EDUCATIONAL TECHNOLOGY AND ICT

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Lecture-13

Module 13: Systems Approach to Education

Hello dear learners, welcome to the 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 the systems approach to education. This will be Module 13 and Lecture 13. Till now, we have covered the course about different approaches to educational technology: educational technology first, second, and third; the comparison of the hardware and software; and the system approach and the major components of the system approach in education.

Now, the whole system approach and the hardware and software aspects will be dealt with as per the Indian educational context. Till now, we have tried to understand the teaching-learning process; now, we will discuss the Indian educational context. In the Indian educational context, the educational approach in the systems approach is an organized methodology for analyzing, designing, and implementing the educational process as interconnected parts of a holistic system.

It integrates various elements such as curriculum, instructional methods, resources, learners' characteristics, and assessments, ensuring each contributes towards the educational objectives. This approach emphasizes structured planning, coordination, and continuous evaluation, optimizing educational outcomes, making it particularly relevant in India, where diversity in student backgrounds, regions, languages, and resource availability can be challenging. The system approach in India has been widely adopted in areas like teacher training, curriculum development, and technology integration to promote standardized yet adaptable educational practices that can address both national educational goals and local needs.

Following are the main points of the systems approach in the Indian context. The first one is structured and goal-oriented. It helps align educational objectives with instructional

strategies and resources to achieve desired learning outcomes. Resource optimization. Given resource constraints in many Indian schools, the systems approach ensures efficient use of available tools and materials.

It means software and hardware compiled together to utilize them at their best. The third is scalability and adaptability. It enables customization to accommodate India's linguistic and cultural diversity, allowing flexibility in implementation across states and regions. Continuous feedback ensures that teachers and administrators receive ongoing insights to adapt their methods and materials based on students' feedback and performance.

The systems approach in the Indian education system: holistic and goal-oriented frameworks. The systems approach starts by defining clear, measurable educational objectives aligned with national policies such as the National Education Policy 2020 (NEP 2020), which aims to make education more inclusive, skill-based, and technology-driven, as we have already discussed in earlier lectures. In India, this approach is especially relevant for large-scale educational programs like *Samagra Shiksha Abhiyan*, which integrates efforts in primary and secondary education under a unified framework by setting clear goals. Such programs ensure that resources and methods are directed toward achieving both academic excellence and social equity.

The second one is a major component of the system approach in Indian education. We have to understand what the input is in this education system. These include all resources such as teachers, curriculum content, teaching material, infrastructure, technology, and funds. In rural or economically disadvantaged areas, inputs can be customized based on resource availability, focusing on low-cost and effective solutions. The process involves instructional methods, administrative functions, and training of educators.

For instance, in teacher training programs, instructional methods are designed to cater to regional variations in languages and learning levels, ensuring that teachers are well-prepared to deliver education that meets the diverse needs of students. The output? These are the learning outcomes, including literacy rates, skill acquisition, and student retention, which are used to measure the success of the educational system. Outputs also include social objectives such as promoting inclusivity and gender equality. Feedback Mechanism

Feedback is collected through regular assessments, surveys, and evaluations, ensuring that programs can be continually adjusted based on real-world results. This feedback is crucial in the Indian setting as it helps educators and administrators Understand the diverse needs of students and adapt instructional strategies accordingly. In higher education systems like

Indian universities, there is IQAC, the Internal Quality Assurance Cell, where they collect feedback from students on how the courses are running. Here in SWAYAM courses, we also collect feedback from our learners.

In India, the educational environment encompasses the physical infrastructure, cultural context, socio-economic factors, and linguistic diversity. Policies are often made for specific regions to create an environment conducive to learners. The third one is the application of a system approach in Indian education. Curriculum development. The first application of this system approach is curriculum development.

It applies in creating a curriculum that aligns with the competencies outlined in NEP 2020. For example, NCERT has implemented competency-based curricula that integrate life skills and vocational education, aiming to make learning more relevant and comprehensive. Technology Integration: Under Digital India and NEP 2020, digital literacy is promoted across schools. The system's approach allows for the effective integration of technologies, such as using ICT tools for remote learning in regions with limited access to traditional educational resources. The DIKSHA app and the CIET produce many things related to ICT and technology to improve traditional educational resources.

Teacher training programs. Teacher education in India utilizes the system approach to ensure that teachers receive continuous professional development. Programs like NISHTHA, National Initiative for School Heads and Teachers Holistic Advancement, are developed to provide ongoing training to teachers, helping them integrate contemporary pedagogical practices and adapt to diverse student needs. CIET, the Central Institute of Educational Technology, is also working continuously for NISTHA and DIKSHA. The next one is assessment and evaluation.

In systems-based evaluation, continuous assessment and feedback are integrated to track student progress and program effectiveness. For example, Pariksha Pe Charcha and other initiative aims to reduce exam stress and evaluate students based on their holistic understanding rather than rote memorization alone. This *Pariksha Pe Charcha* by our honorable prime minister is very famous between the students. They take interest for the listening this variksha pe charcha.

The fourth one is advantages of the system approach in India. What are the advantages? Equity and inclusivity, we have already discussed also. By structuring educational interventions to address diverse learning needs, the systems approach helps in reducing educational disparities among different socio-economic and cultural groups.

For example, special provisions under *Sarva Siksha Abhiyan* target girl students and children from marginalized communities for their learning and education. Resource efficiency, given the budget constraints often faced in Indian education, this approach ensures optimal use of available resources. Schools in resource limited areas can focus on basic infrastructure and affordable teaching aids making education accessible while maintaining the quality of education in Indian scenario. The cultural relevance, the approach considered local context which allow for culturally and linguistically relevant teaching. This is especially important in India where there are over 22 officially recognized languages and many more dialects.

The fifth one is the challenges of implementing a systems approach in India. When we talk about many facilities, there are challenges in implementing this systems approach. The first one is resource disparity. Definitely, while the systems approach is highly effective in theory, disparities in funding, infrastructure, and teacher training can limit its effectiveness in practice, particularly in remote and rural areas.

Complexity in coordination: Coordination between different stakeholders, including state and central educational bodies, can be complex and bureaucratic. This often leads to delays in implementation. Many times, the center starts some schemes, but states do not approve them or implement them in their own states. That's why this systems approach is facing challenges in implementation in the Indian scenario.

Resistance to change: Many times, traditional mindsets in some areas may resist new approaches, particularly when it comes to technology integration or pedagogical reforms that challenge their established practices. For example, many people, lakhs of people, were not able to accept the technological advancement of online classes before COVID, but after COVID, during COVID, they realized the importance of this educational technology and now they are accepting that yes, this resistance to change should be changed in the practical scenario. Otherwise, coping with the different advancements in the technological field in education will be difficult.

Now, some examples of system approach in practice at present. Samagra Siksha Abhiyan, it is clear example of the systems approach in action in India. Sarva Siksha Abhiyan and Samagra Siksha Abhiyan both are the integrates primary, upper primary and secondary education programs under one unified framework focusing on access, equity and quality improvement. By standardizing the curricula, teacher training and learning assessment while adapting to local needs, Sarva Siksha Abhiyan as well as the Samagra

Siksha Abhiyan exemplifies the system approach addressing gaps across different educational stages and ensuring continuity and student learning in the Indian scenario.

For the easy understanding, a comparison of hardware and software technology in education detailing their roles, application advantages and limitation has been given. Understanding both is essential for effectively integrating technology into educational environment. This is the comparison table. of hardware technology and software technology where definition component and the purpose of hardware and software technology is given.

For example, we can take the component it includes the tablet projectors etcetera which we have already discussed and the software technology where we have mentioned the LMS and Duolingo etcetera these are the software. The purpose of the hardware we have already discussed. That delivery of the content enables by using these hands-on devices or the gadgets whereas the software technology is the purpose is to support the curriculum or delivery of the content to the learners.

The application of this hardware technology is the smart classroom where we use the interactive boards, white boards or the tablets whereas the software we use those, software in those smart boards or the tablets like Quizlet or the e-learning contents or the platform or the websites in the software technology. The advantages of the hardware technology definitely without the hardware software is incomplete and without the software hardware is incomplete.

So, support hardware supports the hands-on learning experiences to the learners whereas, the software provides the cost-effective facilities to the learners provided by the system either it is school or college or the university and there are disadvantages also for these both technologies like hardware is costly and the many rapid updates are going on.

So, devices are becoming outdated and the same with the software technology also there is digital divide it is costly also and more dependency on the software technology it chokes the HOTs of the learner's higher order thinking level and the examples from the education we can use the tablets or the laptops or the PCs to or the mobile for reading the ebooks or the lessons or the online resources but in the software side, we can utilize different LMSs, different learning platforms like Google Classroom. different content creation sites like Canva.

So, these are the different aspects and according to that we had discussed. Now, these differences of hardware and software technology can be understood with the help of the component listed here in the section of differences. Now, differences-

The physical versus digital: Hardware is tangible and includes physical equipment that requires maintenance, repair and sometimes physical space in the classroom. And the software on the other hand is tangible, stored in, accessed in digitally and can be uploaded or updated or modified without replacing the physical component.

The second one is the, cost implications: We have already also discussed that Hardware typically incurs higher initial costs for acquisition and setup, plus ongoing costs of maintenance and upgrades, whereas software often has lower upfront costs, particularly with cloud-based and subscription-based models, and can be scaled more easily across larger groups of students without additional equipment. Open-source software is also cost-effective for educational purposes.

The usability of hardware can be limited by the physical setup and infrastructure of the institution, such as a limited number of computers or projectors in a school or college. Software, if hosted online, is accessible from multiple locations and devices, allowing remote learning and flexible use.

The reliance and interdependency: we have already discussed that hardware and software technologies are often interdependent. For instance, software is only accessible when compatible hardware is available. Apps on tablets or LMS on computers, if your system is not updated well or over time, then you cannot use open-source software like OBS on your computer or laptop. So, these interdependencies exist between hardware and software. A balanced approach to using both ensures maximum utility. However, one without the other may limit the full potential of educational technology.

So, what are the challenges of implementation? While the benefits are numerous, the challenges exist. Cost is a challenge. The digital divide is a challenge. Teacher training, privacy, and security are also challenges. The cost is the major issue. Each and every school and college are crying for the cost effectiveness because they are not providing the facilities and saying that there is no money for the hardware. Acquiring and maintaining hardware and software can be expensive. particularly for the institutions with limited budgets. Digital divide, students without access to devices or internet connectivity are at disadvantage.

Underscoring the needs of policies that address disparities in technology access. So, governments or the institutions have to try to fill the digital divide in the educational institutions. Teacher training, definitely effective use of educational technology requires teacher training. Teachers need continuous professional development to integrate hardware and software tools effectively, especially the updated softwares which they can use in their classroom teaching learning process with the small training programs.

Privacy and security using software to store students' data raise privacy and cyber security concerns necessitating the strong data protection measures. So, in conclusion, we can say that the system approach in Indian education provides a structured and effective framework to achieve national educational goal while adapting to the unique challenges posted by countries' diversity. It integrates resources, methodologies, and evaluation in a comprehensive way, promoting equitable, high-quality education for Hardware provides the foundation, the physical tools needed for the digital interaction, while software offers digital content and platform that drive educational activities.

Together, they create an interactive, engaging, and efficient learning environment. Schools and institutions must balance the two, considering factors like cost, accessibility, and adaptability to make technology integration feasible and impactful for all learners. These are a few references for your learning ahead, and you can go through them for further reading.

Thank you.