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Higher Education: Utility of ICT as a Quality Teaching Tool

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Introduction

Information and communication technology (ICT) is a force that has changed many aspects of the way we live. If one was to compare such fields as medicine, tourism, travel business, law, banking, engineering and architecture, the impact of ICT across the past two or three decades has been enormous. The way these fields operate today is vastly different from the ways they operated in the past. But when one looks at education, there seems to have been an uncanny lack of influence and far less change than other fields have experienced. A number of people have attempted to explore this lack of activity and influence. There have been a number of factors impeding the wholesale uptake of ICT in education across all sectors. These have included such factors as a lack of funding to support the purchase of the technology, a lack of training among established teaching practitioners, a lack of motivation and need among teachers to adopt ICT as teaching tools. But in recent times, factors have emerged which have strengthened and encouraged moves to adopt ICTs into classrooms and learning settings. These have included a growing need to explore efficiencies in terms of program delivery, the opportunities for flexible delivery provided by ICT's, the capacity of technology to provide support for customized educational programs to meet the needs of individual learners and the growing use of the Internet and WWW as tools for information access and communication. As we move into the 21st century, these factors and many others are bringing strong forces to bear on the adoption of ICTs in education and contemporary trends suggest.

We will soon see large scale changes in the way education is planned and delivered as a consequence of the opportunities and affordances of ICT.

ICT and higher education

The revolution in ICT has been the main stay of globalization of markets and knowledge systems. Availability of internet based services and communications has allowed distances and barriers to be breached in real time and that too at lower costs than ever imaginable. Internet technology has found two broad applications in higher education or university system. First is its use in creating seamless administrative systems and interfaces, like

1. Online admission forms,
2. Status tracking,
3. Availability of results,
4. Course schedule etc.

In some cases, depending on how tech savvy faculty members are, online submissions of assignments are also being done.

The second application, which is significant in the Indian context, has been in changing the very manner in which education is delivered as a process and also as learning experience. It has taken higher education away from the confines of classrooms, libraries and individual lecture sessions. Availability of on line courses have allowed students and teachers from different parts of the world to converge. On line universities do not require physical infrastructure and thus have facilitated greater accessibility to education as a student need not commute or live on campus. Flexibility offered by on line courses has brought in a new range of students, in terms of social and professional backgrounds. Acquiring specialized degrees is today seen as a sure means of creating possibilities of better jobs, as mid-life career changes become more frequent. On line education holds tremendous potential for India's massive population, but any grand plans for this depend heavily on reliable high-speed Internet coverage. The concept of e-education, especially at higher levels, is just beginning to be viewed seriously

Higher Education through ICT

There are the 378 universities and 18064 colleges in India as on 2011. Higher Education through ICT is possible in all the Universities and colleges through ICT Mission which focus on

- Digitization and networking of all educational institutions,
- Developing low cost and low power consuming access devices, and
- Making available bandwidth for educational purposes.

MHRD-Department of Information Technology (DIT)-Department of Telecommunications (DoT) collaborative efforts is needed to ensure fully electronic universities and digital campuses. Advanced computational facilities are required in institutions.

The Efforts Required:

1. Availability of e-books in English language for most of the subjects.
2. EDUSAT teaching hub at each of the CU.
3. 2000 broadband Internet nodes at each of the 200 Central Institutions.
4. One Satellite Interactive terminal for providing network connectivity in 18000 colleges.
5. Each department of 378 universities and each of the 18064 colleges to be networked through broadband
6. Internet nodes of adequate bandwidth.
7. Digitization of large volume of video contents of Teaching Learning Materials generated overtime.
8. Spreading Digital Literacy.

The growth of higher education in India in the past 60 years has been a phenomenal story. The country's technical and medical institutions can boast of powering the global IT industry and becoming a mainstay of health sector in several developed countries particularly in the United Kingdom. The growth can be ascertained from the fact that starting with only 263,000 students in all disciplines in 750 colleges affiliated to 30 universities in 1950, the numbers have grown to 12 million students in 18,064 Degree colleges affiliated to 378 universities and non-affiliated university-level institutions in this decade.

Growth of Higher Education in India

Year	No. of Student	No. of collage	No. of Universities
1950	263000	750	30
2011	12 Million	18064	378

Source:- Ministry of statistics and programme

According to Brain bench Inc., India ranked behind the US in the number of certified software professionals with 145,517 against 194,211. India produces 400,000 engineers a year compared to 60,000 by US. In addition to this there are about 10 million students in over 6500 in vocational institutions. The enrollment is growing at the rate of 5.1 % per year. This also presents a glaring contrast by the way of massive illiteracy that still persists in our country. Over the years, rigid policies and red tape have compromised the quality of higher education, and in some cases marketability, as they have failed to keep pace with emerging knowledge systems and technology. Financial and infrastructural stagnation are placing massive pressure on the higher education system with explosion in enrollment due growing population. High demand from primary and secondary education has led to the deterioration in the financial support provided by the government.

Role of National Association of Software and Service Companies (NASSCOM).

Poised to become a US$ 225 billion industry by 2020, the Indian information technology (IT) industry has played a key role in putting India on the global map. The IT-BPO sector has become one of the most significant growth catalysts for the Indian economy. In addition to fuelling India's economy, this industry is also positively influencing the lives of its people through an active direct and indirect contribution to various socio-economic parameters such as employment, standard of living and diversity. The industry has played a significant role in transforming India's image from a slow moving bureaucratic economy to a land of innovative entrepreneurs and a global player in providing world class technology solutions and business services, according to National Association of Software and Service Companies (NASSCOM).

Open University System

The sheer geographical expanse and a large population have made India look at Open University for a long time now as a viable means of reaching out hundreds and thousands of people outside the mainstream university system. Indira Gandhi National Open University (IGNOU) has been a Pioneer in the field and has over 11, 87,100 students on its rolls as on 2011. Currently there are more than seven open universities in India offering over 500 courses. Modern communication technology can be harnessed to effectively provide education through this medium. A distance education Council has been set up and a common pool of program is available for sharing. Open Universities can be highly cost effective as the cost of teaching through distance education comes down to a third compared to the traditional system. They also maintain a close relationship with the industry and are especially helpful to those who cannot afford a regular university degree.

Framework for implementation ICTs in Higher Education:

The Framework for implementation consists of nine key components.

(1) Educational Objectives,
(2) Project Management,
(3) Infrastructure Readiness and Platform Deployment,
(4) Curriculum Development,
(5) Content Availability,
(6) Training and Usage Support,
(7) Educational Management,
(8) Maintenance and Technical Support, and
(9) Monitoring and Evaluation.

The Frame work proposes the activities for educational institutes at Higher Level. Implementation of a Project to monitor the day-to-day management of the following initiative will be required.

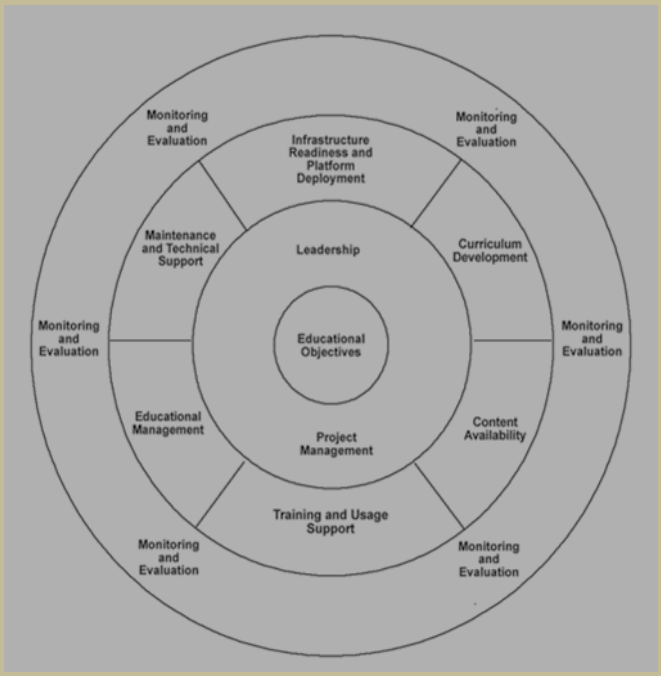
a. Deployment,
b. Curriculum Development,
c. Content Availability,
d. Training and Usage Support,
e. Educational Management,
f. Maintenance and
g. Technical Support.

These are the activities that must be implemented at the educational institution level. Enveloping the entire process must be a comprehensive Monitoring and Evaluation process.

Framework highlights key issues which must be addressed for successful implementation.

1. Physical infrastructure must be in place in the form of power, buildings, and, ideally, telecommunications. Appropriate curriculum must be in place for basic ICT literacy skills, for the integration of ICTs across subject areas, and for ICT as a subject in itself (e.g. computer science).
2. Content must also be available to support the delivery of each of these curricular areas.
3. Training programmes must be implemented to address the ways in which the curricula and content are to be implemented.
4. Educational management at district and national level must be aligned and implemented for the ready exchange of information for planning purposes.
5. All hardware, software, and personnel must be appropriately supported through centralized and on-site support. And all of this must be monitored and evaluated regularly to make suitable adjustments. Each component provides guidance for implementation plan development.

The Framework for implementation of ICTs in Higher Education is presented in the figure below



(Figure 1. Framework for implementation of ICTs in Higher Education.)

The framework is meant to reflect a comprehensive solution for implementation of ICTs across the Higher Education sector.

- One additional benefit of utilizing this framework is that the framework doubles as a "framework for engagement" for all partners to critically influence the ways in which ICTs are introduced and utilized in the Higher Education.
- By focusing on actions instead of institutions, the framework can be used at all levels as implementation plans are debated, drawn up, and executed.

Powerful Combination of ICTs

India is making use of powerful combination of ICTs such as open source software, satellite Technology, local language interfaces, easy to use human-computer interfaces, digital libraries, etc. with a long-term plan to reach the remotest of the villages. Community service centres have been started to promote e-learning throughout the country. Notable initiatives of use of ICT in education in India include:

- Indira Gandhi National Open University (IGNOU) uses radio, television, and Internet technologies.
- National Programme on Technology Enhanced Learning: a concept similar to the open courseware initiative of MIT. It uses Internet and television technologies (National Program on Technology Enhanced Learning, India).
- Eklavya initiative: Uses Internet and television to promote distance learning EKLAVYA Technology Channel, India.
- IIT-Kanpur has developed Brihaspati, an open source e-learning platform (Bhattacharya and Sharma).
- Premier institutions like IIM-Calcutta have entered into a strategic alliance with NIIT for providing programs through virtual classrooms.
- Jadavpur University is using a mobile-learning centre (Bhattacharya and Sharma).

- IIT-Bombay has started the program of CDEEP (Centre for Distance Engineering Education Program) as emulated Classroom interaction through the use of real time
  interactive satellite technology (Centre for Distance Engineering Education Programme, India).
- One Laptop per Child (OLPC).

Government Initiatives

Government sector is a key catalyst for increased IT adoption- through sectors reforms that encourage IT acceptance, National eGovernance Programmes (NeGP) , and the Unique Identification Development Authority of India (UIDAI) programme that creates large scale IT infrastructure and promotes corporate participation.

Certain crucial steps taken by the Indian government to propel the sector growth are:

- ❖ Constitution of the Technical Advisory Group for Unique Projects (TAGUP) under the chairmanship of NandanNilekani. The Group would develop IT infrastructure in five key areas, which includes the New Pension System (NPS) and the Goods and Services Tax (GST)
- ❖ Setting up the National Taskforce on Information Technology and Software Development with the objective of framing a long term National IT Policy for the country.
- ❖ Enactment of the Information Technology Act, which provides a legal framework to facilitate electronic commerce and electronic transactions.
- ❖ Setting up of Software Technology Parks of India (STPIs) in 1991 for the promotion of software exports from the country.There are currently 51 STPI centres where apart from exemption from customs duty available for capital goods, there are also exemptions from service tax, excise duty, and rebate for payment of Central Sales Tax.
- ❖ Plans to formulate Information Technology Investment Regions (ITIRs). These regions would be endowed with excellent infrastructure and would reap the benefits of co-siting, networking and greater efficiency through use of common infrastructure and support services.

Road Ahead

India is uniquely positioned to reap the benefits of its economic gains by forging policies and strategies for effective use of knowledge to increase the overall productivity of the economy and benefit its own population. Some of the main issues, which the World Bank cites for strengthening India's education system include:

1. Efficient use of public resources in the education system, and making it more responsive to market needs, as well as ensuring expanded access to education,
2. Enhancing the quality of primary and secondary education,
3. Ensuring consistency between the skills taught in primary and secondary education and the needs of the knowledge economy,
4. Reforming the curriculum of tertiary education institutions to include skills and competencies for the knowledge economy,
5. Improving the operating environment for higher education and coordinating a system with multiple players,

6. Embracing the contribution of the private sector in education,
7. Establishing partnerships with foreign universities,
8. Increasing university-industry partnerships to ensure consistency between research and the needs of the economy,
9. Using ICTs to meet the double goals of expanding access to and improving the quality of education,
10. Developing a framework for lifelong learning, including programs intended to meet the learning needs of all, both within and outside the school system,
11. Making effective use of distance learning technologies to expand access to and the quality of formal education and lifelong training.

The Indian information technology sector continues to be one of the sunshine sectors of the Indian economy showing rapid growth and promise.

Summary and Conclusions

Changes in the curriculum do support fundamental economic and social transformation in the society. Such transformations require new kinds of skills, capabilities and attitudes, which can be developed by integrating ICT in education. The overall literature suggests that successful ICT integration depends on many factors. National policies as well as school policies and actions taken have a deep impact on the same. Similarly, there needs to be an ICT plan, support and training to all the stakeholders involved in the integration. There needs to be shared vision among the various stakeholders and a collaborative approach should be adopted. Care should be taken to influence the attitudes and beliefs of all the stakeholders.

ICT can affect the delivery of education and enable wider access to the same. In addition, it will increase flexibility so that learners can access the education regardless of time and geographical barriers. It can influence the way students are taught and how they learn. It would enable development of collaborative skills as well as knowledge creation skills. This in turn would better prepare the learners for lifelong learning as well as to join the industry. It can improve the quality of learning and thus contribute to the economy.

Similarly wider availability of best practices and best course material in education, which can be shared by means of ICT, can foster better teaching. However there exist some risks and drawbacks with introducing ICT in education which have to be mitigated. Successful implementation of ICT to lead change is more about influencing and empowering teachers and supporting them in their engagement with students in learning rather than acquiring computer skills and obtaining software and equipment. Also proper controls and licensing should be ensured so that accountability, quality assurance, accreditation and consumer protection are taken care of. ICT enabled education will ultimately lead to the democratization of education

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