

EDUCATIONAL TECHNOLOGY AND ICT

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Module-41: ICT Recourses

Hello dear learners, welcome to SWAYAM-NPTEL course on Educational Technology and ICT. I am your course coordinator, Dr. Sarita Anand, from the Department of Education, Vinaya Bhavana, Visva-Bharati, Santiniketan, West Bengal, India. Today, we will talk about Module 41: ICT resources. This is Lecture 41, and before going into the lecture, we will review the concepts covered. Earlier, in the previous lecture, we covered the Resource Center for Educational Technology (CET), AVRC, and EMRC. We discussed CET, its major contributions, and applications, the Audio-Visual Research Center (AVRC), and we also examined the major contributions and applications of AVRC as well as EMRC.

Now, we will talk about the ICT concept first, and then we will discuss ICT resources. We have already studied the concept of ICT, but before discussing the resources of ICT, we should revise what the concept of ICT is. It refers to the integration of digital technologies for processing, storing, retrieving, and sharing information for the learners, teachers, or anyone who wants to disseminate knowledge or information from one person to another. It includes hardware, software, networks, and digital communication tools to facilitate access to information and improve communication. ICT is widely used in education, business, healthcare, governance, and other sectors of our daily lives.

In education, ICT helps in teaching, learning, assessment, and administration, also enabling more interactive, flexible, and personalized learning experiences. It supports distance learning, e-learning, blended learning, and smart classrooms, making education more accessible and efficient for all stakeholders in the academic endeavor. So, now the ICT resources in education definitely, ICT resources are playing an important role in modern education enhancing teaching and learning through digital tools, multimedia content, and communication platforms.

These resources facilitate interactive learning, remote education, and digital literacy, contributing to the overall effectiveness of the education system. These days, teachers are not dependent only on the classroom teaching-learning process, but they are also involved in different types of traditional ICT resources as well as modern ICT resources.

So, we can categorize the basic types of ICT resources into two parts: traditional and modern ICT resources. We cannot ignore the traditional ones when we are working with modern ICT tools. So, because this is the evolution of technology, and every time it evolves, new technology emerges. So, we have to go with both traditional and modern technologies. When we consider modern resources, they are dynamic, interactive, and accessible tools. These enhance the overall education experience, while traditional ICT resources work well for creating a rich, multifaceted learning environment that caters to diverse teaching and learning styles.

Here, I have shown that in traditional ICT resources, there is basic technology integration, limited interaction, and restricted accessibility, whereas in modern ICT resources, advanced technological tools are available, high interactivity is present, and instant messaging is possible. If we want to organize any class in 5 or 10 minutes, we can message our students and arrange the class, but in traditional methods, this is not possible instantly. And with greater accessibility, whatever content we have prepared can be shared with a large number of students, like those pursuing the course, or even shared with national-level participants. So, the comparison between traditional and modern resources shows that both categories play important roles in education, enabling better teaching, learning, and administration.

It is upon us that how we are utilizing these resources as per our needs in the classroom teaching or administration purpose. So, we will take one by one the traditional ICT resources, we all know that these resources are having some limitation, but still now we are utilizing like limited interactivity, one way method is there in communication, basic technology is there, hardware-based technology is there like we are using the projector and PPT, this is traditional method. But when we are using the interactive PPTs like making it on Prezi and creating the link then they definitely that will becoming the modern ICT. So, restricted access is there if the we have prepared one content that is not connected with the internet only I have that content on the PC or the laptop then definitely students cannot access that content.

So, that ICT resource is limited or restricted access and if same content will be given on the any website, then definitely other candidates or the learners can be benefited. So, with physical presence required, this is the limited scope of the distance learning that the traditional ICT resources require the face to face or physical presence. Like we can take the example radio and educational broadcasting, radio programs like Gyan Vani in India broadcasted recorded lectures and discussions. So, these programs are good learners can be benefited, but that is one way. If the program is being telecasted learners cannot intervene if they are not able to understand.

The short wave or AM/FM radio, these used for the distance learning in remote areas and the phone in radio program, it allows the student teacher interaction via telephone call. So, special time and contact number may be given and the students or the learners can call the particular center and they can inquire whatever doubt they are having. So, the next one is television-based learning.

The educational television channels are also treated in the traditional ICT resources. Programs like Gyan Darshan, Doordarshan educational broadcasts provided pre-recorded lessons and different VCRs video cassette recorders and DVDs are used for recording educational lectures and documentaries and kept in recorded version and the third one is printed and analog media. If we are talking about your traditional ICT, they definitely you have heard the term OHP. These days these OHPs are almost gone, but many institutions are having these OHP, they are using it. It displays the transparency on a screen for a group instruction. It is may be utilized in a small classroom and the slide and film strips, these are also used in the classroom for visual learning. If you want to show something, some process, some structure, then definitely we can use the Filmstrips and Slides.

The printed study materials, all the printed books, manuals, journals, handouts, and whatever teaching aid you have prepared to show or teach in the class all those will come in the traditional ICT resources because they are in the print version either handmade or printed through machine they are coming under the traditional ICT resource. Then comes the fourth one early computer-based learning, like if you have prepared some you CD, ROM or Floppy Disk, those CDs can be simple CDs or rewritable CDs and you can contain your digital education content or that CD in offline mode and you can share it with your students.

Now, these days these traditional CD or Floppy, Floppy is gone so many years back, but definitely we should know the term they because the evolution is there earlier, we had used

the Floppy, then comes the CD, then rewritable CD, then Pen Drive and now we are moving towards the use of Drive. So, these are the evolution and we can keep the CD and Floppy in the early computer based learning and traditional ICT. Basic computer assisted learning, the used standalone application without internet connectivity that software will be uploaded in the computer and a student or the learner have to go to sit in the ICT lab or whatever computer room is there and they will use that CAL (Computer Assisted Learning) and there will be no internet connectivity, that software or the program will be uploaded on the system itself.

Then next one is Multimedia Projector, this shows the digital content, but lack the interactive elements. We can only project through the help of projectors, if we want to show any picture, photo, video, PPT, whatever we want to show to our students, we can use the multimedia projectors, but we cannot interact with them, we can only show them.

Then comes the modern ICT resources. These modern ICT resources are not need to be told because you all are aware that these are the internet based digital technologies, AI driven technologies which are now transforming the whole education system in an interactive way where accessibility and the personalized experiences of learning is possible. So, what are the characteristics of these modern ICT resources?

We all know that highly interactive. If there is possibility of two-way communication and engagement with the teacher and the learner then definitely that is that modern ICT resource is very helpful like, we use in our video conferencing or online classes when we organize this there is possibility of two-way communication and that video conferencing procedure is coming under the ICT resources either we are using video conferencing app, the video cameras and other devices. Then comes the internet-based ICT resources, it supports the online and cloud-based learning. If we have started recording of any video conferencing program or the class, then that can be uploaded on the OneDrive or Google Drive and it can be archived and reused whenever it is required for the teaching the same concept.

Then comes the multifunctional characteristics of the ICT resources. It combines the hardware, software and different type of networking tools. If this ability is not there in the ICT resource, definitely that resource will not come under the modern ICT. So, next one is flexible and accessible. The it encourages the distance learning.

Remote learning and anywhere, anytime learning, virtual collaboration, and real-time assessment. Teachers or trainers can evaluate and assess the work, the given tasks, the

questions, and the quizzes in real time, and they can give feedback to their learners, who can benefit from that feedback. So, what are the examples of modern ICT resources? This list can be expanded to a large size because if feasibility is there, you can prepare your own modern ICT resources.

No problem. Whatever I have mentioned here is as per my understanding and the available information with me. This information may change. Also, remember that educational technology and ICT are fields that are evolving. Daily, new things will come, new information will emerge, and it will be added to this given information.

So, as a learner, you can also add something new that I may not know or have not included. So, you are free to add it. So, start with online and cloud-based learning platforms. The MOOCs, you all know, you are having experiences regarding SWAYAM. Also, there are other platforms; private platforms are there-Coursera, edX, and Udemy offer online courses, and you will see that these platforms are generating so much revenue but in SWAYAM platform you will see for studying for learning there is no money involved. If you are a good learner, you want to learn new things, you can register by free and only for the certification, you have to pay the fee of registration of examination and then after examination, if you will pass, you will get the certificate.

But this is not going with the Coursera or edX, they are giving huge amount of money. The next one is LMS. LMS is now becoming the part and parcel of our teaching learning process. The LMSs like Google Classroom, Moodle, Blackboard are managing course content and student progress. And these days we definitely we teach in our classes in regular classroom like in B.Ed., M.Ed. or M.A education classes. We teach face to face, but we are managing educational content with the help of these LMSs. They are they are very useful for the teachers like us because whenever we want to fetch the information that what information or content I had given to the previous batch, I can fetch it out from this LMS and again, reshare with the next upcoming batch if that content is useful for the upcoming batch also.

The next point of online and cloud-based learning platform is the cloud storage and file sharing. This is the possible due to the modern ICT that we can use the Google Drive, OneDrive or Dropbox type of storage facilities and we can share our educational materials. If we prepare our video or audio podcast, we can share on the Google Drive easily because this is free. Always I keep the Google tools first.

We can share on Google Drive, put it on the drive, and then we can share the link with the learners. So, this is a good facility in modern ICT resources. The second type is interactive and smart classroom tools. Definitely, these days the trend is moving toward smart classrooms where we utilize smart boards and digital whiteboards. These whiteboards, digital whiteboards, or smart boards enable real-time annotations and presentations.

Not only can we present, but we can also write on the smart board. We can write, and if the screen is full, we can go to the next page and write again. If explaining a concept and wanting to refer back to the first formula, we can scroll and go to the first page, which was not possible when using blackboards or green boards in our daily classes. So, this is a very good feature of a smart classroom, and the next one is AR and VR. These are immersive and non-immersive.

Tools like Google Expeditions and Oculus Quest. Time and again, I mention these names, and I request that you try to use them. You will experience that, yes, if we explain a concept using these VR headsets, students will feel like they are in that situation or environment it will feel real-time. Then comes the AI-based tutoring system. These definitely include adaptive platforms like ChatGPT, IBM Watson, Gemini, Meta, Bixby, Copilot, or whatever names you can think of you can keep listing them. These provide personalized guidance not only to learners but also to teachers.

So, the third one is digital and multimedia learning. In modern ICT resources, these platforms or digital and multimedia learning resources are very important. Because as a teacher or a learner, we can access different educational free videos, lectures, and content from platforms like YouTube and educational podcasts. Channels like Khan Academy and TED-Ed offer free video lectures. You do not need to pay also, different institutions have their own YouTube channels and you can go and access whatever you want to learn.

Different podcast apps are there, as I mentioned in an earlier lecture, such as Podbean, Spotify, Anchor, and many others. Whatever is suitable for you, you can explore those podcasts. Next is gamification in education. To make our classes or learning interactive and enjoyable for learners, we can use these platforms as modern ICT resources, like Duolingo, Kahoot! and Quizizz.

I have prepared many quizzes on Quizizz because it not only provides a platform to create interactive quizzes but also offers a question bank. You will select the subject, you will select the learner's age group, and it will provide ready-made questions. If those questions are suitable for your content or quizzes, you can adopt or use them. These facilities save

our time and resources, and these modern ICT resources are like daily life helpers in academics.

The next digital and multimedia learning platform is simulated based or simulation-based learning. I have already mentioned like in physics and chemistry we can use PhET simulations, virtual labs can be utilized, IIT Bombay and other IITs are also using making these virtual labs to enhance the practical learning in the classes. And the fourth type or category I have made that is communication and collaboration tool. Definitely in teaching learning process, communication is the strongest point. If as a teacher, I know many things, I am very knowledgeable, but I am unable to disseminate that knowledge to my students, then that knowledge will not work.

So, this communication with the help of proper platform with the proper procedure is important that how easily and conveniently we can share the information and communicate to our learners. So, first one I have made that these video conferencing and webinars we have already discussed in previous lectures also that we can utilize these ICT resources for our our not only teaching learning process, but also to collaborate with other institutions regarding research methodology or any faculty development program, any training program which we can give and take the resources with each other on online platform. We can collaborate with the other institutions also.

Then comes the social media for learning, yes; these days we all are using social media very fast speed in very fast speed but we can utilize it for the academics also. You can use Facebook groups, LinkedIn learning and Twitter for discussion and help in knowledge sharing. So, if we are in right direction definitely social media can be used as an alternative pedagogy for the teaching learning process but it depends that if we are not distracting ourselves from the educational purposes.

If our purpose is educational, definitely these social media will be utilized for the learning. And the next one is AI chatbots and virtual assistants. They are helping a lot. Suppose you are having Google Assistant, Meta, Siri, Alexa, Bixby. Bixby is the Microsoft AI which we are using in our Samsung S22 Ultra and it can call, it can help you, even it can recognize your voice and whatever instruction you are giving, they can perform accordingly.

So, these AI tutors are supporting the students, the teacher and giving the instant answer to your queries. Earlier we had practice of ask the Google the Google Baba and it provides the written information, but with the help of these AI Chatbots these days we are facilitating our teaching learning process also. Now, whatever we had discussed in the name of

traditional and modern ICT resources, I have prepared one comparison of both the concepts like the regarding the technology.

Traditional ICT resources using analog type of facilities whereas, the modern ICT resources are using digital technology. Regarding access, a classroom we can use the traditional ICT resources in classroom only, but the modern ICT resources are providing greater opportunity more access via the help of mobile or cloud computing. Then comes the interactively activity like this one- way communication will be there in traditional way of ICT resources and their use like if we are using television or radio broadcast. But if we are using the modern ICT resources like we are using zoom meetings or Google meeting to organize our classes online classes, then the interaction will be two-way.

Then comes the flexibility, yes definitely the physical resources present in the physical classroom require the physical presence of the teacher as well as the learner. So, this is the basic difference in traditional and modern ICT that modern ICT is can be controlled, organized through the remote learning and we can utilize the classes sitting somewhere else. The same thing I have prepared one table also for your better understanding you can go through it for proper understanding the difference between the traditional ICT resources and modern ICT resources.

Now, categorizing these ICT resources can be the basic justification I have given that we as per the use, the facility we can categorize these modern and traditional ICTs and I have given here the justification on the basis of features which have we have already discussed. Now, the types of resources in education in earlier lectures also we had discussed about the ICT educational technology different approaches where hardware, software, internet-based resources and networking tools were used. So, I have now given the type of ICT resources, there were two categories traditional and modern ICT resources. Now, the type of ICT resources in education will be based on the different hardware, availability of hardware, software, internet-based resources and networking tools.

So, this hardware is we know that these are the tangible tools essentially for computing the task different devices like computer the projector the mouse the keyboard all are coming under the hardware, whereas the software we know the all kind of intangible tools like the software the programs or digital functionality functionality or the features of any program that come under the software and we know that hardware is incomplete with without the software and also the software is incomplete without the hardware, the both are complementary to each other and the third one is internet-based resources, these resources

are having the features of accessing with the help of internet and with if you are not having the internet these ICT resources cannot be accessed and then the last one is networking tool and these networking tools are the connecting devices like we are having different type of hubs to make the connections.

So, here I have mentioned because you all have studied already regarding the hardware approach, software approach etc. That is why I am not giving much emphasis because you already have learned regarding the physical devices. used or utilized or named as a hardware resources. So, here are the few names like tablets and smartphones. Whatever the gadget you are using

If you want to use the different educational apps or e-books, definitely these hardwares are required. Either it's PC or personal computer, laptop, tablet, smartphone, whatever hardware you are using. Then comes the interactive whiteboard. This is also hardware device. If you are having a good hardware or interactive whiteboard, then definitely it will have some dynamic content.

It will have touch screen. some stylus with it and you can use it for your teaching learning process the projectors that this is also the basic hardware which every class is having these days and you can project your content from the small screen to large screen and the AR, VR devices and time and again I am saying that these devices are very much utilizing being utilized in the science medical engineering and not only that in the school education also they are utilizing like I have already mentioned ePathshala AR which was earlier named as PM eVidya AR, it can be utilized for class 9th and 10th science students who are pursuing the CBSE classes.

Now, the servers and storage devices, all kind of servers and storage devices like if you are using hard drive, different extensional hard disk and your pen drive it all are coming in the storage devices and servers' big machines are also there.

The next one is digital camera and scanner definitely these digital cameras and scanners are being utilized to prepare the educational resources. Then comes the software. You already know that the LMS I have mentioned, educational apps and learning resources are there and we can utilize these resources as an ICT resource, multimedia tools like if we want to utilize or prepare some educational content, we can use the ScreenPal, Camtasia for creating digital educational content. So, whatever software you use definitely that can be utilized. If you know to use then you can be it can be utilized in the educational purposes.

Then comes the digital libraries NDLI, UNESCO digital library, different Google books and Project Gutenberg offer free open resources and also those institutions who are having digital library and free access to those books those can be utilized as a software resources. So, I have mentioned few software here like Geogebra for mathematics, PhET for simulation, AutoCAD for engineering these are few software. Assistive technology software like tools like JAWS, screen readers or speech to text reader I had also mentioned it in earlier lecture also. The language learning apps like Duolingo time and again I am taking the name BBC languages etc. The collaboration tools or video conferencing apps are there, there is long list like Zoom, Microsoft, WebEx, Google Meet.

One short small video conferencing app called 'Jitsi' is there, which you can add it in your Google Gmail account and whenever you want to open it you can use the Jitsi, no need to search. Similarly, if you are having a Screencastify that can be also added to your Gmail and anytime you can access it to prepare the free video for 5 minutes. If you want to prepare any instructional video, you can go through the Screencastify. Then comes the third one, Internet and Cloud Based Resources. I have already mentioned that these platforms can be utilized like MOOCs can be utilized and NPTEL courses are there on MOOC.

The Google Scholar online research portal is there using Google Scholar base search engine ResearchGate, etc. Then also the OERs there is another lecture I had mentioned the different OERs. So, we have already learned about the OERs, the concept of OER, CC licensing in earlier lecture you can utilize these resources these OERs as your ICT resources. Then comes the educational TV and radio programs like Swayam Prabha, Gyan Darshan or Gyanvani programs can also be utilized as the ICT resource. And the cloud-based storage I have mentioned, these cloud-based storage like Google Drive, OneDrive can be utilized for the keeping your educational content.

Then comes the networking and communication tools and resources. For networking and collaboration and Connectivity requirements you can go through the internet and different networking sites or the resources like internet and cloud services, provide online learning materials and email and messaging system like Gmail, Outlook, Whatsapp and Telegram. These days we are mailing less and Whatsapping in greater amount because these are the instant messaging services and for the teaching learning process to communicate to give the instructions, we are frequently using WhatsApp and Telegram.

Then comes the video conferencing tools it can be utilized with the help of networking, if you're the people your participants are larger you can go for the zoom or cisco Webex if

you are using your personal Gmail id for creating the google meeting that is only having the hundred participants capacity, so as per the requirement you can choose the networking sites and these platforms for your classes then comes the social media definitely YouTube educational channels and I forgot to mention the name that is TeacherTube- TeacherTube is also being utilized for the networking at the school level where we are engaging our school students for the YouTube videos for teaching and learning process.

Then discussion forums, these are very important for the academics like the courses on SWAYAM, we are having discussion forum, you are time and again writing some queries and we are trying to satisfy you all as a learner that whatever is your query we will give the answer. So, these are promoting and facilitating the teaching learning process as an ICT resource in the education.

Now, application of ICT in education, there are different applications like blended learning, distance education, flipped classroom, gamification in education, STEM education, assessment and evaluation and digital literacy program. All these are I have mentioned in earlier lectures also.

The concept of blended learning and flipped classes you have learned and these are the concept which earlier I mentioned in the previous lecture that is why I am not going in detail, but the distance education we all know that through the IGNOU and other online platforms we can go through with the help of these ICT tools. Definitely hardware and software both are required and these are the features of applications of ICT in education.

Now the Challenge Every time, every concept has its own challenges, here is also these ICT resources are having the challenge of digital divide, those who are having good quality of computer laptop or the smartphone they are using more efficiently, if you are having their proper internet connectivity the day and then that okay otherwise the

Economic and geographical barriers are there in the field of ICT utilization. Then comes the teacher training. Teacher training is also biggest issue. Every time you see in the field of educational technology and ICT, there are some general challenges and these are the general challenges like the teacher training issues, digital divide is there, lack of awareness is there, cyber security issues are there, maybe fraud or data breaches or inappropriate content can come on the screen and you will not feel good. So, these are the challenges also, the infrastructural gap is the basic problem in school level especially because unreliable electricity and poor internet connectivity in rural areas.

If electricity is not there then definitely you cannot utilize the hardwares like projector or the computers. Your mobile phone will work, but with the help of mobile phone you cannot show your educational content to your large-scale classes. So, this is the challenge of ICT in education, also the cost of technology definitely cost is also the matter purchasing of the different devices software and hardware and its maintenance is also the issue, then resistance to change in our Indian education system, definitely resistance to change is the bigger problem some educators and institution hesitate to adopt new challenges they will tell you that 'ekhane eisab chalena' means that it will not go here, because we are the traditional people, we are not going to use this kind of ICT resources in our classes.

So, we can conclude that ICT resources have transformed education by making learning more accessible, engaging and interactive. They support digital classroom, distance education, research and skill development. Both traditional and modern ICT resources are important, they play important role in education but modern ICT tools have revolutionized learning by making it more interactive, accessible and flexible. The integration of AI, cloud computing and immersive technology continues to shape the future of education. Definitely after 5 years you will see that the education system has been changed with the help of these AI technologies.

However, challenges like the digital divide, lack of teacher training, cybersecurity issues, and infrastructural gaps need to be addressed for effective ICT integration. There must be equal access to both traditional and modern ICT resources, ensuring inclusive and equitable learning opportunities. for all learners and teachers as well. So, these are the references I have provided. I hope you will go through them for your further learning.

Thank you. Keep learning.