study it.
- Motivates the students to learn- One problem with online classes is that all too often, they motivate us to get a degree, but not to learn. When students receive face to face verbal feedback and constructive criticism from their professors, it instills in them a motivation to not to let their professors down. It is the relationships and bonds that are formed that give face to face learning an advantage over online learning.

Cons of Offline Examinations

- A lot of resources required: To conduct a traditional way of examination needs a lot of resources and capital investment. A physical campus, requirement of adequate faculty and study material, seating arrangements, etc. are all mandatory for the traditional method.
- The difficulty for the physically disabled students: Physically disabled students have limited access to such traditional methods of educations and examination. Reaching the campus, writing the papers could be an obstacle for them.

14.6 E-ASSESSMENT QUALITY ASSURANCE

For an effective e-assessment system, quality assurance has to be robust. Online examination system's reliability has been acceptable to both the student and teacher. Thus, e-assessment system has to be structured by taking the proper steps towards the staff training, regular updating of systems and e-assessment tools, question banks, integrating the scheduling of computer-based tests into the timetable at the end of module examinations and finally incorporating feedback mechanisms to guide academic staff in the improvement of tests and systems.

Example-

National Testing Agency (NTA) has been established as a premier, specialist, autonomous, and self-sustained testing organization to conduct several examinations for admission/fellowship in higher educational institutions. To assess the competence of candidates for admissions and recruitment has always been a challenge in terms of matching with research based international standards, efficiency, transparency, and error-free delivery. The National Testing Agency is entrusted to address all such issues using best in every field, from test preparation, to test delivery, and to test marking with the help of technology-based assessment.

So, we can say online examinations are in top trends because of their several benefits to the assessing authorities as well for the candidates.

14.7 POINTS TO REMEMBER

- Online examination is not only for assessing but also it is for the management and teachers who arrange the examinations who are responsible to ensure everything goes secure and well organized.
- Online Examination System removes most of the drawbacks that were in the traditional examination system like students can give exams from anywhere around the globe, just a computer with internet connection needed.
- Examination results can be calculated very fast (automatically) at the end of the examination.
- Online Examination also minimizes the error in calculating results that humans do most of the time.

14.8 GLOSSARY

- NTA- National Testing Agency.
- E-Examination tools- There are various learning management systems (with examination facility), e.g., Moodle, Optima and ViLLE, and also some dedicated e-examination systems, Soft Tutor Tenttis, etc.
- Electronic assessment (e-assessment) can be defined as a method where information technology is used for any assessment-related activity.

14.9 CHECK YOUR PROGRESS

Descriptive type questions-

a) What do you understand by e-assessment?

b) Define the importance of e-assessment in respect to "from anywhere."

c) How online examination helps management and teachers?

d) Define the role of online assessment for admission/recruitment exams.

e) List the functions role and responsibilities of the National Testing Agency (NTA).

14.10 BIBLIOGRAPHY/ REFERENCES

- https://educationaltechnologyjournal.springeropen.com/articles/10.1186/s41239-018-0108-z
- https://journal.alt.ac.uk/index.php/rlt/article/view/1492/html
- https://www.lethbridgecollege.net/elearningcafe/index.php/studyskills/tests/online-exam-strategies
- https://cft.vanderbilt.edu/online-exams/
- https://www.thesoftwareguy.in/online-examination-system/

14.11 SUGGESTED READINGS

- https://educationaltechnologyjournal.springeropen.com/articles/10.1186/s41239-018-0108-z
- https://journal.alt.ac.uk/index.php/rlt/article/view/1492/html

UNIT- 15

INTRODUCTION TO CYBER SECURITY- I

15.1 INTRODUCTION

This unit is designed to provide the basic concepts and terminology of cybersecurity to the learners. This text further examines how the concept of security integrates into the importance of user involvement, security training, ethics, trust, and application of cybersecurity practices. This unit further advocates the need for Cybersecurity, Types of Cyber Attacks, discusses issues and challenges to ensure a secure and safe cyberspace.

15.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Define cybersecurity and its role.
- Explore types of cyber-attacks.
- Understand the issues and challenges of a safe cyber world.

15.3 WHAT IS CYBERSECURITY?

In today's digital era, cyber security denotes the protection of computer systems and the prevention of unauthorized uses or changes or access to electronic data/ systems. It deals with the protection of software, hardware, networks, and information. In other words, Cybersecurity is the protection of Internet-connected systems, including hardware, software, and data from cyber-attacks or unauthorized attacks. Cyber Security is made up of two words (Cyber + Security) one is cyber, and the other is security. Cyber is related to the technology which contains systems, network and programs or data. In contrast, security related to protection includes systems security, network security and application, and information security.

Cybersecurity is the set of technologies, processes, and practices specially designed to protect networks, devices, programs, and information (data) from attack (unauthorized access), misuse, theft, damage, modification, or destruction. There are two similar popular terms one is 'Cybersecurity,' and the other is 'information security.' Commonly we interchangeably used them, but both the terms are having a different meaning, as defined below-

[1] Cyber Security-Cyber security is a broader term that defines the activity of defending the computers, servers, mobile devices, electronic systems, networks, and data from malicious attacks, which ranges from business organizations to personal devices. The types of security concerns in reference to cybersecurity attacks are- Network security, Application security, Information security, Operational security, and disaster recovery and response. In a nutshell, we can say cybersecurity is to secure cyberspaces from different cyber-attacks worldwide. User awareness about cyber education also can perform a key role in avoiding some cyber-attacks. The network security and application security focus on securing computer networks and software and device free from threats and vulnerabilities, respectively. There are some popular terms in the world of cybersecurity/attacks as- cybercrime, cyber-attacks, cyberterrorism, malware, virus, trojans, spyware, ransomware, adware, botnets, SQL injection, phishing denial-of-service attacks, etc.

[2] Information Security-When we use the term 'security' in reference to the digital world, it is all about securing the data from malicious users and threats. In reference to information security, it is very important to define the difference between the terms ' data' and 'information.' The data means anything which is unprocessed or before processing and the computer receives from the user or any other medium is called data. In other words, data is a raw fact and figure, whereas the processed data is known as information. Processed data means what we receive after data processing. So, information means meaningful data or processed data where data means unmeaning data or unprocessed data. Here we are concerned about information security, how to secure our information?

Examples of such information, are biometric information, social media profile, data on mobile phones, your choice during Internet surfing/online shopping, etc. In today's digital age, information having high value with respect to decision making and all about, so information security especially denotes the following keywords, e.g., confidentiality, integrity, and availability.

In today's digital era, we understand the role of digital presence and online services; how heavily we depend on the online services, in this consequence, the popular saying by someone is "if data is lost, everything is lost" fits correctly. This is our responsibility to save our resources from unauthorized access, and simultaneously we also need to update our level of awareness in regard to cybersecurity and education.

Cybersecurity is a global issue, as the volume of cyber-attacks grows, companies and organizations, especially those that deal information related to national security, health, or financial records. We need to take steps forward to protect our resources from cyber-attacks.

15.4 WHY NEEDS CYBERSECURITY?

- We are living in a digital world where our work lives, personal lives, finances (bank accounts, insurance policy), and many more are directly or indirectly connected to the Internet using smartphones or through any other medium which makes cybersecurity vital.
- Secure cybers space keeps us safe from hackers, cybercriminals, and other agents of fraud.
- Secure cybers space maintains a well-ordered digital world where we can use/serve such useful online services.
- User's behavior is one of the weak points towards cybersecurity and defenses. There is a need for users to take personal responsibilities and educate themselves to help maintain a secure cyberspace.
- Opportunistic hackers are on the lookout to target vulnerable organizations, which may have weak security infrastructure.
- The risk of cyber-attack is more when cybersecurity is de-prioritised or neglected by us, so it is urgent to prioritise security issues and spread cybersecurity awareness among the community level.
- Nowadays, hackers are playing on people's concerns to their natural need for information and interaction, to drive cyber-attacks.

- Many cybersecurity threats originated from social engineering, user error, exploits to web browsers, etc. One must not take any chance to do the same otherwise, he/she will have to pay the cost for the same.
- Cybersecurity is something every user needs to take notice of alerts. A considerable number of incidents are caused by people ignoring mainstream advice around avoiding clicking on suspicious links and maintaining secure passwords.
- Antivirus software is still an essential part of the security concern, but it is not enough to protect from cyber threats. We should have many more tools/resources/solutions to avoid various kinds of cyber-attack and make our systems safe and secure.
- We must have a backup and recovery plan to avoid/mitigate any kind of cyber disaster.

15.5 TYPES OF CYBER ATTACKS

There are different forms of Cybersecurity threats, such as-

[1] Denial-of-service (DoS) Attack-

A denial-of-service (DoS) attack occurs when legitimate users are unable to access information systems, devices, or other network resources due to the actions of a malicious cyber threat actor. Services affected may include email, websites, online accounts, or other services that rely on the affected computer or network.

[2] Man-in-the-middle (MitM) Attack-

A man-in-the-middle attack is also known as a hijack attack where the attacker secretly relays and possibly alters the communications between two parties who believe that they are directly communicating with each other. In this type of security attack, the attacker will be able to intercept all relevant messages passing between the two victims and inject new ones.

[3] Phishing Attack-

Phishing uses fake emails, duplicate websites with somehow similar domain, and sending text messages to them to get access to people's information and misuse them for their (hackers) own benefits. It is one of the most regular attacks, especially against the general public. Raising cyber awareness can overcome this kind of attack.

[4] Malware-

This kind of attack method is categorized as spyware, ransomware, worms, and viruses. During the Internet surfing with casual attitude becomes the key medium to malware attacks. To stay safe from these kinds of attacks, we need to have updated Antivirus and cyber awareness with suspicious kinds of websites.

[5] Ransomware attack-

It is a type of malware that involves an attacker locking the victim's computer system files typically through encryption and demands for payment to decrypt and unlock them.

[6] SQL Injection (SQLi) Attack-

SQL injection (SQLi) is a web security vulnerability that allows an attacker to interfere with the queries that an application makes to its database. A successful SQL injection attack can result in unauthorized access to sensitive data or perform a denial-of-service attack also. This kind of attack is also known as a database or back end attack, which can devastate the complete database infrastructure. To prevent such types of attacks, the developers should restrict the entry of such queries at the query box. A query box is a place where the end-user has access to write something (e.g., where we type 'User Name or password').

[7] Social engineering-

Social engineering is the term used for a broad range of malicious activities accomplished through human interactions. Social engineering is the process of psychologically manipulating people into disclosing personal information and also finds potential points of entry and weak security protocols to break the security practices of an individual or an organization.

[8] Password Attack-

A password attack is a kind of attack where a third party gets access to your system by cracking your (user's) password. To initiate a password, attack the generally the attacker uses software to crack your password. Password attacker uses many methods to access accounts, including brute force attacks made to guess passwords, as well as comparing various word combinations against a dictionary file. Strong passwords are the effects to overcome this kind of attacks and safeguard against password attacks. A strong password means the user password should be a combination of upper and lowercase letters, symbols, and numbers (all together) and having at least eight characters or more.

15.6 ROLE OF CYBERSECURITY TO SAFE DIGITAL WORLD

Ensuring safer digital/cyberspace requires the coordination of security efforts made throughout the digital world includes-

- Application-level security.
- Information level security.
- Network-level security.
- Disaster recovery planning.
- Operational level security.
- Organizational level security.

- End-user cyber awareness.
- User's attitude towards cybersecurity.

To think about the safe and secure digital society, we need to protect against various cyber-attacks, e.g., malware, ransomware, phishing, social engineering, etc. We also have a need to develop future plans to protect our resources, such as Networks, programs, and so on, from unauthorized access. Simultaneously, we should assess the evolving nature of security risks involved herewith. The policymakers and torchbearers in the area of cybersecurity need to rethink about to address the end-user cyber education and awareness, either employees or any other user, because anyone accidentally can become the cause of security breach due to lack of security awareness and principles. This is the urgent need of time to have compulsory cyber education for all kinds of smartphone/ Internet users.

15.7 ISSUES AND CHALLENGES TO ACHIEVE SECURE CYBERSPACE

In today's digital world, cybersecurity issues are directly concerned with the national security issues, so that to safe and secure your nation, you should develop and implement a strong and committed cybersecurity plan for securing the resources and maintaining the privacy of the users.

To deal with all security issues and challenges, the Indian Computer Emergency Response Team (CERT-In) is established by the Ministry of Electronics and Information Technology, Government of India, in the year 2004 with the objective of securing Indian cyberspace. CERT-In provides Incident Prevention and Response services as well as Security Quality Management Services. Some of the key functional areas where CERT-In deals are-

- Collection, analysis, and dissemination of information on cyber incidents.
- Forecast and alerts of cybersecurity incidents.
- Emergency measures for handling cybersecurity incidents.
- Coordination of cyber incident response activities.
- Issue guidelines, advisories, vulnerability notes, and whitepapers relating to information security practices, procedures, prevention, response, and reporting of cyber incidents.

Cert-In provides proactive services like Advisories, Security Alerts, Vulnerability Notes, and Security Guidelines to help organizations/users to secure their systems and networks against security risks and attacks. In the year 2018, the CERT-In handled 208456 incidents. The types of incidents handled were Website intrusion & Malware propagation, Malicious Code, Phishing, Distributed Denial of Service attacks, Website Defacements, Unauthorized Scanning activities, and Vulnerable Services.

Finally, we should always be ready to address cybersecurity issues to deal with the following, e.g., Securing against malware, mobile/smartphone security, web browser security, the Cloud security, Wi-Fi security, etc.

15.8 POINTS TO REMEMBER

- Cyber Security denotes the protection of computer systems and the prevention of unauthorized uses or changes or access to electronic data/ systems.
- Cybersecurity is the protection of Internet-connected systems, including hardware, software, and data from cyber-attacks or unauthorized attacks.
- 'Cybersecurity' and 'information security' are the commonly interchangeably used terms, but both the terms are having different meanings.
- Cybersecurity defines the activity of defending computers, servers, mobile devices, electronic systems, networks, and data from malicious attacks, ranging from business organizations to personal devices.
- The term 'information security' refers to securing the data from malicious users and threats.
- Cybersecurity keeps us safe from hackers, cybercriminals, and other agents of fraud.
- Cybersecurity is something every user needs to take notice of alerts, and a huge number of incidents are caused by people ignoring mainstream advice around avoiding clicking on suspicious links and maintaining secure passwords.

15.9 GLOSSARY

- Vulnerability– A point at which there is potential for a security breach.
- Threat– Some dangers that can exploit a vulnerability.
- Access Control— The means and mechanisms of managing access to and use of resources by users.
- Cyber Ecosystem— The collection of computers, networks, communication pathways, software, data, and users that comprise either a local private network or the world-wide Internet.
- Data Breach— The occurrence of disclosure of confidential information, access to confidential information, destruction of data assets, or abusive use of a private IT environment. Generally, a data breach results in internal data being made accessible to external entities without authorization.
- Malware (malicious software)— Any code written for the specific purpose of causing harm, disclosing information, or otherwise violating the security or stability of a system. Malware includes a wide range of types of malicious programs, including virus, worm, Trojan horse, logic bomb, backdoor, Remote Access Trojan (RAT), rootkit, ransomware and spyware/adware.

- Firewall— A security tool, which may be a hardware or software solution used to filter network traffic.
- Payment card skimmers— A malicious device used to read the contents of an ATM, debit, or credit card when inserted into a POS (Point of Sale) payment system.
- Trojan Horse (Trojan) — A form of malware where a malicious payload is embedded inside of a benign host file. The victim is tricked into believing that the only file being retrieved is the viewable benign host. However, when the victim uses the host file, the malicious payload is automatically deposited onto their computer system.
- Worm— A form of malware that focuses on replication and distribution. A worm is a self-contained malicious program that attempts to duplicate itself and spread to other systems.
- Whitelist— A security mechanism prohibiting the execution of any program that is not on a pre-approved list of software.
- Virus— A virus is typically designed to damage or destroy data, but different viruses implement their attack at different rates, speeds, or targets. A virus is a form of malware that often attaches itself to a host file or the MBR (Master Boot Record) as a parasite. When the host file or MBR is accessed, it activates the virus enabling it to infect other objects.
- Countermeasure– Action you take to protect your information against threats and vulnerabilities.
- CERT Computer Emergency Response Team (CERT-In)
- SQLi- Structured Query Language injection.
- DoS- Denial-of-service.

15.10 CHECK YOUR PROGRESS

Descriptive type questions-

a) What do you understand by Cybersecurity?

b) How cybersecurity affects the individual cyber user?

c) Differentiate between cybersecurity and information security.

d) Why is cybersecurity essential for an organization or an individual?

e) Define the types of cyber-attacks briefly?

f) How to prevent cyber-attacks? Define in your words.

Objective type questions-

a) Information security is related to the technology which contains systems, network and programs or data. (True/False)

b) To overcome password attacks, a strong password is to safeguard against this kind of attack. (True/False)

c) Indian Computer Emergency Response Team (CERT-In) is established by the Ministry of Human Resource and Development, Government of India. (True/False)

d) Cybersecurity is related to the protection of data. (True/False)

e) A password attack is a kind of attack where a third party gets access to your system by cracking your (user's) password. (True/False)

Answers (objective type questions)-

[A] False [B] True [c] False [d] False [e] True

15.11 BIBLIOGRAPHY/ REFERENCES

- https://www.geeksforgeeks.org/difference-between-cyber-security-and-information-security/
- https://www.javatpoint.com/cyber-security-introduction
- https://en.wikibooks.org/wiki/Introduction_to_Information_Technology
- https://geekflare.com/understanding-cybersecurity/
- https://www.peoplemattersglobal.com/article/technology/cybersecurity-in-the-post-covid-landscape-25937
- https://securityfirstcorp.com/why-is-cyber-security-important/
- https://searchsecurity.techtarget.com/definition/cybersecurity
- https://www.globalknowledge.com/us-en/topics/cybersecurity/glossary-of-terms/

15.12 SUGGESTED READINGS

- Fundamentals of Cyber Security by Bhushan Mayank, BPB Publications, ISBN: 9789386551559, 9789386551559
- Introduction to Information Security and Cyber Laws by Surya Prakash Tripathi and Ritendra, John Wiley Publications (Dreamtech), ISBN 9789351194736

UNIT- 16

INTRODUCTION TO CYBER SECURITY- II

16.1 INTRODUCTION

In the previous unit, we have discussed the basics of cybersecurity, the need, and the types of cyber-attacks. As we know, cybersecurity is a buzz word in today's digital world. Cybersecurity denotes the set of technologies and tools, processes, and practices designed to protect our networks, servers, workstations, computers, programs, and data from attacks, damage, or unauthorized access. It involves protecting information and systems or cyberspace. Cyberspace includes all kinds of networks and devices, e.g., interconnected computers, computer networks, and even the Internet.

In the current scenario, cybersecurity is essential for all of us, being an organization, a country, or even an individual. Now the cybersecurity is a matter of National security policy to protect resources from cyber-attacks.

16.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Explore the guiding principles to protect from cyber-attacks.

- Understand the future trends and perspectives in cybersecurity.
- Define the role and importance of cybersecurity in today's scenario.

16.3 GUIDING PRINCIPLES TO PROTECT FROM CYBER ATTACKS

The increasing dependence on computer systems and interconnecting technological tools lighten the field of cyber-attacks/threats. Now the cybersecurity becomes the area of key importance for organizations, individuals and even nations. Cybersecurity market globally is growing day by day because of the increasing demand for cyber experts who can secure one's cyber systems. Cyber actors(attackers) can exploit vulnerabilities to steal information and money and threaten the delivery of essential services. There is a range of cyber-attacks where cyber attackers can exploit a vulnerability and use it for their own benefit.

- Educate the Stakeholders- Lack of awareness is the biggest vulnerability when it comes to cybersecurity. So, we should conduct awareness workshops regarding cybersecurity issues.
- We should raise the level of cyber education among staff.
- Increase investment in cybersecurity.
- Always try to follow essential safeguards to protect from cyber threats.
- Always update your antivirus software and enabled firewalls.
- During Internet downloads, you should try to download from trustworthy sites.
- Always follow the following practical security measures, e.g., regularly patching firewalls, updating firmware, setting strong passwords, changing the password of the Wi-Fi router, always updating the Operating System (whenever it asks for the update software).
- It is more important to ensure that individuals are aware of cyber threats and conscious of their cybersecurity-related issues.
- Choose strong passwords and keep them safe. Use separate ID/password combinations for different login accounts.
- Do not disclose your personal information anywhere publicly on websites.
- Make sure to change your login details, at least once or twice a month. You can cut down your chances of being a target of cybercrime by doing so.
- Avoid sending photograph(s) online particularly to strangers and chat friends as there have been incidents of misuse of the photographs.

- Avoid entering your credit card number and other bank account credentials to any website that is not secured. This is very important to decide where to use your banking details and where is a suspicious scene.
- Always keep back up of your data to prevent loss of data due to virus attacks or any other security issues.
- It is strongly advised to use a security program that gives control over the cookies and send information back to the site, as leaving the cookies unguarded might prove fatal.
- Ensure that your social networking profiles (e.g., Facebook, Instagram, Twitter, YouTube, MSN) are set to private. You must have a good level of awareness about security settings of social media accounts and be careful what information you post online.
- Generally, we leave our mobile devices, unattended. By activating the built-in security features, we can avoid any access to personal details. Try to avoid storing passwords, pin numbers, and even your own address on any mobile device.
- Do not click on any link or file or e-mail attachment of unknown origin or Stranger.
- Finally, one thing is very important for Internet users "Internet means nothing is private." So, understand it and apply its implications in your day to day life. When you are connected with the Internet, everything is publicly accessible. Make sure your information and other details you have to secure.

Note: Strong password checklist-

- Do not use simple, easy to guess passwords, e.g., names of friends, family, and pets.
- Do not use words from the dictionary or commonly used passwords such as 12345 or QWERTY.
- Do not share passwords with other people. If they need access to data, they should be given their own login.
- Do not leave passwords lying around in notebooks, or on sticky notes close to your computer, or in files on your computer where they can easily be read.
- Before you enter a password into a website, make sure it is using a secure connection beginning with https:// (it might also show a small padlock close to the address) this means the site is using a secure link that cannot be intercepted by attackers.
- When you register with some online services, they will send you a password so that you can log in. Many sites force you to change the password when you first log in, if they don’t, change it when you first visit the site.

- If possible, change the default password on devices such as your internet router. This is programmed at the factory, and some companies have a single password for all their devices. An attacker only needs to know the make of your router to gain access.
- If you have trouble remembering passwords try a password manager program that not only stores passwords but can generate new, highly complex passwords for you.
- Two-factor authentication gives you additional protection as it requires two pieces of information (such as a password and a random number sent by SMS) to provide access to your data. If a company offers two-factor authentication, you should use it.

16.4 FUTURE TRENDS AND PERSPECTIVES IN CYBERSECURITY

We have discussed different aspects of cybersecurity (data or information security, system security and etc.) and cyber threats and as well as the countermeasures and guiding principles to maintain secure cyberspace. Now we are going to discuss the future trends and perspectives of cybersecurity. Here we will review the future trends of information systems security and discusses some of the measures that can be taken to mitigate cybersecurity threats. We will also review the security precautions that individuals can take in order to secure their personal computing environment.

To develop a secure cyber system, an organization requires several skills to protect its resources (network infrastructure, programs, and information). Security measures not only involves techniques to avoid cyber threat but also includes several duties, e.g., creating regulations, enforcing policies, and many more. We should develop the culture of information security among organizations and also develop the habit of taking security responsibilities. Therefore, we can minimize the risk of security threats.

There is not any single solution to protect oneself from cyber threats because there are many different types of cyber threats available to address such types of issues, security experts need to work on several types of countermeasures to protect their cyber system and infrastructure for any kind of harm.

Today, business and social habits are being revolutionized by the internet. The conversion has become from connecting information and computers into a network to connect people. Potentially, Internet in the future will be a structure of virtualized and scalable resources provided by service providers to the end-users. From a technical perspective, technical issues will be changed significantly; more new business models, new problems, and an increased number of services will be over the internet (Koch et al. 2012). The increasing of the connectivity and complexity in the infrastructures of new emerging systems are being exploited by cybersecurity threats. These threats place the economy, national cybersecurity, and business and commerce at risk. Cybersecurity risk effects touch the bottom line of a company similar to

reputational and financial risks, impacting revenue, and driving up costs. Thus, cyber threats can limit the ability of organizations to innovate, compete, and increase the reputation of customers.

When we are deliberately becoming more and more digitalized, there are also more and more threats involved. Few serious future cyber threats are briefly defined below-

- Kidnapping and controlling someone's information and encrypting it; for their release demanding a ransom. This kind of trend targeting businesses and organizations that have important information, e.g., Offices, Banks, Hospitals, etc.
- Selling information found through Kidnapping, such as office records, bank records, hospital records, credit card details, accounts, passwords,etc.
- Phishing, i.e., false email used to trick people into providing information that can either be utilized to steal money or be sold. The trend here is focusing on directed attacks, so-call spear phishing, against selected persons that can produce a high yield.

16.5 IMPORTANCE OF CYBERSECURITY IN CURRENT SCENARIO

Cybersecurity can be obtained only through systematic development and implementation of security policy. In order to implement cybersecurity policies, computer users must keep the software up to date with patches that fix their vulnerabilities. Cybersecurity plays an important role in the current development of information technology and services. Good Cybersecurity practices can secure users personal and professional information undamaged from the attacks on the Internet. In today's time, the prime medium of communication over Internet is either smartphone or computer. We should always ensure the security of our devices, e.g., must not clicking over any attracting e-mail or messages and etc.

Nowadays, social media has become essential for many people. But, as with anything else online, it is important to be aware of the risks related to it. Based on protecting your cyber system from different types of security threats, there are several types of computer securities, e.g., Network Security, Data or information Security, and System Security.

Network Security- Network security is a common type of computer security which deals with securing the networks against different types of viruses and also from many other forms of security threats. Network security ensures the stable working of computer networks and network availability to authorized users only.

Data or information Security- Data or information security is another important security aspect for computer users. There are various types of information security threats through different mediums. Data security mostly affects the confidentiality, integrity, and availability of data or information.

System Security- Primarily, system security concerns about malicious programs, that can disrupt and or sometimes destroy the computer systems. These malicious programs can be viruses such as Love Bug, rabbits, Logic Bomb, Trojan horse, and worms such as Morris Worm and bugs. If attackers get succeed in reaching and controlling your computer system, it can affect financial losses to the victims. Ransomware is a type of malware that prevents or limits users from accessing their system, either by locking the system's screen or by locking the users' files unless a ransom is paid. Ransomware malware can be spread through nasty email attachments, infected software apps, infected external storage devices, and hacked websites. Once executed in the system, ransomware can either lock the computer screen or, in the case of crypto-ransomware, encrypt predetermined files.

16.6 POINTS TO REMEMBER

- Cyberspace includes all kinds of networks and devices, e.g., interconnected computers, computer networks, even the Internet also.
- A software application that runs automated tasks (scripts) over the Internet is also known as a web robot or Internet robot (hence the name “bot”).
- The increasing dependence on computer systems and interconnecting technological tools lighten the field of cyber-attacks/threats.
- The careless behaviour of stakeholders is the biggest vulnerability when it comes to cybersecurity. We should try to conduct awareness workshops regarding cybersecurity issues for increasing the awareness level of stakeholders.
- We should always try to follow the following practical security measures, e.g., regularly patching firewalls, updating firmware, setting strong passwords, changing the password of the Wi-Fi router, always update the operating system (whenever it asks for update software) and etc.
- Avoid entering your credit card number and other bank account credentials to any website that is not secured. This is very important to decide where to use your banking details and where is a suspicious scene.
- Ensure that your social networking profiles (e.g., Facebook, Instagram, Twitter, YouTube, MSN, etc.) are set to private. You must have a good level of awareness about social media accounts' security settings and be careful what information you post online.

16.7 GLOSSARY

- Unauthorized Access— Any access or use of a computer system, network, or resource which is in violation of the company security policy or when the person or user was not explicitly granted authorization to access or use the resource or system.

- Two-factor authentication- Two-factor authentication refers to proving identity using two authentication factors usually considered stronger than any single factor authentication. A form of multi-factor authentication. Valid factors for authentication include Type 1: Something you know, such as passwords and PINs; Type 2: Something you have such as smart cards or OTP (One Time Password) devices; and Type 3: Someone you are such as fingerprints or retina scans (aka biometrics).
- Two-step authentication- A means of authentication commonly employed on websites as an improvement over single-factor authentication but not as robust as two-factor authentication. This form of authentication requires the visitor to provide their username (i.e., claim an identity) and password (i.e., the single-factor authentication) before performing an additional step. The additional step could be receiving a text message with a code, then typing that code back into the website for confirmation.
- Spoof (spoofing)- The act of falsifying the identity of the source of communication or interaction. It is possible to spoof an IP address, MAC address, and email address.
- Spyware- A form of malware that monitors user activities and reports them to an external party. Spyware can be legitimate in that it is operated by an advertising and marketing agency for the purpose of gathering customer demographics.
- SPAM- A form of unwanted or unsolicited messages or communications typically received via e-mail but also occurring through text messaging, social networks, or VoIP. Most SPAM is advertising, but some may include malicious code, malicious hyperlinks, or malicious attachments.
- Social engineering — An attack focusing on people rather than technology. This type of attack is psychological and aims to either gain access to information or to a logical or physical environment. A social engineering attack may be used to gain access to a facility by tricking a worker into assisting by holding the door when making a delivery, gaining access into a network by tricking a user into revealing their account credentials to the false technical support staff or gaining copies of data files by encouraging a worker to cut-and-paste confidential materials into an e-mail or social networking post.

16.8 CHECK YOUR PROGRESS

Descriptive type questions-

a) How cybersecurity is an important issue for an individual user? Define in your words.

b) Explain Network Security and System security briefly.

c) List five guiding principles of cybersecurity to protect from cyber-attacks.

d) List the user responsibilities during Internet surfing to protect from attacks.

Objective type questions-

a) A form of unwanted or unsolicited messages or communications typically received via e-mail is called .....

b) A form of malware that monitors user activities and reports them to an external third party is known as …….

c) Two-factor authentication refers to proving identity using two authentication factors usually considered stronger than any single factor authentication. (True/False)

d) The act of falsifying the identity of the source of communication or interaction is called Spoofing or IP spoofing. (True/False)

e) The careless behaviour of stakeholders is not an issue to security vulnerabilities. (True/False)

Answers (objective type questions)-

[a] Spam [b] Spyware [c] True [d] True [e] False

16.9 BIBLIOGRAPHY/ REFERENCES

- https://www.peoplematters.in/article/hr-technology/cyber-security-at-a-glance-what-organizations-need-to-do-14834
- Ghate S. and Agrawal P. R. (2017). A Literature Review on Cyber Security in Indian Context. Journal of Computer & Information Technology. Vol. 8(5), pp. 30-36.
- https://bus206.pressbooks.com/chapter/chapter-6-information-systems-security/
- https://combitech.com/news-inspiration/stories/the-future-of-cyber-security/
- Alqahtani H. S. (2016). Latest Trends and Future Directions of Cyber Security Information Systems. Journal of Information Engineering and Applications. Vol.6(11), ISSN 2224-5782 (print) ISSN 2225-0506 (online).
- https://www.globalknowledge.com/us-en/topics/cybersecurity/glossary-of-terms/

16.10 SUGGESTED READINGS

- Fundamentals of Cyber Security by Bhushan Mayank, BPB Publications, ISBN: 9789386551559, 9789386551559
- Introduction to Information Security and Cyber Laws by Surya Prakash Tripathi and Ritendra, John Wiley Publications (Dreamtech), ISBN 9789351194736.

UNIT- 17

AN INTRODUCTION TO AUDIO AND VIDEO EDITING TOOLS

17.1 INTRODUCTION

Video Editing is a technical and artistic process in which a group of video material (Footage) is compiled or altered from its original to create a new version which is more audience oriented. In other words, Video editing is the process and technique of working with video images to produce a complete piece of attractive information.

During COVID 19 global pandemic, the role of educational videos in each level of learning is in high demand. It can be used to connect virtually with students, provide feedback, and assign homework in a clear and detailed manner. Videos provides a way of personalized learning experience. Educational videos are very popular and becoming an increasing demand for virtual learning.

In video editing activating a great cut point is the most challenging task. In editing process, the editor learns to perform the best editing methods and best processes which is decided by the editor. The duration of the shooting, the angle of the camera, the color composition of the scene, method to find the best place for the filter and transition altitude, etc are the key things which are decided by the editor itself.

For becoming more technical about video editing, one should have the knowledge of machine's hardware, software, and tools which are dedicatedly used for editing. Several technical terms are frequently used in the area of video/audio editing, as- layout interphase, filter, version, kind of the transition, motion, effect, key framing, color correction, audio modification, audio filter, codec setting, capturing and rendering, etc.

17.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Define the role of audio and video in teaching-learning.
- Explore Open-Source tools for audio video editing.

17.3 ROLE OF AUDIO AND VIDEO IN TEACHING LEARNING

In modern days classroom teaching, the role of audio-visual aids in teaching-learning is helpful for the learners to develop well understanding of the subject related complex concepts. If the teachers choose to integrate instructional videos in between their lectures, it would not only facilitate the learning process but would also makes teaching joyful. The use of internet-based smart devices enables the learners to grasp these concepts quickly and easily. Such technological advancements, make the job of teachers easier than ever. While using such teaching aids, teachers also should be aware of harms involved with this methodology of teaching. Relying too much on technology can make some difficulties for achieving target learning outcomes. Any kinds of teaching aids should only be used for assistance, so that one can make interesting class environment.

There have been continuous developments of audio technology, from audio-cassettes to modern smart phone-oriented podcasts, the pedagogical characteristics of audio have remained remarkably constant over a fairly long period. Although audio can be used on its own, it is often used in combination with other media, particularly text. The audio can be used to present Spoken languages for practice; Music, either as a performance or for analysis; and Interviews with leading researchers or experts. Because of the ability of the learner to stop and start recorded audio, it has been found to be particularly useful for enabling students through repetition and practice to master certain auditory skills (e. g. language pronunciation, analysis of musical structure, etc). [1]

Videos are particularly helpful for- [2]

- To demonstrate experiments where equipment or phenomena to be observed are large, microscopic, expensive, and inaccessible;
- Where resources are scarce, or unsuitable for student experimentation;
- Where the experimental design is complex;
- Where the experimental behaviour may be influenced by uncontrollable but observable variables;
- Illustrate principles involving dynamic change or movement;
- Illustrate abstract principles through the use of specially constructed physical models;
- Illustrate principles involving three-dimensional space;
- Demonstrate changes over time through the use of animation, slow-motion, or speeded-up video;

Strengths of videos in teaching- [2]

- Linking concrete events and phenomena to abstract principles and vice versa;
- The ability of students to stop and start, so that they can integrate activities with video;
- Providing alternative approaches that can help students having difficulties in learning abstract concepts;
- A growing amount of freely available, high quality academic videos;
- Good for developing some of the higher-level intellectual skills and some of the more practical skills needed in a digital age;
- The use of low-cost cameras and free editing software enables some forms of educational videos to be easily produced.

Weaknesses of videos in teaching- [2]

- Faculty unawareness and unwillingness to use videos in teaching.
- To maintain quality educational videos is a challenge.
- Creating original material that exploits the unique characteristics of video is time-consuming, and still relatively expensive.

17.4 POPULARLY USED OPEN-SOURCE TOOLS FOR EDITING

[1] Blender (www.blender.org)-

It is powerful open-source tool for 3D creation, modelling, sculpting, rendering, animation, video editing, game creation, and etc. You may download it from the given URL, as- blender.org.

[2] Kdenlive (www.kdenlive.org)-

It is a powerful video editing tool having a user-friendly drag-and-drop-based user interface. You may download it from the given URL, as- kdenlive.org.

[3] OpenShot (www.openshot.org)-
OpenShot is a free and open-source video editor for Linux, macOS, and Windows. It is user friendly tool for beginners. You may download it from the given URL, as- openshot.org.

[4] Shotcut (www.shotcut.org)-
It is a free and open-source, cross-platform video editing software for FreeBSD, Linux, macOS and Windows. You may download it from the given URL, as- shotcut.org.

[5] Audacity (www.audacityteam.org)-
Audacity is a free and open-source, user-friendly tool for digital audio editing and recording application software. It can be used for Windows, macOS, and Linux. You may download it from the given URL, as- audacityteam.org.

[6] VidCutter ()-
It is a free, open source, cross-platform video editing tool that allows you to perform various cut related actions to audio and video files. it supports Windows, MacOS and Linux OS.

[7] Pitivi (www.pitivi.org)-
Pitivi is an open-source video editing tool. You may download it from the given URL, as- pitivi.org.

[8] Cinelerra (www.cinelerra.org)-
It is a popular open-source video editor with several features, i.e. advanced timeline, motion tracking support, video stabilization, colour correction, etc. You may download it from the given URL, as- cinelerra.org.

Note- If you want to download more open-source applications for different purposes, you may visit to "**www. sourceforge.net**"; and you can make a search query as per your need.

17.5 HARDWARE SOFTWARE REQUIREMENT FOR AUDIO AND VIDEO EDITING

Basically, today's digital computers are well equipped with all such minimum features through which one can start editing of a at beginner's level. However, some guidelines are given for the minimum hardware/software requirement of audio and video editing, as-

- Memory (RAM)- 4 to 32 GB (ideally at minimum 8 GB).
- Processor- multi-core Intel i5/i7/i9 preferably with 4 or more processor cores.
- Storage- at least 256 GB hard disk drive (preferably SSD).
- Graphics Card- This is dependent on the editing software. Preferably AMD and NVIDIA. (Minimum 2 GB)

- Operating System- Windows 7 or advance (64 bit), Mac OS X, Linux, etc.
- Screen size- larger screen size preferred (Minimum 17 to 21 inches).

Note- A working computer system with speaker and web cam is required, and it also should fulfill the above requirements.

17.6 OVERVIEW OF AUDACITY AUDIO EDITING TOOL

Here, we are giving brief overview of "Audacity" an audio editing tool. The basic operations you can perform with the Audacity, as- [3]

- Record, Play and Edit.
- Saving your work in desired audio formats.
- Customizing Audacity- themes, colors, preferences, layout and plug-in extensions.
- You can utilize shortcuts and Macros for faster editing process.
- Changing the loudness of your audio- fades, Amplify, pan and gain.
- You can manage the noise in your audio- reducing, adding, fine tuning.
- Navigation and changing speed and pitch, etc.

Toolbars provide quick access to many functions in Audacity. In some cases, the functions provided by a toolbar are available only through that toolbar. If your desired toolbar is not visible, choose View -> Toolbars and click to put a checkmark by the toolbar you wish to enable. [3]

The Meter toolbars are a special case. You may have one or both of the separate Recording and Playback Meter toolbars visible (both are visible by default). Alternatively, you can have only the Combined Meter toolbar visible (which displays recording and playback levels in a single meter). The tooltips for the toolbars and tools (visible when hovering over the toolbar or tool) will display the shortcut for that tool/toolbar if one is set. [3]

For more details, you may follow the following help manual of Audacity, as- https://manual.audacityteam.org/#tutorials.

17.7 OVERVIEW OF OPENSHOT VIDEO EDITING TOOL

Here, we are giving brief overview of "OpenShot" a video editing tool. The basic features of OpenShot are as-

- It is available for cross-platforms (Supports Linux, OS X, and Windows).
- Support for many videos, audio, and image formats.
- Supports curve-based Key frame animations.
- Desktop integration (drag and drop support).
- Supports unlimited tracks / layers.
- Supports clip resizing, scaling, trimming, snapping, rotation, and cutting.

- Supports compositing, image overlays, and watermarks.
- Supports title templates, title creation, sub-titles.
- Supports 2D animation (image sequences).
- Supports 3D animated titles and effects.
- SVG (Scalable Vector Graphics) friendly.
- Advanced timeline (including Drag & drop, scrolling, panning, zooming, and snapping).
- Frame accuracy (step through each frame of video).
- Supports time-mapping and speed changes on clips (slow/fast, forward/backward, etc.).
- Supports audio mixing and editing.

For more details, you may follow the following help manual of "OpenShot" open-source video editing tool, as- www.openshot.org/user-guide.

17.8 POINTS TO REMEMBER

- Editing is a process. Editing is usually done in layers; determine which layer you need to start with by determining what the base is.
- After a long editing session your brain can start to get muddy and tired, you must take a short break.
- There are a lot of rules for traditional editing. Sometimes, breaking these rules can lead to some great consequences for your audience. You should have a good grasp of those rules, if you know when it makes sense to deviate, it will be good for you.
- Do not get too carried away in your videos and also not to expect from your audience.

17.9 GLOSSARY

- Capture - Digitizing raw footage onto your computer for use digitally in editing.
- Batch Capture - Capturing a number of clips all at one time using in and out marks from a log sheet.
- Logging - Marking a series of In and Out points in a clip to signify which parts should be captured.
- Cutting - The cut of editing video.
- Slide (Slip) - A type of edit which keeps the same length of the clip but changes the in and out points to make it start and end earlier or later.
- Roll (Trim) - A type of edit those changes just the pin point or the out point and also makes the clip longer or shorter.
- Frame - A measurement of time, and also the smallest amount a video can be cut to.

- Frame Rate - The number of frames that will make one second of video this can range to any number. Common frame rates are 60, 30, 29.97, 25, 24, 23.98, 16.
- Mark In - Placing a marker at the beginning of where you want your clip to start.
- Mark Out - Placing a marker at the beginning of where you want your clip to end.
- Edit - To make a cut in a clip making it a separate clip.
- Transition - An effect which visually moves your video from one clip to another. There are many types of transitions.
- Keyframe - A marker that locks in a Parameter for a specific property. Changing keyframes over time will animate the video or change properties over time.
- Sequence (Timeline) - Where all the cuts take place, a place to lay out clips.
- Levels - The amount of loudness the audio of a clip or sequence will have this ranged from -infinity db. to 0 db.
- Title Safe - An area within the viewable space of your screen in which text will be able to be seen safely on a TV set at home. Usually, 20% from the side of the viewer.
- Action Safe - An area within the viewable space of your screen in which the video will be able to be seen safely on a TV set at home. Usually, 10% from the side of the viewer.
- Bit- A measure of quantity of data. A bit is one binary digit, a 0 or a 1.
- Bit Rate- The number of computer bits conveyed or processed per unit of time. Normally expressed in kilobits per second (kbps).
- dB- Decibels. A logarithmic unit (typically of sound pressure) describing the ratio of that unit to a reference level.
- Dither- Intentional noise which is added so as to randomize the quantization errors (rounding errors) that occur when down sampling the Bit depth of an audio stream to a lower resolution than the current format.
- Lossless- A format that does not lose any information. It may be either a size-compressing format like FLAC where the quality is exactly as good as before compression, or an uncompressed format like WAV.

17.10 CHECK YOUR PROGRESS

a) Define the role of audio and video in modern day teaching-learning.
b) List some popular open-source tools for audio and video editing.
c) List the hardware/software requirements for audio and video editing.
d) How videos are helpful for teaching-learning? Explain.

17.11 BIBLIOGRAPHY/ REFERENCES

- [1] https://opentextbc.ca/teachinginadigitalage/chapter/9-5-2-audio.
- [2] https://opentextbc.ca/teachinginadigitalage/chapter/9-5-3-video.
- [3] https://manual.audacityteam.org/#tutorials.
- https://en.wikibooks.org/wiki/Audacity/Introduction
- https://opensource.com/article/16/12/yearbook-top-open-source-creative-tools-2016.
- https://itsfoss.com/open-source-video-editors.

17.12 SUGGESTED READINGS

- https://sourceforge.net.
- https://www.openshot.org/user-guide.
- https://manual.audacityteam.org/#tutorials.

UNIT- 18
VIDEO CONFERENCING

18.1 INTRODUCTION

The Video conferencing also known as video teleconference. In Video conferencing the pair of hardware/software interacts with each other. They simultaneously transmit and receive video and audio signals from the different geographic locations. In Video conferencing you can share:

- documents,
- presentation materials,
- whiteboards,
- flip charts and
- Visual aids etc.

The Video conferencing is often used at the corporate or enterprise level. The Video conferencing is also different from video phone calls. Video conferencing is sometime known as online video conferencing or PC video conferencing. The invention of the television assisted

the Video conferencing. The two devices are connected by coaxial cable or radio transmission. Following are some milestones of Video Conferencing:

- In 1961 the NASA used video conferencing in the first manned space flight. This time two radiofrequency links used one in each direction. The TV news channels also used the same technology. They used it for reporting from distant locations. They use trucks with mounted satellite dishes and these trucks provide mobile links for video conference transmissions. Initially this technology was very expensive. That time it was not used for business, education or telemedicine.
- After 1980s, digital telephony becomes very popular. It is available using compressed video and audio transmissions.
- After 1984 the first video conferencing systems sold commercially by PictureTel Corp.
- During the 1990s, very reasonable and cost-effective video conferencing comes in the market.
- The IP-based video conferencing became possible after 1990s.
- In the Winter Olympics of 1998, the video conferencing is used. Nagano, Japan, used this technology in the opening ceremonies. Around five continents are appeared in real time.
- After 2000s, video conferencing became available at very reasonable costs using Internet connection. (Source: https://www.techopedia.com/ definition/1791/ videoconferencing)

Always the Video conferencing is live, and it has visual connection between the devices. Two or more remote person can interact over the internet. They can perform face-to-face meeting over internet. It is very important. It can help to join people. If person cannot meet physically then it can provide online or virtual face-to-face connection. Video conferencing can transmit of static images and text between two devices. It can also transmit full-motion video images and high-quality audio. In today's scenario the web conferencing and cloud-based virtual meeting room services are very popular. It enables organizations or companies to deploy video conferencing with minimal infrastructure investment or cost.

How video conferencing works?

There are two steps of video conferencing: Compression and Transfer.

Compression phase- During the compression step, the webcam and/or microphone capture analog audio-visual (AV) images or input. This data collected is in the form of continuous waves of frequencies. It can also be amplitudes. This collected data may represent the captured sounds, colors, brightness, depth and shades. This data should be transferred over a normal network. Therefore, it requires some code. This code used to compress the data into digital packets. Finally, this enables the captured audio-visual fast transfer over broadband or Wi-Fi internet. (Source: https://www.techopedia.com/definition/1791/videoconferencing)

Transfer phase: During the transfer step, the digitally compressed data is sent over the digital network to the receiving computer. After reaching the endpoint, another program decompresses the data. This program converts it back into analog audio and video due to this the receiving screen or speakers correctly view and hear the audio-visual (AV) data. (Source: https://www.techopedia.com/definition/1791/videoconferencing)

Figure 18.1 Video Conferencing Demonstration[1]

[1] (Image Source: https://media.istockphoto.com/vectors/business-people-video-conferencing-vector-id509256686?k=6&m= 509256686&s=612x612&w=0&h= TB5F7fUyWz3jk XQIlaHLYVu4X97 oqzsDDVU0D74MG90=)

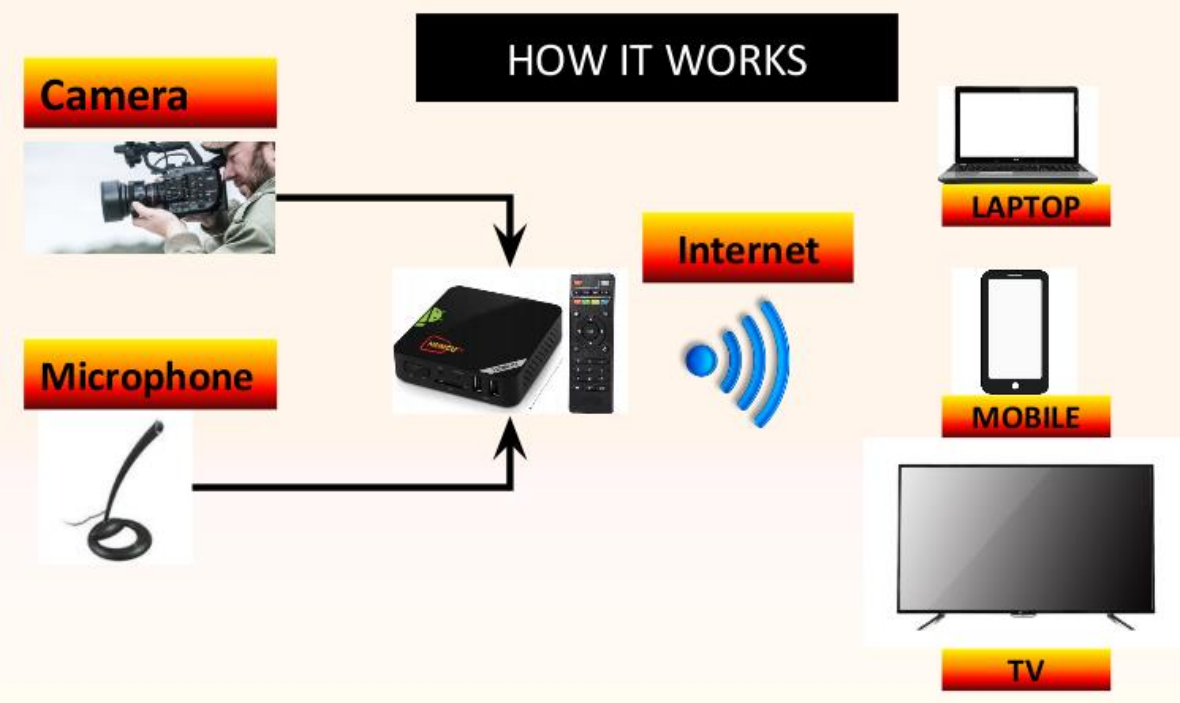


Figure 18.2 How video conferencing works?[2]

Components of video conferencing systems-

Following are some major components of a video conferencing system:

- It requires a network for data transfer. This network should require a high-speed broadband internet connection. It also uses voice over Internet Protocol (VoIP) technology. Sometime the Local area network (LAN) and Integrated Services Digital Network (ISDN) connections can also be uses.
- Requires more than two video cameras/webcams which provide video input.
- Requires more than two microphones – it may be an external microphone/built in microphone.
- Requires computer screen/monitor/TV/projector. These devices can broadcast video output.
- Requires Headphones/laptop speakers/external speakers can be used for audio output.
- Requires Hardware- or software-based coding and decoding technology. It can compress Audio Video (AV) data into digital packets. It can decompress the data at the other endpoint.

[2] (Image Source:http://blynkmedia.com/wp-content/uploads/2017/05/Mungucast-how-it-works-1.png)

- The Acoustic echo cancellation (AEC) software can be used. It reduces audio delays. It can also support real-time communication. (Source: https://www.techopedia.com/definition/1791/videoconferencing)

Figure 18.3 How video conferencing works?[3]

[3] (Source: https://image.slidesharecdn.com/video-conferencing-fundamentals-and-application282/95/video-conferencing-fundamentals-and-application-6-728.jpg?cb=1271304404Video conferencing vendors)

Video conferencing and remote working-

Video conferencing is very useful for remote workers. The worker can perform their work-related meetings. These remote workers can also do work from home. The Work from home sometime better than the companies' traditional office spaces. The video conferencing can also provide face-to-face contact between two person/members/colleagues. Video conference consists screen sharing, video calls or voice communications.

Now Video conferencing provides better communication and productivity. It can also provide co-working relationships. It can effectively engage co-worker in hearing voices on phone or correspondence via email. Situation like COVID-19 pandemic the remote working is very important. It is very important for the companies who are looking video conferencing technologies to maintain business operations remotely. To follow the social distancing protocol, video conferencing is really very important. However, the closest approximation is an actual, face-to-face meeting. It is very much beneficial for intraorganizational meetings. The video conferencing also been useful for job candidate interviews, in place of physical face to face interviews.

Zoom, Webex Meet, Meet etc. are a widely popular video conferencing vendor. There is explosive growth in video conferencing in 2020 due to the Covid-19 pandemic. Now the Zoom has become eponymous for video conferencing. The user interface (UI) of Zoom is very well. It is free for the users. Users can conference for up to 40 minutes long and 100 users each at a time. (Source: https://www. techopedia.com /definition /1791/ videoconferencing)

Importance of Video Conferencing-

There are many benefits of video conferencing. It can increase productivity among employees. It is very useful for businesses. It provides a very improved way of communication. You can interact with colleagues, partners and customers with video conferencing.

Video conferencing is very cost effective you can reduce travel costs during employee training, meeting, project demonstration, client meeting etc. The hidden benefits of video conferencing have to conduct more efficient meetings. In these meeting we can exchange nonverbal communications and a stronger sense of community among business contacts. It can happen between companies, as well as with customers. In video conference the face-to-face connection adds nonverbal communication to the exchange. It helps participants to develop a stronger sense of familiarity with individuals.

(Source: https://www.techopedia.com/definition/1791/videoconferencing)

18.2 OBJECTIVES

After the successful completion of this unit, you will be able to-

- Explore the applications of Video Conferencing.
- Know the Hardware Software requirements for Video Conferencing.
- Explore the steps of configuring Video Conferencing.

18.3 APPLICATIONS OF VIDEO CONFERENCING

Following are the applications and benefits of using video conferencing for your organization

a) Enable Digital Workforce
b) Simplify the Management and Usability
c) Communication and Culture
d) Increased Communication Reliability
e) Improve Value and Reduce Redundancy

- **Enable Digital Workforce-** The Video conferencing software creates a collaborative meeting culture in your company. It is a strong foundation for enabling this new generation digital workforce. Always the Video meetings/conference help teams to maintain human connections, irrespective of their physical location. It gears up decision making as well as improves our capability to collaborate internationally.
- **Simplify the Management and Usability-** The groups or Teams collaborates through audio conferencing, video conferencing, screen sharing and real-time instant messaging. Always the video conferencing makes communicating very easy.
- **Communication and Culture-** The prioritizes of new generation is mobility, flexibility and modern forms of communication over offices. The Video conferencing bringing remote workers face-to-face with in-office employees. It can boost productivity on both ends. It can also lower travel costs at the same time. The travel costs of offline meeting is very high. The video conferencing is obviously very cost effective. When company is building the remote employees then it is very useful. The video conferencing has the unique ability to bring the human connection. It is online face-to-face communication. Today we have video-first culture and really it improves communication.
- **Increased Communication Reliability-** Video conferencing often provides a fast and secure way to communicate with each other. Video conferencing also increases communication reliability.
- **Improve Value and Reduce Redundancy-** Companies are now upgrading their audio or web conferencing. The video conferencing provider vender companies now providing enhanced quality solutions like audio conferencing, screen sharing, chat, meeting recording and event live streaming etc. (Source: https://www.lifesize.com/en/resources/guides/video-conferencing-advantages-benefits)

18.4 H/W & S/W REQUIREMENTS FOR VIDEO CONFERENCING

Video Conferencing Hardware Requirements:

- **Camera-** The main hardware requirements of video conferencing system is the Web camera. It mainly required to record a video signal which sent to people on the other side of the live session of video conference. Big businesses house particularly need high-definition (HD) conferencing web cameras. It comes with advanced camera features like remote control pan, tilt and zoom. Sometime in medical applications or in educational conferences, the participants may need to use more cameras to ensure better clarity. By using the HD cameras participants enjoy the highest resolution and big images.

- Codec Unit- The important hardware used for video conferencing is the CODEC (coder-decoder). This CODEC compress audio and video feed, and then transmit it through an IP network. It also decompresses or expands incoming audio and video stream and maintains the network's data link.

Figure 18.4 Various Video Conferencing tools.[4]

[4] Image Source: https://img.eztalks.com/video-conference/support-multiple-vc-software.png

- Video Display- The monitor display for live video conference sessions. LCD, HD Plasma display, LDP Projector and XGA PC Type Display are the most common video conferencing displays. Most of the company liker high-definition (HD) displays ranging between 720p and 1080p. This HD display provides the good resolution and it also offers extra viewing space. While the standard monitor devices provide less space.
- Microphone and Speakers- The Microphone and audio subsystems are also an important part of for video conferencing hardware. Participants need microphones or headsets to communicate with other attendees at the time of the live session. It should be digital microphones with integrated software and these collaborative microphones can be used in large group interactions. Microphones used in video conferencing can also provide instant connectivity. It can also cancel any background echoes.

Software Used for video conferencing

- Desktop End-Point Software- The desktop endpoint applications or browser-based interfaces are software that provides access to instant video conferencing. This type of software used for video conferencing. Audio system work with integrated microphones, speakers and other USB-connect devices. The ezTalks and Lifesize are video conferencing providers. They have their own software for video conferencing. Their software is fully compatible with Windows, Mac, iOS and Android. Firefox and/or Chrome to support video conferencing.
- Broadband Internet Access- A high-speed internet service required for high quality video conferencing streaming. The broadband modem can have the huge bandwidth. This is helpful for running live conferencing sessions. To ensure smooth instant streaming stable internet connectivity is required. For video conferencing routers can also be fitted in the offices for establishing internet access in computers or mobile.
- Mobile Apps- Different Mobile applications can enable meeting attendees to participate in video conferences via their smartphones, tablets or iPads etc. as per their availability.
- Web Conference Software used for video conferencing- Video conferencing software facilitate VoIP (Voice over Internet Protocol) communication. These software also allow for video streaming, application sharing and private text chats. Many video conferencing software can have record and playback ability, whiteboards, instant messaging and inbound faxing.

(Source: https://www.eztalks.com/video-conference/hardware-and-software-requirements-for-video-cobferencing.html)

18.5 STEP BY STEP CONFIGURATION FOR VIDEO CONFERENCING

Video conferencing also be used for video training. This is powerful and cost-effective methods for delivering the professional education. Following are some steps to Better Video Conferencing:

Step 1 Test everything- The equipment should be tested with your colleagues prior to your conference. Following points should also be considered:

- Make sure that the software well enough and confidently manage the meeting
- Ensure that hardware should be all functional
- Video display should be proper
- Sound quality and volume is sufficient or not
- Internet speed should be fast enough to handle the video
- Headphones and microphones, should be functional
- You should also practice with screen sharing software

Step 2 Prepare the conference room- Video conferencing should be with proper lighting. Sunlight can cause unexpected issues. Diffused light should be there in place of direct light for video quality. The conference room size or meeting will decide the type of microphone to be used.

Step 3 Control what will be captured on camera- The Bare walls, painted a subdued colour are the best backgrounds for video conferences.

Step 4 Dress the part- You can participate in video conferencing from home, the beach, or the corporate headquarters, but you should be dressed professionally.

Step 5 During the Call, Follow Proper Communication Etiquette

- Take some time for introductions so that everyone can be connected.
- When you're not speaking mute your mic. It will help to eliminate distracting background noise.
- Avoid activity like tapping pens, shuffling papers, etc. It might be amplified by your mic.
- Focus into your camera at the time when you're speaking. So that others patrticipent feel that you're communicating to them.
- You can send your location prior to speaking.

Step 6 Speak clearly- Be sure that you are speaking clearly. Also confirm that your equipment is working properly or not. Do not shout into your microphone. Be patient when beginning to speak. Do not speaking over another. Be sure to introduce yourself each time when you speak.

Step 7 Be organized- Before the video meeting you should have a clear agenda for talking. You should also know the purpose of your video conference.

Step 8 Have a backup plan- The electricity backup is very important. So you should have a electricity backup plan.

Finally, Video conferencing an important and integral part of every company. (Source: https://franchetti.com/8-steps-to-better-video-conferencing/)

18.6 TOOLS USED FOR VIDEO CONFERENCING

The Video conferencing is growing very rapidly. Now it becomes an essential tool for connecting remote employees. During the COVID-19 pandemic it has led to unprecedented growth. It has been seen that the record numbers of downloads for video conferencing apps. Now we have lots of good video conferencing tools available. They offer extensive features. We can integrate them with enterprise software suites. Following are some video conferencing tools. (Source: https://www.jotform.com/blog/video-conferencing-tools/)

The Best Free Video Conferencing Tools

- Zoom
- Google Hangouts
- UberConference
- TrueConf Online
- Skype
- FreeConference
- Lifesize Go
- Slack Video Calls
- Facebook Live
- YouTube Live

(Source: https://www.owllabs.com/blog/video-conferencing-tools)

18.7 VIDEO CONFERENCING VENDORS

The video conferencing Application like Zoom, Webx Meet, JioMeet, GoToMeeting, Meet, Apple's FaceTime, Google's Chat and Microsoft's Skype. By these applications the video conferencing ubiquitous can be very easily used on desktops and mobile devices. These devices must have an embedded camera. The Facebook also introduced Workplace Rooms, for video conferencing service.

(Source: https://www.techopedia.com/definition/1791/videoconferencing)

Following are some video conferencing vendors and products:

Angekis	ZTE	ScanSource
Cisco Webex	PGi	RingCentral
Avaya	Konftel	GoToMeeting
Mitel	Jenne	Adobe Connect

Lifesize	Poly	Blackboard Collaborate
Logitech	West	Fuze

18.8 WORKING OF VIDEO CONFERENCING

There are some easy steps how to Video Conferencing Works. The company like retail and finance to healthcare, education and the corporate world, getting the benefits of video conferencing by remote communication. Following are some points on, how video conferencing works:

- Two or more people communicate through audio and video.
- Two people communicate with each other remotely through the following: (i) A computer with a webcam and speakers or a telephone; (ii) An internet connection

In Video conferences we can include hundreds of people. Video conferences require software and web page and internet communication tools enable streaming audio and video, instant messaging, etc. The end user can communicate via mobile devices, laptops, tablets and even smartphones or digital screens.

- AV input is converted to digital data.
  When end users communicate, the video input from the camera and audio input from the microphone are converted from analog to digital by video conferencing software.
- The digital video and audio are compressed.
  There are some Special compression software of video and audio data, so that the data move faster over Wi-Fi or broadband internet.
- The video and audio data reaches its destination.
  When the digital data arrives at the other endpoint, then the software decompresses it. It converts it to original size and converts it back to analog.
- Ideally, the listener clearly sees and hears the content.
  Most video conferencing software ensures that the audio and video are as clear as possible, also including acoustic echo cancelation. This removes sound interference. It means that overlapping speech from the other user. It also eliminates any sound delays. In this new era customers expect a better and smooth video conferencing. They also want to invest too significantly. (Source: https://imaginenext.ingrammicro.com/ucc/how-video-conferencing-works-in-5-easy-steps)

NOTE-

Video conferencing is very important in this new era. This is next generation technology. There are many video conferencing hardware and software requirements. We have discussed many of these but new tools and technologies are replacing them. This is

especially beneficial for a small business. Sometime new technological components can cost you extra money but it will pay off in the long run. We can lead and face the competition. For a stable video conferencing system, we have to ensure efficient communication. Investing in hardware and software for video conferencing is really worthwhile. Again, the video conferencing is one of the future technologies. By implanting video conferencing, we can improve productivity and reduce costs.

18.9 POINTS TO REMEMBER

- In Video conferencing the pair of hardware/software interacts with each other. They simultaneously transmit and receive video and audio signals from the different geographic locations.
- In Video conferencing you can documents, presentation materials, whiteboards, flip charts and Visual aids etc.
- In 1961 the NASA used video conferencing in the first manned space flight. This time two radiofrequency links used one in each direction. The TV news channels also used the same technology. They used it for reporting from distant locations. They use trucks with mounted satellite dishes and these trucks provide mobile links for video conference transmissions. Initially this technology was very expensive. That time it was not used for business, education or telemedicine.
- In the Winter Olympics of 1998, the video conferencing is used. Nagano, Japan, used this technology in the opening ceremonies. Around five continents are appeared in real time.
- Video conferencing can transmit of static images and text between two devices. It can also transmit full-motion video images and high-quality audio.
- In today's scenario the web conferencing and cloud-based virtual meeting room services are very popular. It enables organizations or companies to deploy video conferencing with minimal infrastructure investment or cost.
- The video conferencing Application like Zoom, Webx Meet, JioMeet, GoToMeeting, Meet, Apple's FaceTime, Google's Chat and Microsoft's Skype. By these applications the video conferencing can be very easily used on desktops and mobile devices. These devices must have an embedded camera. The Facebook also introduced Workplace Rooms, for video conferencing service.
- Situation like COVID-19 pandemic the remote working is very important. It is very important for the companies who are looking video conferencing technologies to maintain business operations remotely.

- The Video conferencing software creates a collaborative meeting culture in your company. It is a strong foundation for enabling this new generation digital workforce. Always the Video meetings/conference help teams to maintain human connections, irrespective of their physical location. It gears up decision making as well as improves our capability to collaborate internationally.
- The Video conferencing Bringing remote workers face-to-face with in-office employees. It can boost productivity on both ends. It can also lower travel costs at the same time. It is online face-to-face communication. Today we have video-first culture and really it improves communication.

18.10 GLOSSARY

- **Video conferencing-** Always the Video conferencing is live, and it has visual connection between the devices. Two or more remote person can interact over the internet. They can perform face-to-face meeting over internet. It is very important. It can help to join people. If person cannot meet physically then it can provide online or virtual face-to-face connection.
- **Video Compression-** During the compression step, the webcam and/or microphone capture analog audio-visual (AV) images or input. This data collected is in the form of continuous waves of frequencies. It can also be amplitudes. This collected data may represent the captured sounds, colors, brightness, depth and shades. This data should be transferred over a normal network. Therefore, it requires some code. This code used to compress the data into digital packets. Finally, this enables the captured audio-visual fast transfer over broadband or Wi-Fi internet.
- **Video Transfer-** During the transfer step, the digitally compressed data is sent over the digital network to the receiving computer. After reaching the endpoint, another program decompresses the data. This program converts it back into analog audio and video due to this the receiving screen or speakers correctly view and hear the audio-visual (AV) data.
- **Zoom-** Zoom, Webex Meet, Meet etc. are a widely popular video conferencing vendor. There is explosive growth in video conferencing in 2020 due to the Covid-19 pandemic. Now the Zoom has become eponymous for video conferencing. The user interface (UI) of Zoom is very well. It is free for the users. Users can conference for up to 40 minutes long and 100 users each at a time.
- **Audio or web conferencing-** Companies are now upgrading their audio or web conferencing. The video conferencing provider vender companies now providing enhanced quality solutions like audio conferencing, screen sharing, chat, meeting recording and event live streaming etc.

- **Video conferencing Camera-** The main hardware requirements of video conferencing system is the Web camera. It mainly required to record a video signal which sent to people on the other side of the live session of video conference. Big businesses house particularly need high-definition (HD) conferencing web cameras. Sometime in medical applications or in educational conferences, the participants may need to use more cameras to ensure better clarity.
- **Codec Unit-** The important hardware used for video conferencing is the CODEC (coder-decoder). This CODEC compress audio and video feed, and then transmit it through an IP network. It also decompresses or expands incoming audio and video stream and maintains the network's data link.
- **Video Display-** LCD, HD Plasma display, LDP Projector and XGA PC Type Display are the most common video conferencing displays. Most of the company liker high-definition (HD) displays ranging between 720p and 1080p. This HD display provides the good resolution and it also offers extra viewing space. While the standard monitor devices provide less space.
- **Broadband Internet Access-** A high-speed internet service required for high quality video conferencing streaming. The broadband modem can have the huge bandwidth capacity. This is helpful for running live conferencing sessions. To ensure smooth instant streaming stable internet connectivity is required.
- **Web Conference Software used for video conferencing-** Video conferencing software facilitate VoIP (Voice over Internet Protocol) communication. This software also allows for video streaming, application sharing and private text chats. Many video conferencing software can have record and playback ability, whiteboards, instant messaging and inbound faxing.

18.11 CHECK YOUR PROGRESS

Descriptive Type Questions-

a) What are the major components of a video conferencing system? Why is It requiring a network for data transfer? What are these networks?

b) How video conferencing is beneficial for intraorganizational meetings? Which tools are useful for online job candidate interviews, in place of physical face to face interviews?

c) What are the benefits of video conferencing in modern businesses? How new communication tools helpful in modern businesses?

d) How the video conferencing has the unique ability to bring the human connection? Explain.

e) How Video conferencing provides a fast and secure way to communicate with each other? Explain.

f) Can Video conferencing be used for video training? How this is powerful and cost-effective methods for delivering the professional education?

g) What is the use of routers for video conferencing? Is it fitted in the offices for establishing internet access in computers or mobile?

h) Which video conferencing software ensures the clarity of audio and video? Explain.

i) What are the different good video conferencing tools available? What extensive features they offer?

j) For which purpose video input from the camera and audio input from the microphone are converted from analog to digital? Which video conferencing software's are for this purpose?

Objective Type Questions-

a) The Video conferencing also known as ..... teleconference.

b) The two ..... are connected by coaxial cable or radio transmission.

c) The two steps of video conferencing are.....and.....

d) To follow the social distancing protocol, ... is really very important.

e) The groups or Teams .....through audio conferencing, video conferencing, screen sharing and real-time instant messaging.

f) By using the HD .....participants enjoy the highest resolution and big images.

g) The .....display for live video conference sessions.

h) Participants need microphones or headsets to ..... with other attendees at the time of the live session.

i) The ezTalks and Lifesize are video conferencing.....

j) The company like retail and finance to healthcare, education and the corporate world, getting the benefits of video conferencing by remote.....

k) Video conferencing is sometime known as online video conferencing or PC video conferencing.

l) The video conferencing is obviously very cost effective.

m) The Microphone and audio subsystems are also an important part of for video conferencing software.

n) Firefox and/or Chrome to never support video conferencing.

o) Mobile applications can enable meeting attendees to participate in video conferences via their smartphones, tablets or iPads etc.

p) The Video conferencing is an essential tool for connecting remote employees in offline mode.

q) Video conferences require software and web page and internet communication tools enable streaming audio and video, instant messaging.

r) There are some Special compression software of video and audio data, so that the data move faster over Wi-Fi or broadband internet.

s) When the digital data arrives at the other endpoint, then the software decompresses it. It converts it to original size and converts it back to analog.

t) Sound interference means that overlapping speech from the other user.

Answers (Objective Type Questions)-

[a] Video [b] Devices [c] Compression, Transfer [d] Video Conferencing

[e] Collaborates [f] Cameras [g] Monitor [h] Communicate

[i] Providers [j] Communication [k] True [l] True [m] False [n] False

[o] True [p] False [q] True [r] True [s] True [t] True

18.12 BIBLIOGRAPHY/REFERENCES

- https://www.techopedia.com/definition/1791/videoconferencing.
- https://www.lifesize.com/en/resources/guides/video-conferencing-advantages-benefits.
- https://www.eztalks.com/video-conference/hardware-and-software-requirements-for-video-cobferencing.html.
- https://franchetti.com/8-steps-to-better-video-conferencing.
- https://www.jotform.com/blog/video-conferencing-tools.
- https://www.owllabs.com/blog/video-conferencing-tools.
- https://imaginenext.ingrammicro.com/ucc/how-video-conferencing-works-in-5-easy-steps.

18.13 SUGGESTED READINGS

- Dustdar S and Huber R (1998) Group Decision Making on Urban Planning Using Desktop Multimedia Conferencing, Multimedia Tools and Applications, 6:1, (33-46), Online publication date: 1-Jan-1998.
- Scott Firestone, Thiya Ramalingam, Steve Fry, Voice and Video Conferencing Fundamentals, Published Mar 16, 2007 by Cisco Press.