EDUCATIONAL TECHNOLOGY AND ICT

Dr. Sarita Anand

Department of Education, Vinaya Bhavana

Visva-Bharati, Santiniketan

Week-07

Lecture-31

Module-31: Applications of ET in formal, non-formal (Open and Distance Learning)

Hello dear learners, welcome to the SWAYAM-NPTEL course on Educational Technology and ICT. I am Dr. Sarita Anand from the Department of Education, Vinaya Bhavana, Visva-Bharati, Santiniketan, West Bengal, India. Today, we will talk about Module 31 on applications of ICT in formal, non-formal, open, and distance learning. This is Lecture 31. Before going to the topic, we will see the course content covered. In the last lecture, we covered NEP 2020 and ICT, the role of NEP 2020 in promoting ICT. We discussed what NEP 2020 says about ICT, provided document analysis, and reviewed the National Educational Technology Forum through its website.

Now, we will talk about today's topic on applications of educational technology, formal, non-formal, and open and distance learning. Formal education, as we all know, is structured learning that typically takes place in educational institutions such as schools, colleges, and universities. It follows a well-defined curriculum and aims to develop academic, professional, and vocational skills among students. While young children may start their learning journey in nurseries or kindergarten, formal education officially begins in pre-primary school and progresses through secondary education, culminating in higher education.

Higher education, also referred to as post-secondary education, is pursued at the university or college level, where students can earn academic degrees. This form of education operates under established rules and regulations, ensuring a systematic approach to learning. It is delivered by certified educators professionals who are trained in instructional methodologies and adhere to a disciplined framework. Both students and teachers actively participate in the structured learning process of the formal education system.

Now, we will take the examples of formal education, like classroom-based learning in schools and colleges, academic certification, diplomas or university degrees, and subject-based instructions with a prescribed curriculum followed in educational institutions. What are the characteristics of these formal education systems? It is organized into a structured hierarchy, starting from school education to higher education, planned in a systematically designed curriculum, requiring payment of tuition or fees at scheduled intervals, and following a chronological grading and evaluation system. Evaluation is part and parcel of this formal education and subject-specific syllabus, which must be completed within a set timeframe. The application of educational technology in formal education across different stages.

We will start with educational technology in schools, where it plays a crucial role in teaching, learning, and assessment. Educational technology at different levels, like childhood to higher education and beyond. By integrating digital tools, AI-driven platforms, and interactive methodologies, educational technology ensures effective learning experiences, skill development, and career readiness. Formal education is structured in hierarchical stages, each requiring specific technological applications to improve the learning process. So, these stages include pre-primary and early childhood education, which we call nursery or kindergarten level.

The second one is primary and secondary education, which includes elementary and high school levels. The third one is higher education, like UG and PG courses pursued by students in colleges and universities. The fourth and last one is the highest level, which is professional and vocational training. Like post-formal education, teacher training programs all come under this. So, let's see the application of educational technology in pre-primary and early childhood education at the nursery or kindergarten level. At the foundation level, it is used to develop basic cognitive, social, and motor skills in young learners through interactive learning tools. The application of educational technology in early education It is based on interactive educational apps.

Platforms like ABC Mouse, FunBrain, Baizu's Early Learning Game, and gamified platforms teach letters, numbers, and basic concepts. The second one is digital storytelling and animated learning. StoryWeaver and YouTube Kids help in language development through animated stories. The third one is AI-powered personalized learning tools like Google Read Along and the Bolo app. They provide speech recognition-based reading assistance.

Students and small children enjoy these types of apps. The fourth one is augmented reality and VR (virtual reality) for engagement. Quiver AR allows children to interact with 3D models of animals, objects, and their characteristics. The different characters, and the fifth one is smart toys and robotics. Lego Education, Osmo, and Cubetto introduce coding and logical thinking at an early age. These kinds of apps and software provide AI-based learning platforms and apps to small children. The second one is primary and secondary education. In this school education system, educational technology supports curriculum delivery, skill development, and student engagement.

It helps make learning interactive and ensures systematic assessments by teachers. So, the application of educational technology in school education is- The first one is smart classrooms and digital learning. These days, we all know that the smart classroom trend is increasing, and interactive whiteboards like SmartTech, Tata ClassEdge, and Promethean replace traditional blackboards or whiteboards, also, we can use Google Classroom, Microsoft Teams, or Schoology to support digital assignments and collaboration.

But definitely it is only possible where these facilities are available in the schools. The second one is e-learning and open educational resources. These OERs are available like the platform Swayamprabha, National Digital Library, NDLI, OpenStacks provide free educational content, also the DIKSHA app is also providing the free educational content. The third one is AI based adaptive learning.

Well, like Khan Academy by use AI to personalize the learning path of the learners. Now, the fourth one is gamification and simulation-based learning. Kahoot and quizzes and the prodigy makes learning engaging through games. PhET, Interactive Simulation, help students understand science and mathematic concepts through virtual experiences. These kahoot and quizzes were very much utilized by the teachers in the classes during COVID and after COVID classes.

And the fifth one is Virtual Labs and Augmented Reality for Science Experiments. Amrita Virtual Labs, Google Expeditions, PME Vidya AR app and merge cubes provide hands on virtual experiments. This PM E Vidya AR I have already told in previous classes also that this app is very good for the CVSC 9th and 10th science subject. The sixth one is digital assessments and AI proctored examination definitely exam soft

Metal proctor, you can conduct the online test with AI-based monitoring, so proctored examinations can be taken by the teachers in their institute with the help of these kinds of apps and software. The seventh one is assistive technology for inclusive education: JAWS,

which is a screen reader, speech-to-text tools, and dyslexia-friendly fonts that help students with disabilities. So, the third level is higher education, where college and university-level students come under this category—UG, PG, PhD students. In higher education, educational technology is essential for blended learning, research, skill-based courses, and global collaborations. So, let us see what facilities are available here with the help of applications of educational technology. What we can do: The first one is Massive Open Online Courses. We have already mentioned many times that MOOCs and online certifications are a boon for higher education students, especially learners in UG and PG classes. SWAYAM, Coursera, edX, and Udacity provide degree-level courses and certifications. SWAYAM is almost free. Right now, you are pursuing this course.

If you are going to take the examination, only then do you have to pay the money; otherwise, the whole course content is free for you to study. The second one is Learning Management Systems (LMS). LMS like Moodle, Canvas, Blackboard, and Google Classroom manage course content, online lectures, and student progress whether they are completing assignments on time or not, answering questions or not this can be monitored by the teacher with the help of an LMS. The third one is AI-based research and digital libraries. Google Classroom, IEEE Explore, and ResearchGate provide access to research articles and academic papers for PhD-level or PG-level researchers. The fourth one is digital credentials and certificates. Definitely, these days in India, DigiLocker and ABC accounts are the most prominent educational technology facilities where students can store their earned certificates in DigiLocker.

So, MIT's digital diploma system ensures the secure storage of degrees and transcripts. The fifth one is collaborative tools for higher education. These collaborative tools are very helpful for researchers, especially tools like Mendeley and Zotero. These are reference management systems. Overleaf and LaTeX for research papers help scholars in academic writing. The sixth one is virtual labs and AI-based simulations.

MIT OpenCourseWare, Labster provide virtual STEM experiments for hands-on learning. The sixth one is online proctoring and AI based exam monitoring definitely which we can do in school level. Here also we can use the AI based apps for monitoring the examination like proctorio, examly ensure secure online exam for university level students because they are mature enough and they can find out the way out for cheating. So, the fourth one is professional and vocational training. for the post formal education and career development.

The teachers like me and the other teachers who are pursuing the Swayam courses and other platforms they can go for utilizing these educational technology applications for supporting their skill-based learning, professional certification and career development. applications of educational technology in professional training let's see the corporate e-learning and skill development like linkedin learning udemy for businesses skillshare offers upskilling courses for professionals the second one is ai based career counseling and resume building this is a very good facility where univariate nokia.com ai resume builder Indeed, hiring platforms help job seekers and they utilize these technological platforms for their CV preparations. The third one is online job simulations and virtual internships. 4AGE, Intrashala, Coursera, Career Academy provide hands-on experiences in various industries.

The fifth one is webinars and virtual conferences for lifelong learning. Springer webinars, TED talks, Harvard business review webinars provide continuous educational opportunities. Also in our country, many conferences, virtual conferences, lifelong training are going on in different HRDCs, MMTC centers, etc. The fifth one is AI and digital badges and credentials. Definitely, MI media, labs, digital certification, accreditable badges validate skills and achievements.

Then, non-formal education. Non-formal education, we all know. This non-formal education refers to the structured learning that takes place outside the traditional school or college system. It includes programs such as adult literacy courses, vocational training, and skill development workshops. Individuals who are not enrolled in formal education can acquire basic literacy, life skills, or professional competencies through this non-formal education.

The dropouts who have not completed their education can also benefit from this non-formal education. Alternative learning methods such as homeschooling, individualized instruction, distance education, and computer-assisted learning also fall under this category. Unlike formal education, non-formal education is intentionally designed, systematically implemented, and tailored to meet the specific needs of a targeted group. For example, if we pursue an online digital course from NIOS, that is for school education, and if you pursue one from IGNOU, that is for higher education. It requires flexibility in curriculum design, teaching methods, and assessment strategies to accommodate diverse learners. So, now examples of non-formal education.

Like Boy Scouts and Girl Guides programs that teach sports like swimming, community fitness programs, adult education programs offered at the community level, free educational courses for adults conducted by NGOs, open schools, or colleges, and then the characteristics of non-formal education. It is a planned form of education but occurs outside traditional schools. It means the restrictions of attending classes or classroom boundaries are not present in non-formal education. The schedule and syllabus are flexible and can be adjusted based on the learner's needs. Whereas in traditional classes, these are fixed.

But here in non-formal education, the flexibility is greater than in traditional classes. It focuses more on practical and vocational training rather than theoretical learning. There is no age restriction; anyone can participate and get certification. Fees and certification may or may not be required. Sometimes there are free courses offered by different institutions, but mostly a small fee is required to complete this non-formal or distance education.

Learners can combine education with work, as it can be full-time or part-time. It emphasizes professional and skill-based learning for the learners. Now, the main point is the application of educational technology in non-formal or open and distance learning, which we call ODL. This non-formal education refers to structured learning outside the traditional school system or college or higher education, including adult education. Skill-based training, continuing education, open and distance learning, etcetera.

So, unlike formal education, non-formal is flexible, learner-centered, and does not follow rigid rules for entry, attendance, or curriculum design. Examinations are also not fixed; learners can choose when they want to take them for certification. With the advancement of educational technology, open and distance learning has gained prominence, offering access to quality education through digital tools. Online platforms and virtual learning environments, along with the integration of ICT in non-formal education, have expanded opportunities for lifelong learning. Allowing learners to acquire knowledge, develop skills, and earn certifications remotely.

The application of educational technology in non-formal or ODL; the first one is online learning platforms for distance education. So, MOOC platforms like SWAYAM, NPTEL, Coursera, ADEX, Udemy, and FutureLearn provide self-paced courses in various disciplines. These courses are accessible to working professionals, homemakers, and individuals in remote areas who are interested in learning. University-based distance

education portals are another option, such as IGNOU, NIOS, Commonwealth of Learning, Netaji Subhas Institution, and Rajarshi Tandon. Uttarakhand Open University, among many others.

They use educational technology tools to provide online courses, study materials, and virtual classrooms. Many universities offer LMS platforms like Moodle, Blackboard, or Google Classroom to support these distance learning programs. So, the next one is skill-based or vocational training. For this, the application of educational technology in non-formal education includes government initiatives like Skill India, e-Skill India, and the National Digital Literacy Mission, which use digital tools to provide vocational training in fields such as IT, healthcare, and entrepreneurship.

The second application is virtual classrooms and learning management systems. This educational technology enables real-time instruction and structured learning experiences in non-formal education through synchronous learning, live classes, or webinars. Video conferencing tools like Zoom, Microsoft Teams, WebEx, Cisco WebEx, and Google Meet help conduct live interactive sessions for distance learners. Live doubt-clearing sessions and expert lectures provide an engaging learning experience similar to traditional classrooms, where they address learners' difficulties. The second one is asynchronous learning, pre-recorded lectures, and study materials.

Platforms like YouTube, Khan Academy, and Swayamprabha provide pre-recorded lectures. Accessible anytime, anywhere. Learners can download e-books, PDFs, presentations, and lecture notes from online libraries too. The third part is the Learning Management System (LMS) for course management. Many teachers and educators utilize tools like Moodle, Canvas, Blackboard, and Google Classroom, which allow instructors to upload course material, content related to their subject, assign tasks, conduct assessments and tests, and monitor student progress.

Like we do in our classes, we parallelly run the LMS, primarily on Google Classroom, because it is free. So, LMS ensures flexibility in learning schedules, making it ideal for working professionals and adult learners who are unable to attend regular classes. The third one is mobile learning. M-learning for non-formal education. About mobile learning, there was another special lecture in this course. So, you can go through that also. With the increasing penetration of smartphones, mobile internet, and m-learning, they play a crucial role in the ODL system by providing an anytime, anywhere learning concept. For this, we can take one by one, like the first one: educational mobile apps. To promote mobile

learning, especially in non-formal education, there are apps like IGNOU E-Content, Diksha, Byju's, Unacademy, Udemy, Duolingo, Khan Academy, and the list goes on. There is a list of these kinds of mobile apps that provide interactive video lessons and assessments. Language learning apps like Duolingo and Babbel help learners acquire new languages.

Skills informally- The second one is podcast-based learning and audiobooks. Platforms like Google Podcast, Audible and Spotify Education offer subject-specific lectures, discussions and storytelling for learners on the go. The learners can access educational audio content without needing a formal classroom setup. The third one is Offline learning features, many platforms including YouTube, Coursera offer downloadable lectures and the PDFs for learners with limited internet access.

The fourth one is digital open educational resources. These OERs for self-paced learning, we have already covered the whole lecture on these OERs. The first one is e-textbook and digital libraries. Platforms like NCERT, epathshala, National Digital Library of India Project Guttenberg and open stacks offer free access to academic books and research materials not only subject specific but for also the competitive examination you can get it from the ndli the second one is virtual labs for practical learning Amrita Virtual Lab, PhET Interactive Simulation and IIT Bombay's Virtual Lab provide practical science and engineering experiments online. Virtual labs enable learner to conduct simulated experiments without needing the physical lab infrastructure. It saves them from the hazardous experiments too. The third one is AI-powered learning assistance.

AI tools like ChatGPT, IBM Watson, Google Bard, Meta, and many other AIs are emerging day by day. They offer instant explanations, summaries, and concept clarity for non-formal learners. These days, Gemini and DeepSeeek are also becoming famous for clarifying many kinds of concepts for both non-formal and formal learners. The fifth one is gamification and augmented reality for interactive learning. Gamified learning skills and development are aided by apps like Duolingo, SoloLearn, coding platforms, and Kahoot! for quizzes, which use gamification techniques to make learning engaging.

Students enjoy answering questions while playing Kahoot quizzes. These gamified learning methods promote higher retention and motivation among learners. They take interest in quizzes, answering questions, conducting assessments, and completing different assignments. The second one is augmented reality for immersive learning. Google Expeditions, Merge Cube, and AR-enabled e-books allow learners to explore 3D models and simulations for better conceptual understanding.

These days, these e-books also include audio. If the student is interested, the e-book can also be accessed through the audio system. AR-based tools enhance non-formal learning. In medical training, architecture, vocational education, and many other skill-based fields of study. The sixth one is artificial intelligence and data analytics in non-formal education.

These days personalized learning with AI is going on. AI powered platforms provide adaptive learning path based on the learner's strengths and weaknesses like For example, Coursera AI-powered recommendations and Khan Academy's mastery learning approach is giving help to the learners to learn by their own pace. The second one is automated assessments and AI tutors. AI-driven assessment tools provide instant feedback on quizzes, assessments.

Chatbot and virtual tutors assist the learners in solving academic queries in real time. and these days small kids are also asking meta to solve their query. The comparison on application of educational technology between formal and non-formal whatever we had discussed till now I have prepared one comparison table and you can go through it when you will get the PDF. We can say that educational technology enhances learning across the model, either it's the formal or non-formal education system by making knowledge more accessible, interactive and engaging. It plays a transformative role in all stages of formal education from early childhood learning to higher education and professional training.

By integrating AI-driven platforms, virtual labs, gamification and digital classrooms, Educational Technology enhances the teaching learning process and improves the accessibility and ensures the career readiness. While formal education relies on the structured educational technology tools like LMS and the smart classrooms, non-formal educational education has the educational technology which has transformed the non-formal or ODL system by making learning accessible, flexible, cost-effective, etc. Through MOOCs, LMS platforms, mobile learning, virtual labs, AI-driven personalization, educational technology has expanded opportunities for lifelong learning and skill development, especially those who cannot go for the formal education system, or they can pursue non-formal education.

Despite challenges such as the digital divide and lack of practical training, educational technology continues to bridge educational gaps, empower learners, and provide equitable learning opportunities worldwide. So, these are the references for your further reading. I hope you will go through them for a better understanding of the concept of educational technology in formal and non-formal education systems.

Happy learning. Thank you.