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## ICT in Education: The Indian Perspective

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*Education is the most effective instrument which can instill people with the knowledge, skill and capability to observe and analyze the sense of purpose and confidence for building a dynamic energetic, just and unified nation able to take care of its entire people. Education does not have accumulation of information as its terminus. It should engender wisdom, which comprises tolerance, understanding, compassion and large-heartedness in outlook. Perhaps, this is what Plato meant when he said that the purpose of education is “not to fill an empty vessel but to turn the eye of the soul towards light”.*

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### Information & Communication Technology

ICTs stand for information and communication technologies and are defined as a “diverse set of technological tools and resources used to communicate, create, disseminate, store, and manage information.” These technologies include computers, the Internet, broadcasting technologies (radio and television), and telephony. Information technology defines an industry that uses computers, networking, software programming, and other equipment and processes to store, process, retrieve, transmit, and protect information. China and the United States. Since independence the higher education in India

### Growth of Higher Education in India

India’s higher education system is the third largest in the world after has increased manifold in its institutional capacity as can be observed from the given table:

Table - 1  
Institutional Capacity expansion in Higher Education

Institutional capacity indicator	1950	2008
Number of University Level Institutions (including 11 Private University)	25	431
Number of Colleges	700	20,677
Number of Teachers	15,000	5,05,000
Number of Students Enrolled	1,00,000	1,16,12,000

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## The Aim of Involvement of ICT in Education

For developing countries like India, ICTs have the potential for increasing access to and improving the relevance and quality of education. It thus represents a potentially equalizing strategy for developing countries. ICTs greatly facilitate the acquisition and absorption of knowledge, offering developing countries unprecedented opportunities to enhance educational systems, improve policy formulation and execution, and widen the range of opportunities for business and the poor.

One of the greatest hardships endured by the poor, and by many others, who live in the poorest countries, is their sense of isolation. The new communications technologies promise to reduce that sense of isolation, and to open access to knowledge in ways unimaginable not long ago. However, the reality of the Digital Divide—the gap between those who have access to and control of technology and those who do not—means that the introduction and integration of ICTs at different levels and in various types of education will be a most challenging undertaking. Failure to meet the challenge would mean a further widening of the knowledge gap and the deepening of existing economic and social inequalities. The multifaceted aim of involvement of ICTs in education may be given as follows:

### ICTs for Expanding Access to Education

ICTs are a potentially powerful tool for extending educational opportunities, both formal and non-formal, to previously underserved constituencies—scattered and rural populations, groups traditionally excluded from education due to cultural or social reasons such as ethnic minorities, girls and women, persons with disabilities, and the elderly, as well as all others who for reasons of cost or because of time constraints are unable to enroll on campus.

### Anytime Anywhere

One defining feature of ICTs is their ability to transcend time and space. ICTs make possible asynchronous learning, or learning characterized by a time lag between the delivery of instruction and its reception by learners. Online course materials, for example, may be accessed 24 hours a day, 7 days a week. ICT-based educational delivery (e.g., educational programming broadcast over radio or television) also dispenses with the need for all learners and the instructor to be in one physical location. Additionally, certain types of ICTs, such as teleconferencing technologies, enable instruction to be received simultaneously by multiple, geographically dispersed learners.

### Access to Remote Learning Resources

Teachers and learners no longer have to rely solely on printed books and other materials in physical media housed in libraries (and available in limited quantities) for their educational needs. With the Internet and the World Wide Web, a wealth of learning materials in almost every subject and in a variety of media can now be accessed from anywhere at any time of the day and by an unlimited number of people. This is particularly significant for many schools in developing countries, and even some in developed countries, that have limited and outdated library resources. ICTs also facilitate access to resource persons—mentors, experts, researchers,

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professionals, business leaders, and peers—all over the world.

ICTs for better Grooming of Students for the modern workplace.

One of the most commonly cited reasons for using ICTs in the classroom has been to better prepare the current generation of students for a workplace where ICTs, particularly computers, the Internet and related technologies, are becoming more and more ubiquitous. Technological literacy, or the ability to use ICTs effectively and efficiently, is thus seen as representing a competitive edge in an increasingly globalizing job market. Technological literacy, however, are not the only skill well-paying jobs in the new global economy will require,

ICTs to improve the Quality of Education.

Improving the quality of education and training is a critical issue, particularly at a time of educational expansion. ICTs can enhance the quality of education in several ways as follows:

Motivating to Learn

ICTs such as videos, television and multimedia computer software that combine text, sound, and colorful, moving images can be used to provide challenging and authentic content that will engage the student in the learning process. Computers with Internet connectivity can increase learner motivation as it combines the media richness and interactivity of other ICTs with the opportunity to connect with real people and to participate in real world events.

Facilitating the Acquisition of Basic Skills

The transmission of basic skills and concepts that are the foundation of higher order thinking skills and creativity can be facilitated by ICTs through drill and practice. Most of the early uses of computers were for computer-based learning (also called computer-assisted instruction) that focused on mastery of skills and content through repetition and reinforcement.

Enhancing Teacher Training

ICTs have also been used to improve access to and the quality of teacher training. Institutions are taking advantage of the Internet to provide better teacher professional development opportunities to in-service teachers. At Indira Gandhi National Open University, satellite-based one-way video- and two-way audio-conferencing was held in 1996, supplemented by print-materials and recorded video, to train 910 primary school teachers and facilitators from 20 district training institutes in Karnataka State. The teachers interacted with remote lecturers by telephone and fax. In China, large-scale radio and television-based teacher education has for many years been conducted by the China Central Radio and TV University.

ICTs to transform the Learning Environment into one that is Learner-Centered

Research has shown that the appropriate use of ICTs can catalyze the paradigmatic shift at the heart of education reform in the 21st century. If designed and implemented properly, ICT-supported education can promote the acquisition of the knowledge and skills that will empower

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students for lifelong learning. When used appropriately, ICTs—especially computers and Internet technologies—enable new ways of teaching and learning rather than simply allow teachers and students to do what they have done before in a better way. These new ways of teaching and learning are underpinned by constructivist theories of learning and constitute a shift from a teacher-centered pedagogy—in its worst form characterized by memorization and rote learning—to one that is learner-centered.

### Forms of ICTs in Education

#### Radio and TV Broadcasting

Radio and television have been used widely as educational tools since the 1920s and the 1950s, respectively. There are three general approaches to the use of radio and TV broadcasting in education:

##### Direct Class Teaching

Where broadcast programming substitutes for teachers on a temporary basis.

##### School Broadcasting

Where broadcast programming provides complementary teaching and learning resources not otherwise available.

##### General Educational Programming over Community

National and international stations, which provide general and informal educational opportunities.

##### Teleconferencing

Teleconferencing refers to “interactive electronic communication among people located at two or more different places.” There are four types of teleconferencing based on the nature and extent of interactivity and the sophistication of the technology:

- Audio conferencing involves the live (real-time) exchange of voice messages over a telephone network.
- Audio-graphic conferencing: When low-bandwidth text and still images such as graphs, diagrams or pictures can also be exchanged along with voice messages, then this type of conferencing is called audio graphic. Non-moving visuals are added using a computer keyboard or by drawing/writing on a graphics tablet or whiteboard.
- Videoconferencing allows the exchange not just of voice and graphics but also of moving images. Videoconferencing technology does not use telephone lines but either a satellite link or television network (broadcast/cable).
- Web-based conferencing, as the name implies, involves the transmission of text, and graphic, audio and visual media via the Internet; it requires the use of a computer with a

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browser and communication can be both synchronous and asynchronous.

Teleconferencing is used in both formal and non-formal learning contexts to facilitate teacher-learner and learner-learner discussions, as well as to access experts and other resource persons remotely. In open and distance learning, teleconferencing is a useful tool for providing direct instruction and learner support, minimizing learner isolation.

### Computers and the Internet for Education

There are three general approaches to the instructional use of computers and the Internet, which are as follows:

#### Learning about computers and the Internet

Learning about computers and the Internet focuses on developing technological literacy. It typically includes:

- Fundamentals: basic terms, concepts and operations
- Use of the keyboard and mouse
- Use of productivity tools such as word processing, spreadsheets, and data base and graphics programs
- Use of research and collaboration tools such as search engines and email
- Basic skills in using programming and authoring applications such as Logo or Hyper Studio
- Developing an awareness of the social impact of technological change.

#### Learning with Computers and the Internet

Learning with the technology means focusing on how the technology can be the means to learning ends across the curriculum. It includes:

- Presentation, demonstration, and the manipulation of data using productivity tools.
- Use of curriculum-specific applications types such as educational games, drill and practice, simulations, tutorials, virtual laboratories, visualizations and graphical representations of abstract concepts, musical composition, and expert systems.
- Use of information and resources on CD-ROM or online such as encyclopedia, interactive maps and atlases, electronic journals and other references. Technological literacy is required for learning with technologies to be possible, implying a two-step process in which students learn about the technologies before they can actually use them to learn. However, there have been attempts to integrate the two approaches.

#### Learning through Computers and the Internet

Learning through computers and the Internet combines learning about them with learning with them. It involves learning the technological skills “just-in-time” or when the learner needs to learn them as he or she engages in a curriculum-related activity.

## Role of Teachers in ICT Environment

Learning and Teaching has undergone a tremendous change due to the emerging technologies. Because of the advances in the technologies, the teaching profession is evolving from an emphasis on teacher-centered, lecture-based instruction to student-centered, interactive learning environments. The responsibility of the teacher has changed from knowledge transmitter to that of learning facilitator, knowledge guide and co-learner with the students in ICT environment. The modern teacher in the ICT age acts as a guide rather than a knowledge transmitter. In fact, with the introduction of ICTs in the classroom, we can say that the teaching and learning process has been modified from blackboard to keyboard from pen-to-pen drives and from chalk to mouse.

Because of the rapid change and uncertainty, there is one thing of which we can be sure, that the teachers need to adapt to change if they are to survive and keep pace with new methods and technologies. The teachers should adapt current teaching skills and practice to accommodate the introduction of ICT in all their academic efforts. These efforts are in bringing changes in teaching methodology, assessment of learning, student tracking, communication and evaluation.

## ICT in Education: The Indian Perspective

Though the potential and capability of open and distance learning was realized in early sixties across the globe however, it got national acceptance and recognition with the emergence of Indira Gandhi National Open University in 1985.

IGNOU and ISRO share a common vision of creating Educated India. And to achieve this, ISRO and IGNOU have been collaborating in the use of satellite communication to enrich learning processes and increase access to education through distance mode. Under ISRO-IGNOU collaboration, IGNOU has developed capability for four TV-channels and two interactive networks dedicated for education. In order to fulfill the requirements of education for all, the Indian Parliament took a major decision in the year 2001 whereby education was made compulsory for every Indian in the age group of 6 to 14 years.

This task is to be accomplished by the year 2015 under the initiative Sarva Shiksha Abhiyan. The massive educational setup required to handle such large numbers requires development of effective satellite communication systems with extensive point-to-point reach covering the whole country. In this initiative, some successful joint interventions between ISRO and IGNOU and a few other educational institutions and organizations propelled the idea of designing and developing a dedicated satellite for education by ISRO.

Within a short period of less than 2 years, ISRO successfully designed, developed and launched a dedicated geo-stationary satellite on September 20, 2004, EduSat, dedicated exclusively for Education. India is unique in the world in this respect and it is expected that this capability will immensely support the mission to provide seamless education and to accomplish the target of education for all. Overall, India is graduating at a steady pace towards implementation of various ICTs at all levels of education which will soon be taken as a standard by other countries desirous of achieving this goal.

## Conclusion

The one fact that emerges in the relatively brief history of ICT use in education is that “It is not the technology but how we use it”. Technology should not drive education; rather, educational goals and needs, and careful economics, must drive technology use. Only in this way can educational institutions in developing countries effectively and equitably address the key needs of the population, to help the population as a whole respond to new challenges and opportunities created by an increasingly global economy. Indian Education System has a bright future in terms of Information & Communication Technology, as that it will enhance the speed of providing education even to remote areas of the country. Let’s wait for the dawn when education will become a familiar term to all the Indians....

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