

# **EDUCATIONAL TECHNOLOGY AND ICT**

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**Week-01**

**Lecture-03**

## **Module-3: Types and Forms of ET**

Hello dear learners, welcome to the SWAYAM-NPTEL course on Educational Technology and ICT. I am Dr. Sarita Anand, Assistant Professor, Department of Education, Vinaya Bhavana, Visva-Bharati, Santiniketan, West Bengal. Today, we are going to deliver Module 3: Types and Forms of Educational Technology. Here, we will discuss different types and forms of Educational Technology.

Earlier, we have covered concepts like the nature, origin, and evolution of educational technology and ICT, starting from the pre-industrial era to the 2020s, including artificial intelligence, virtual reality, and beyond. Now, we will talk about the types of educational technology. Educational technology encompasses a range of tools and methods designed to enhance learning, teaching, and educational administration.

Here are some of the main types of educational technology commonly used across educational institutions and organizations. Mind it, in any educational technology and ICT book, you will not find a particular type of educational technology. So, before talking about types of educational technology, we should understand the meaning of types. Here, the types of educational technology can be segregated based on the use and utilization of different technological devices, gadgets, and tools in the field of education. So, we will start with synchronous and

Asynchronous learning technologies. These are the two types of educational technology most prominently being used right now in the education system. First, synchronous tools. These tools enable real-time interactive learning experiences where students and teachers interact at the same time. Regardless of their location, allowing for immediate feedback and discussion.

Examples include video conferencing platforms like Zoom, Microsoft Teams, Google Meet, Jitsi, different live chats, and collaborative whiteboards, etc. You all have experience using maybe Zoom, Google Meet, or other video conferencing apps. Jitsi is also a small video conferencing app which you can add to your Gmail account as an extension. Different teachers are utilizing it as a video conferencing tool for their online classes.

So these kinds of video conferencing platforms are being utilized by teachers as synchronous tools. This synchronous learning is effective for direct engagement and immediate feedback, enabling live classes and virtual meetings. These days, school students, college students, higher education students, as well as teachers, are very much acquainted with these kinds of synchronous tools used in different educational institutions. Any meeting which can be organized online or in blended mode is being organized in their institutions. Now comes the asynchronous tools.

Asynchronous tools allow students to access learning materials at their own pace and convenience, or on their own schedule, as materials are not delivered in real time. What does that mean? It means they can download the document, keep it with them, and whenever they have time, they can use it, read it, or study it. Examples include learning management systems like Moodle, Canvas, Blackboard, different discussion boards, as well as the most prominent and freely used LMS, Google Classroom. Students can access recorded lectures, assignments, and online forums anytime they want.

These tools are valuable for self-paced learning and flexible access. So, dear learners, we must understand the concept of synchronous and asynchronous tools. Asynchronous tools provide the facility for you to access the content anytime. For example, you are using the SWAYAM platform, the SWAYAM NPTEL platform, to pursue this course on educational technology and ICT. Whenever you have time in the evening, at night, or whatever time suits you; you can access the course content. You can download it and read it whenever you have time.

This is the asynchronous mode, whereas when you attend live online classes, that is a synchronous tool. The next one is the learning management system. Learning management system platforms serve as central hubs for managing, delivering, and tracking online or hybrid learning experiences. They offer tools for course management, assessment, grade tracking, content delivery, and facilitate communication between students and instructors, meaning student-teacher interaction.

For example, popular LMS platforms include Canvas, Moodle, and Blackboard. I always insist to my teacher trainees and the students that at least you, as a prospective teacher, use any free LMS for your students so that you, as a prospective teacher, can learn how to manage the LMS. The best-suited example is Google Classroom. LMS tools help organize educational content. They facilitate communication and provide analytics on student performance.

What is that analytics? That analytics shows, for example, if there are 100 students in your class, how many have submitted the assignment on time? How many have submitted after the due date? How many have followed the system or instructions given by the teacher or the trainer? So, these LMS tools are very helpful for managing classroom content.

Whenever a teacher tries to fetch the first semester's content in the fourth semester, which may be utilized for the same student, they can retrieve it from the archived classroom. That is not possible in physical classes, as we are using either a whiteboard or a blackboard. So, LMS tools often feature modules for creating quizzes, managing assignments, grading, and providing feedback, making them integral to online and blended learning environments. By using these LMSs, we are not only facilitating ourselves as teachers but also training our students for future-ready classes. The next one is multimedia and presentation tools.

This is very essential and important tool for the teachers as well as the learners. Multimedia tools such as PowerPoint, Prezi and Canva enable teachers to create engaging presentations that incorporate text, images, audio and video. These days, this Prezi and Canva is providing opportunity to the educators to prepare their PPTs and other content materials with the help of AI. And as the teacher from the education field and a teacher trainer, we recommend our students to utilize the Canva.

This is the app beneficial for the teacher's fraternity. These tools can make lessons more engaging and help students to visualize complex concepts through animations, infographics and interactive elements. By providing different free available templates, we need not to prepare the PPTs by our own, but they are providing the readymade PPT templates and we can use it as per our requirement. There are different types of areas and we have to select the area and download the freely available designed templates and use it for content creation and facilitating the classroom teaching learning process with the help of these multimedia tools making our classes very interactive.

Gamification and game-based learning. Gamification integrates game mechanics such as points, badges, ladder boards, and rewards into learning activities to motivate students and

encourage active participation. Platforms like Kahoot, Pidgeys, and Classcraft use gamified approaches to encourage active learning and competition. The students, even my children studying in schools, they enjoy the assessment taken on Kahoot because Kahoot is giving them point.

They are giving them ladder board. They can see that where is their position, who has given right answers with minimum time. So, this kind of gamified assessment systems are motivating students to respond well in their classes. And I must appreciate the teachers and the teacher training institutions who are utilizing this kind of gamification and game-based learning approaches in their classes and teacher training programs. Game-based learning involves using actual games to teach concepts, often making learning more enjoyable and effective.

Educational games like Minecraft Education Edition and Roblox Education help students learn in an interactive and immersive way. These two concepts of gamified educational system I have learned from my So, what I want to say that these kind of advancement in educational technology are coming for the children. They are playing game, but these games are educational games. And here I have mentioned Minecraft education edition and Roblox.

So, you can also assist your children, your juniors. or the teacher trainees to use these kinds of educational games which may be utilized for teaching learning process and giving or helping students to learn in an interactive and immersive way. The games like chess.com students are playing in their schools and home to learn chess. This also is providing game-based learning experience and parents are motivated to play Okay, go and play with the chess.com.

So, this kind of game-based learning should be promoted and utilized in classes, not only for training but also for our school system. The next type is augmented and virtual reality. Augmented reality overlays digital content onto the physical world. Accessible through smartphones or tablets, it enhances the learning experience. Apps like Quiver and Google Expedition AR allow students to visualize historical artifacts, scientific concepts, and 3D models.

PM eVidya AR Now known as E-Pathshala AR, developed by CIET, Ministry of Education, Government of India, it is being utilized by school teachers and students in India. Presently, it provides AR experiences for 9th and 10th-grade science class content developed by NCRET. What does that mean? It means that the Government of India has

prepared an augmented reality app with the help of CIET, which is already available on the Google Play Store.

You can go and download this AR app to utilize it for the teaching-learning process. If you are a teacher, you can use it for your students in the classroom. And if you are a student or a parent, you can use it for your children or yourself. For this, they have made a system. AR provides 9th and 10th-grade science class experiments in the real world.

It means the 9th class chemistry experiment from chapter 4 can be viewed on your mobile phone or tablet. These kinds of advancements in the field of AR are making AI accessible to common people. Other apps like AR circuits for learning electrical circuits or Google Lens enable interactive learning by superimposing educational information onto the real-world environment. I suggest to all of you who are listening to this lecture to go to the Google Play Store, download the ePathshala AR app, and try using it for your teaching and learning process.

If you are not a school learner, then as a teacher, you should familiarize yourself with this augmented reality initiative by the Government of India. Virtual reality. Virtual reality provides immersive simulated experiences, ideal for subjects that benefit from visualization, such as virtual labs, historical site tours, medical training, or geographical exploration, enabling students to study complex topics in a controlled and interactive manner. For example, Oculus VR and HTC Vive allow virtual field trips, medical simulations, and interactive science labs.

VR headsets and apps like Google Expeditions and Atlas Space VR enable students to experience complex concepts firsthand. You all know that VR headsets are also available in various shopping malls. You can play there and experience immersive learning. There is the use of VR is for entertainment but if a teacher wants to give the experience of NASA, how NASA works, then definitely they can use this VR headset connecting with the YouTube NASA website and the students of their classes can feel the immersive experience of NASA visit. So, this kind of virtual reality is also different type of educational technologies aspect's part. The sixth one is mobile learning and e-learning platform. Mobile learning involves the use of mobile devices such as smartphones and tablets to access the educational content.

Educational apps like IGNOU e-content and NDL provides a wide range of learning resources. M-learning provides flexibility, enabling students to learn on go and at their own pace. It's particularly useful for micro-learning and for making learning accessible to

students without a traditional computer setup. These days, mobile learning apps are providing chance, opportunity to the learners to learn anytime in their classes, outside the classes. Teachers are providing assignments on the mobile phones. Students are able to access their Google Classroom or their WhatsApp chats for the educational purposes.

Any kind of academic information, content are being shared with the help of mobile. So, these days utilizing the apps like Igno e-content is essential for the student especially in higher education. The app like Diksha developed by government of India, Ministry of Education is being utilized by the students, the school students for their teaching learning process. The e-learning platforms, these platforms like Udemy, Coursera and Khan Academy, also the SWAYAM, provide online courses on various subjects, often created by experts or educational institutions.

They are designed for flexible and independent learning, offering courses in multiple languages and subjects. MOOCs are a type of e-learning platform offering open-access courses to a large number of participants. These are beneficial for lifelong learners, professionals, and students seeking supplementary knowledge. SWAYAM is an Indianized MOOC providing online education anytime, anywhere, which we are doing right now. Teachers like us who teach in higher education institutions can also benefit from this SWAYAM platform because it not only provides UG and PG courses for e-learning but also offers opportunities for professional development of teachers through ARPIT, the Annual Refresher Program for Teachers. So, the teachers of higher education institutions whether central universities, colleges, or other institutions like IITs and IIMs can also benefit from these online e-learning platforms.

Artificial Intelligence and machine learning in education are also types of educational technology. Adaptive learning tools provide personalized learning experiences by analyzing student performance and adapting content based on individual needs. For example, AI-powered tutoring platforms like Carnegie Learning adjust the difficulty level according to the student's progress and platforms like SmartParo and DreamWorks offer adaptive learning in math and science. AI-powered tools like chatbots, virtual tutors, and predictive analytics support students and teachers by automating tasks, providing feedback, and monitoring student performance.

These days, students are using chatbots. Small school-going students are using ChatGPT, or Meta AI for their small queries and education-related problems. So, adopting AI in our daily lives is also essential to be future-ready in our classes. For example, AI-driven

platforms like Socratic by Google offer students help in problem-solving by guiding them through questions. Meta AI is also doing the same. Meanwhile, grading tools powered by AI can assist teachers in providing faster feedback on assignments. Though we deny it or prohibit teachers from doing these things with AI, human intervention is important when using AI.

Different AI chatbots are being used by teachers and students frequently, like ChatGPT, Google Gemini, Copilot, and Meta AI, for solving their course content and related problems but remember, I always suggest, I always tell my students and learners, '*Don't be a slave to AI*'.

AI is good. The use of AI in education is good. But don't be a slave to AI. Be the master of AI. Don't be a slave to AI. '*Be the master of AI*' because if you are not doing that, then your HOTS will be affected. So, I am talking about your higher-order thinking. Mind it. Do not be dependent on AI.

Use it wisely. Assistive technologies help students with disabilities access learning materials and participate in the classroom. For example, it includes screen readers, speech-to-text software, and specialized devices for hearing-impaired students. Software like Kurzweil Education, text-to-speech, and apps that provide braille support are critical in making education more inclusive. These days, our VI students are using speech-to-text and text-to-braille typing.

These days, braille typing machines are also available where they input their PDF content provided by us as teachers, and they are printing it in braille form. So, these assistive devices are also a type of educational technology used for inclusive settings. E-books and digital libraries. Different e-books and digital libraries provide students with digital access to textbooks, reference materials, and other resources.

Examples include the National Digital Library of India, which I have already mentioned in the previous module, and Google Books. Recently, the Government of India has announced the 'One Nation, One Subscription' initiative. What does that mean? It means that access to books or journals by libraries will be shared with other institutions through links. With less money, we can access more books.

These resources support self-paced learning and research, reducing dependency on physical textbooks and increasing accessibility to knowledge. Virtual labs and simulations. Virtual labs simulate scientific experiments and practical activities, allowing students to

perform experiments that might be unsafe, impractical, or expensive to conduct in real life. For example, these include PhET Interactive Simulations and Labster.

These tools are invaluable in subjects like chemistry, biology, and physics, providing a hands-on experience in a virtual setting. Remember, if you recall chemistry labs and physics labs, chemistry labs can be hazardous for students. Nickel-cadmium experiments can cause explosions. So, to protect students from such unsafe or impractical situations, these virtual labs are very helpful.

Schools are suggested to use these virtual labs. Whichever institutions are using them can access the website and show the experiments to their students using these virtual labs. The next one is digital assessment and testing tools. Digital assessment tools facilitate online quizzes. Exams and formative assessments provide instant feedback to students.

These tools allow for various assessment formats, such as multiple-choice, short-answer, and essay-type questions, and can automatically grade and analyze results, saving teachers time. Platforms like Google Forms, Socrative, Quizziz, Testmoz, Hot Potatoes, and ExamSoft, etc. are widely used for both formative and summative assessments. Maybe you all remember when COVID-19 came, the whole education system depended on online platforms and these digital tools.

For examination purposes in higher education, especially in our institution, we utilized the facilities of Google Forms. Students were taking examinations in multiple-choice questions, as well as short-answer and essay-type questions, and attaching their responses in PDF form in the Google Form. So, these kinds of digital assessment and testing tools, like Quizziz and Testmoz, are also helpful for generating assessments for students. Hot Potatoes also provides detailed types of assessments, whichever is suitable for you, you can utilize. So, they often come with analytical tools for teachers to track student performance.

Including Google Forms, Socrative, and Edmodo, Digital assessments enable educators to measure learning outcomes more efficiently for teaching strategies and according to them. Now, we will talk about forms of educational technology. There are basically four forms of educational technology, and we will start with the first one, which is teaching technology. Teaching technology is the use of scientific methods and technological tools to improve teaching practices, making them more systematic, effective, and engaging.

It emphasizes teacher-centered approaches, focusing on enhancing instructional skills, managing the classroom, and improving the overall quality of teaching. Teaching technology is all about teaching students in a classroom setting with proper skills and training. For this, there are a few examples where we can see the use of teaching technology, like micro-teaching. This method allows teachers to refine their skills on a small scale before entering a full classroom setting. This micro-teaching is done in an artificial situation with a small lesson plan and a particular skill to train our prospective teachers.

This provides the opportunity for our prospective teachers to practice in an artificial situation on a particular skill. So, micro-teaching is basically skill-based teacher training. Audiovisual aids: schools in India, especially in rural areas, use teaching aids like charts, diagrams, and projectors to make lessons more interactive. And visually appealing, helping students better grasp complex topics. In government schools, governments are providing these audiovisual aids under the name of TLM.

Teaching-learning materials, which help teachers explain concepts in an easier manner with the help of these TLMs. Teacher Training Program. The National Initiative for School Heads and Teachers Holistic Advancement, which we call NISHTHA by the Ministry of Education, includes training modules that incorporate new teaching technologies, and strategies to upskill teachers across India. At present, NISHTHA training is ongoing at CIET, the Central Institute of Educational Technology.

The second form of educational technology is instructional technology. It is the use of technology and media to facilitate and deliver instructional content effectively. This approach is learner-centered, focusing on tools and resources that enhance student learning experiences, either in person or through online and blended learning. So, instructional technology refers to instruction delivered with the help of technology.

We can take the example of e-learning platforms. Platforms like Byju's, Vedantu, and Unacademy have transformed instruction in India, offering video lessons, interactive exercises, and live tutoring. These platforms support diverse learning needs by providing structured, accessible content across grades and levels. But there is definitely a matter of fees. Money is required to access these platforms like Byju's, Vedantu, or Unacademy.

The next one is digital classrooms. The Digital India Initiative has promoted smart classrooms equipped with projectors, tablets, and interactive whiteboards in many urban and semi-urban schools. These digital classrooms help make learning engaging and enable

real-time feedback on student progress. The teacher has to use the whiteboards or the interactive boards in their classes if they are available.

But for that, proper training is also required. So, I am at the DIKSH Portal. I have already mentioned that the Government of India Its SWAYAM platform, which we are right now pursuing, provides free online courses. While the DIKSHA portal supports teachers with resources for classroom teaching in schools, and the students from schools can also access the course content from the DIKSHA portal.

Both platforms offer digital content and supplement traditional classroom instructions, making education available nationwide. The third form of educational technology is behavioral technology. It focuses on applying behavioral science principles to encourage positive learning behavior and manage the classroom environment. Rooted in behavioral psychology, it uses strategies such as reinforcement and conditioning, and feedback to shape desired behaviors in students.

In teaching learning process at the time of teacher training we always talk about modification of behavior and whenever we are talking about the modification of behavior we are focusing on the modification of the behavior of the teachers whom have to act like a teacher. The prospective teachers have to learn that they are going to be a teacher. And they have to learn about how to deal with the student, classroom management, how to give the reinforcement and feedback to the responses of the student. So, we can take the example of positive reinforcement in classroom.

Many schools in India implement behavior charts and reward system to encourage good behavior and academic performance. For example, student may receive stars or points for completing assignments or participating actively in class. Appreciating words, gestures, writing good in their copy assignment is a positive reinforcement to the student. And this is the part of behavioral technology.

To promote the positive behavior in students, teachers are instructed to give the positive reinforcement. '*Shabash beta, very good. Bohot achcha bataya*'. This kind of responses are called positive reinforcement. And also, if the student is showing some negative behavior, or bad behavior, then definitely there is a requirement of negative reinforcement to check that kind of behavior. So, both kinds of reinforcement are required in the classroom teaching-learning process. Next one is social and emotional learning programs. Some schools incorporate programs that focus on building social and emotional skills, aiming to positively influence behavior.

These days, we are not only always talking about intelligence; we are talking about emotional intelligence and this emotional intelligence makes our students skilled with the understanding of the emotions of others. Programs like life skills in CBSE schools use role-playing and discussions to teach students self-regulation, empathy, and cooperation. The next one is inclusive classroom and behavioral support. For students with behavioral challenges or special needs, Indian schools increasingly incorporate Individualized Education Programs (IEPs) to provide specific support.

Special education teachers use behavior modification techniques to help these students adapt better to classroom routines. Right? If some student is facing a visual problem, may be VI (Visual Impairment) of any ratios, the teacher has to manage his or her seating arrangement. Provide the extra learning materials, providing the podcast. We are developing podcasts for our VI students.

So, this kind of inclusive classroom and behavioral support comes under the behavioral technology form of educational technology. The fourth form of instructional design and technology involves the systematic design, development, and organization of instructional materials and activities based on learning theories and educational psychology. This approach focuses on creating structured learning experiences that achieve specific educational objectives. For example, as I have already mentioned, the ADDIE model in curriculum development.

This ADDIE model- Analysis, Design, Development, Implementation, and Evaluation is used by educational institutions and organizations on a large scale to create structured learning materials. For example, content developers in India and e-learning companies use this model to ensure well-organized, effective content. which is provided not only to students but also to teachers. Teachers can also utilize these created contents for their classes. Gagné's 9 events of instruction.

Some progressive Indian schools and training institutions apply Gagné's 9 events, which guide the sequencing of learning activities from gaining attention to enhancing retention. This helps design lessons that are not only engaging but also focused on learning outcomes. So, as a student of educational technology and ICT, this will be your assignment to search for Gagné's 9 events of instruction. You should learn a few things and also search on your own.

The next one is designing MOOCs and online courses. Indian universities are developing online courses for platforms like Swayam, which we are currently working on. Use

instructional design principles to structure courses systematically, making them easy to follow and effective. Content is sequenced to gradually build skills, and assessments are embedded to reinforce learning at each stage.

In conclusion, each of these types and forms of educational technology addresses a specific aspect of the learning and teaching process, contributing uniquely to the overall educational experience. We can conclude that all these educational technologies offer diverse solutions that address the complex needs of modern education systems. From personalized learning to efficient classroom management and enhanced collaboration, by incorporating these technologies into education, schools and institutions can provide more engaging, inclusive, and accessible learning experiences. ultimately preparing students for the demands of the 21st century. These are the references for this module. You can follow these references for further studies.

Thank you.