

ICT IN INDIAN HIGHER EDUCATION: TRENDS AND DEVELOPMENTS

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Abstract

“Education is what remains after one has forgotten everything he learned in school”.

Albert Einstein

Introduction: Learning relevant for the 21st century

A holistic view of 21st century teaching and learning that combines a discrete focus on 21st century student outcomes (a blending of specific skills, content knowledge, expertise and literacies) with innovative support systems to help students master the multi-dimensional abilities required of them in the 21st century is the need of the hour. In order to transform learning to be relevant to life in the 21st Century, Rethinking beyond traditional literacy to an additional set of 21st-century fluencies such as Solution Fluency, Information and Communication Technology Fluency, Creativity Fluency, Media Fluency, Collaboration Fluency, and Global Digital Citizenship that reflect the rapidly changing society is the pedagogical need today.

Today, the term information and communication technology has ballooned to encompass many aspects of computing and technology, and the term is more recognizable than ever before. The information technology umbrella can be quite large, covering many fields.

When computer and communications technologies are combined, the result is information technology or ‘InfoTech’. Information Technology (IT) is a general term that describes any technology that helps to produce, manipulate, store, communicate and/or disseminate information. Presumably, when speaking of Information Technology (IT) as a whole, it is noted that the use of computers and information are associated.

Information Technology (IT) is defined by the Information Technology Association of America (ITAA), as “the study, design, development, implementation, support, or management of computer-based information systems, particularly software applications and computer hardware.” IT deals with the use of electronic computers and computer software to convert, store, protect, process, transmit, and securely retrieve information.

“Information Technology is the acquisition, processing, storage, and dissemination of vocal, pictorial, textual, and numerical information by a microelectronics-based combination of computing and telecommunications”. (Dennis Longely and Michael Shain, 1982, Dictionary of Information Technology).

A Perspective of Current Indian Higher Education:

India has the second largest higher education system in terms of number of students and the third largest higher education systems in the world in terms of the number of institutions. In India the number of universities and varsity-level institutions had risen from 523 to 573 over the past year. The number of colleges had grown from 32,964 in March 2011 to 35,539 in March this year. Enrolment had risen as well with 20.37 million students enrolling in various courses in the academic year 2011-12, as against 18.7 million in 2010-11. Though higher education in India is in the concurrent list, as a joint responsibility of the Central and State Governments, Central Government is responsible for major policy relating to higher education in the country. It provides grants to the UGC and establishes Central Universities in the country. The Central Government is also responsible for the declaration of educational institutions as 'Deemed to be University' on the recommendation of the UGC.

State Governments are responsible for establishment of State Universities and Colleges, and provide plan grants for their development and non-plan grants for their maintenance. The co-ordination and cooperation between the Union and the States is brought about in the field of education through the Central Advisory Board of Education (CABE).

University Grants Commission (UGC) is responsible for coordination, determination and maintenance of standards and release of grants. Professional Councils are responsible for recognition of courses, promotion of professional institutions and providing grants to undergraduate programmes and various awards.

Institutions of Higher Education in India

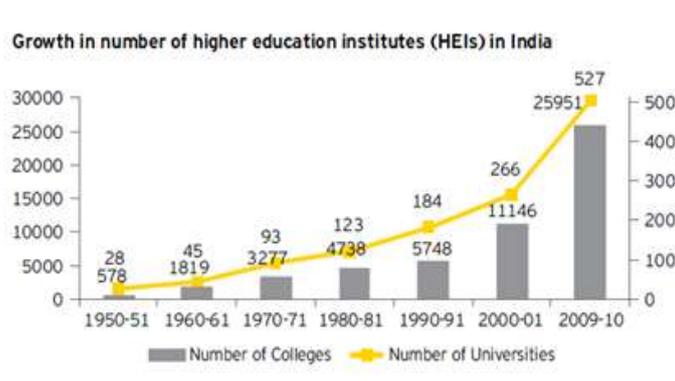
The following are the different types of institutions of higher education in India.

Universities and University-Level Institutions (527)

- Central Universities (40)
- State Universities (289)
- Deemed Universities (130)
- State Private Universities (76)
- Institutions Established under State Legislation (5)
- Institutions of National Importance (33)

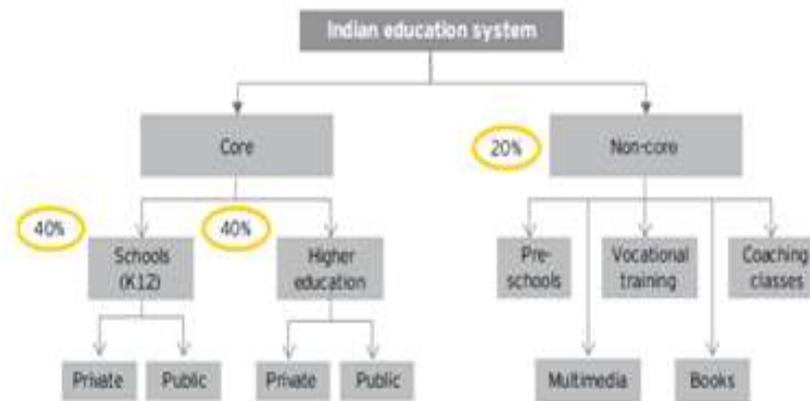
There has been a growth in the number of Higher Education Institutions in India, as shown in **Figure.1**. The number of universities was just 28 in the year 1950-51. There has been an impressive growth in year 2009-10, in which there were 527 universities. In the case of colleges, it was just 578 in the years 1950-51. In the years 2009-10, the number of colleges was 25951, which shows that there was an impressive 44 fold increase.

Figure:1 The Present Status of Higher Education Sector and the Growth in Number of Higher Education Institutions (HEIs) in India



The higher education institutions in India primarily consist of Universities and Autonomous Colleges as shown **Figure: 2**. Among the various types of Universities, State universities stand first (243), followed by Deemed universities (130).

Figure: 2 The Different Types of Universities in India



Higher education in India			
Form of Existence	Universities & University-level institutes	• Central Universities	40
		• Deemed Universities	130
		• Institutes of National Importance	33
		• Instituted established under State legislations	5
		• State Private Universities	76
		• State Universities	243
	Colleges	25951	
	• Autonomous colleges		
	• Affiliated colleges		

The Higher Education growth rate in the last 25 years is shown in **Figure: 3** and the growth of spending in Higher Education in the last 5 years is shown in **Figure: 4**. During the 20 years between 1985-86 and 2009-10, the enrollments in higher education have grown at a relatively steady Compound Annual Growth Rate (CAGR) of 6%. Currently, there are 16 million students undergoing Higher Education in India with nearly half of them having joined the system in the last decade. The growth of Higher Education sector is expected to grow continuously with the increased government support in spending. State governments are spending a larger amount when compared to the Central government. In the last 5 years, Central government’s expenditure on the Higher education sector has grown at 30% Compound Annual Growth Rate (CAGR). In the years 2009-10, a significantly higher growth in expenditure (45%) touched a new scale.

Figure: 3 The Growth Rate of Higher Education in India and the Growth of Spending in Higher Education

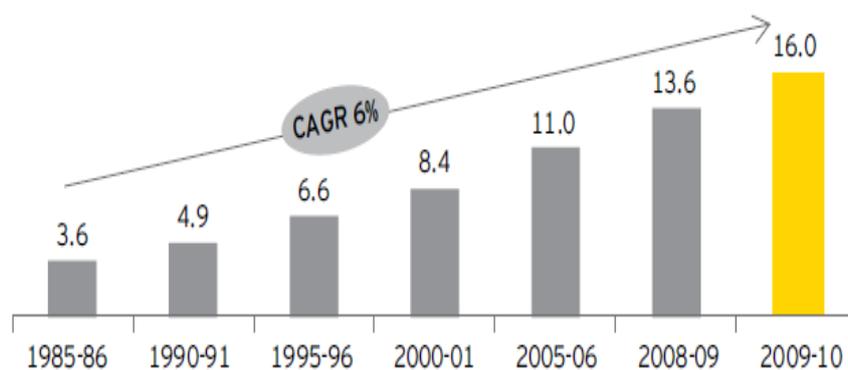
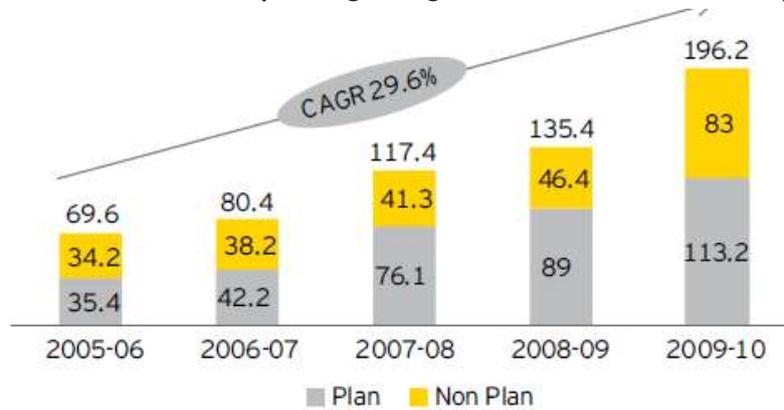


Figure: 4 The Growth of Spending in Higher Education in the last 5 years



The Indian Higher Education sector is expected to grow at an 18% Compound Annual Growth Rate (CAGR) till 2020 as shown in **Figure: 5**. The expenditure in the Indian Higher Education sector is currently estimated to be INR 46,200 crores. It is projected to grow at an average rate of 18% over INR 232,500 in the next 10 years.

The share of private sector expenditure on Higher Education (2008-2009) accounts for almost 67% of the total expenditure in Higher Education as shown in **Figure: 6**. The growth of higher education has resulted in a sharp increase in the number of institutes. Over the decade from 1950-51 to 2009-10, universities have grown at a constant rate. Colleges in India have grown at a higher Compound Annual Growth Rate (CAGR) (8%) between 1990-91 and 2009-10 compared to between 1950-51 and 1990-91 (6%). Private and Unaided Colleges which form a significant share of the total number of the colleges are shown to be rapidly growing in number.

Figure: 5 The Expected Compound Annual Growth Rate (CAGR) in Higher Education in India till 2020

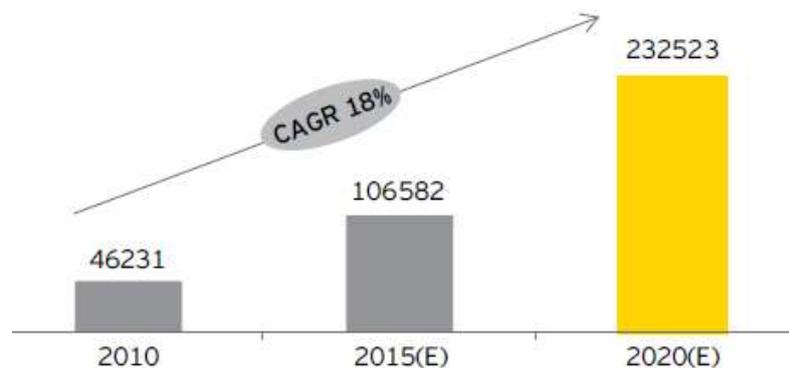
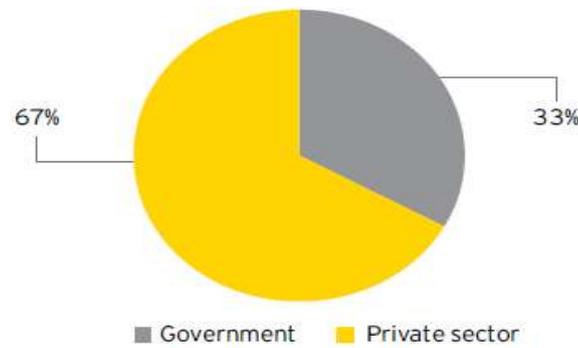


Figure: 6. The Share of Public and Private Sector Spends on Higher Education (2008-2009)



It is found from the **Figure: 7** that the Government allocates the largest share of 38% of its funding for General Education. By the setting up of new institutions like 16 central Universities, 14 Innovation Universities, 8 IITs and 7 IIMs, further investment is being planned. It is also shown that the total government outlay for Higher Education has increased from 21% of total education spend in the Xth 5 Year Plan to 31% in the XIth 5 Year Plan. It is believed that, Indian public expenditure as a percentage of GDP has a significant opportunity to grow when compared with other countries as shown in **Figure: 8**

Figure: 7 The Central Government Spending on Higher Education (2009)

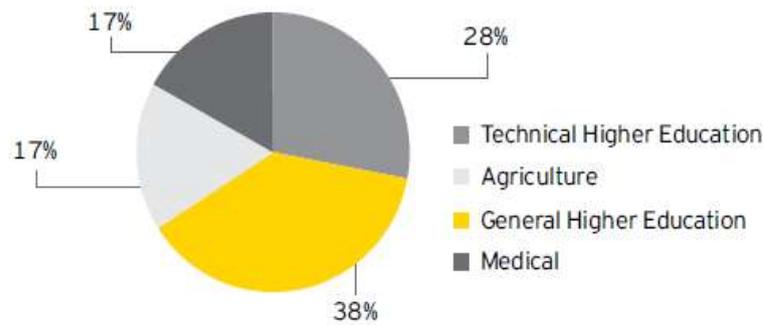
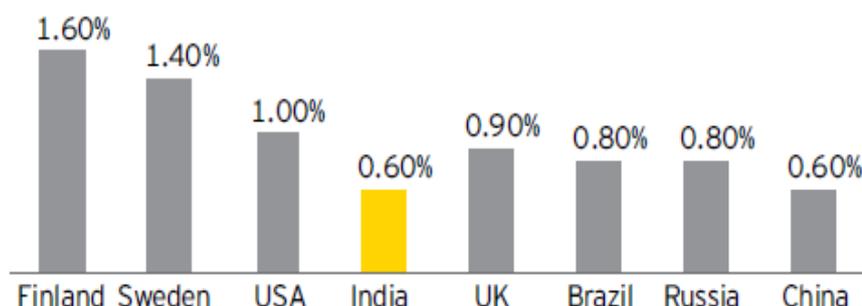


Figure:8 Public Expenditure on Higher Education as a % of GDP

Promotion of Technology Enabled Higher Education by University Grants Commission (UGC) and Consortium for Educational Communication (CEC)

The University Grants Commission is a statutory organization established by an Act of Parliament in 1956 for the coordination, determination and maintenance of standards of university education. Apart from providing grants to eligible universities and colleges, the Commission also advises the Central and State Governments on the measures which are necessary for the development of higher education. Under the UGC, the National Assessment and Accreditation Council (NAAC) is established to assess the quality of higher education. In order to enhance the technological deployment in Higher Education, the National Assessment and Accreditation Commission (NAAC) has incorporated the effective utilization of Information Technology in universities and colleges as one of the parameters of evaluation of the quality in these institutions. It is obvious that the trend is towards incorporating more and more of computer education and information technology in the higher education system. Though the clamour for culture and values continues, the apparent focus is on the technology-transformation of higher education system. Hence, the professional development of teachers should reflect the changing higher education needs. Both in the pre-service and in-service training, special focus must be on imparting education for teachers for communicating the curriculum through information technology.

One of the innovations in higher education carried out by the UGC in early eighties was using the powerful medium of films for knowledge communication. As early as in 1984, UGC launched countrywide classroom (CWCR) and Production facilities at 6 universities. Initially the coordination with these centres was done from UGC office with the support of a consultant. Subsequently an inter-university Centre named as 'Consortium for Educational Communication' was set up in the year 1993 with the following objectives:

- Close coordination, facilitation, overall guidance and direction to the activities of the Media Centres set up by the UGC in various universities.

- Dissemination of educational programmes, through both the broadcast and non-broadcast modes.
- Production of educational programmes (especially video and audio) and related support material and setting up of appropriate facilities for this.
- Research related to optimizing the effectiveness of the programmes.
- Providing a forum for the active involvement of academic and other scholars in the creation of appropriate educational programme.
- Studying, promoting and experimenting with new techniques/technology that will increase the reach and/or effectiveness of educational communication.

As a response to these objectives the CEC coordinates the development of Centres, ensuring the quality of software, coordination of telecasting of the selected films, inspiring and encouraging innovations. During the two decades of CWCR and a decade of CEC considerable progress has been made.

The system of educational communication has grown to 17 Educational Media Research Centres and Audio Visual Research Centre, now known as Educational Multimedia Research Centres (EMMRC). Average number of educational programmes produced has increased to 1000 programmes per year from 25 in the beginning. CEC runs a 24hr higher education channel known as Vyas Channel on Gyan Darshan Bouquet now also available on DTH. The focus of education films are the following three types:

- Enrichment oriented films
- Subject related series of films
- Under graduate syllabus based lectures by eminent teachers.

On the side of development of production equipment, CEC coordinates acquisition of latest equipment by the media centres and maintenance of these equipments. The Countrywide Classroom has completed more than 2 decades and Consortium of Educational Communication has completed more than a decade of service.

Several measures are adopted for quality assurance, namely preview, feedback, technical quality check at the time of telecasting and post telecast feedback and viewers survey. It also encourages quality improvement through competition and awards. Some of the important awardees include programmes from EMMRC Calcutta, Hyderabad, Ahmedabad, Pune, Jodhpur, Indore, Imphal, Sagar, Calicut, Mysore, Srinagar, Roorkee and some outside producers, like NID, Ahmedabad; MIC Manipal; IMCPL, Faridabad; National Open School, New Delhi; C-DIT, Thiruananthpuram; and PSBT, New Delhi.

National Mission of Information Technology in Higher Education (NMITHE)

There was a strong need to fully utilize ICT as a tool in education to enhance the current enrolment rate in Higher Education from 10% at present to 15 % by the end of the

11th Plan period. A budget allocation of Rs. 502 crores was made in 2008-09 for the National Mission on Education through ICT. It is a momentous opportunity for all the teachers and experts in the country to pool their collective wisdom for the benefit of every Indian learner and, thereby, reducing the digital divides. Under this Mission, a proper balance between content generations, research in critical areas relating to imparting of education and connectivity for integrating our knowledge with the advancements in other countries is attempted. For this, what is needed is a critical mass of experts in every field working in a networked manner with dedication. Although disjointed efforts have been going on in this area by various institutions/organizations and isolated success stories are also available, a holistic approach is the need of the hour. This Mission seeks to support such initiatives and build upon the synergies between various efforts by adopting a holistic approach.

It is obvious that emphasis on ICT is a crying need as it acts as a multiplier for capacity building efforts of educational institutions without compromising the quality. The Mission is also necessary to sustain a high growth rate of our economy through the capacity building and knowledge empowerment of the people and for promoting new, upcoming multi-disciplinary fields of knowledge. The proposed Mission shall work for scaling up of the existing Education Help line - 'One Stop Education Portal'- "SAKSHAT". The helpline shall take care of all the needs of the entire learning community including the students enrolled in various educational institutions and lifelong learners by extensively utilizing e-learning concepts and the ICT based methodology. "SAKSHAT" shall be fully equipped with intelligent navigation techniques for easy and smooth browsing. The education portal shall integrate the scholarship programme of the Ministry of Human Resource Development and ensure disbursement of Scholarship electronically. In order to achieve its objective, the proposed Mission shall encourage development of high quality e-content, for loading on to 'SAKSHAT' in all disciplines and subjects, at various levels using the best available authoring tools and making fullest use of animation and multimedia technologies in order to make learning interesting and facilitate clarity of concepts to the learners.

Digital Literacy to Teaching Learning Community in Higher Education

For bridging the digital divide and empowering teachers /learners to harness information and communication technologies for their empowerment through knowledge, the need of the hour is to provide digital literacy to teaching learning community in Higher Education. The aim has to be that this community should be able to operate the computer or other devices and connect to the knowledge network. Obviously, this digital literacy cannot be spread through the computer networks since it aims to empower the teacher / learner to use the network. Hence, digital literacy for teacher empowerment will have to

be imparted through other means relying heavily on audio-visual material, non-governmental organizations, change agents and institutions established for them, and mass contact programmes. The Mission shall provide financial, technical and logistic support to the Governmental and Non-Governmental Organizations engaged or intending to be engaged in the task of teacher empowerment. It shall be open to the NGOs and Governmental Organizations to devise their own strategy for educating the teachers about the use of computer and access devices in order to empower themselves for making the best use of ICT to meet their educational and training needs. The formulation of new strategies for the teaching-learning community is essential because the people in different conditions and states of mind may require them for developing the competence for using the e-devices and using ICT for learning. In order to accomplish its major objective of utilizing latest technologies to make higher education easily accessible, the Mission shall provide financial assistance to all the institutions of higher learning for the procurement of hardware or replacement of the obsolete hardware essential for accessing to the world of knowledge in cyber space. Institutions of higher education shall be encouraged to have, at least, the same number of computers as the number of the faculty members with them. Half of the number of the computers shall have to be arranged by the institutions by themselves, through their own resources or through grants from other sources whereas the remaining 50% may be purchased out of the financial grant provided by the Mission directly or through any other designated Government agency.

Areas of Research

Since ICT is fast growing area of technology and new research and innovations are changing the complexion very rapidly, the Mission shall encourage individuals as well as institutions to undertake research projects for the development of new technologies and innovations. Such technologies can support the Mission's goals and help in achieving its objectives. These research projects may include:

1. Development of low-cost access devices
2. Development of authoring tool for e-content
3. Development of new technologies for enhanced use of ICT in education
4. Development of ERP system for institutions of higher learning
5. Development of Educational entertainment and gaming for knowledge enhancement
6. Development of on-demand examination system
7. Development of tools for maximization of Bandwidth usage
8. Development of hardware technologies like routers and switches

This is an illustrative list and cannot be treated as a final. New areas may emerge with the passage of time and the Mission shall consider providing financial assistance for undertaking research in the areas of interest on case to case basis.

It is in the above backdrop of the National Mission, Objectives and Priorities,

Velcro learning through ICT

The essential 21st Century Fluencies are not about hardware, they are about headware (Crockett, Jukes and Churches, 2011). The key elements of 21st century learning are represented in the graphic and descriptions below. The graphic represents both 21st century skills **student outcomes** (as represented by the arches of the rainbow) and 21st century skills **support systems** (as represented by the pools at the bottom).



Fig..9 21st Century Student Outcomes and Support Systems

While the graphic represents each element distinctly for descriptive purposes, the Partnership views all the components as fully interconnected in the process of 21st century teaching and learning.

The elements described below are the critical systems necessary to ensure 21st century readiness for every student. Twenty-first century standards, assessments, curriculum, instruction, professional development and learning environments must be aligned to produce a support system that produces 21st century outcomes for today's students. Effective learners relate existing knowledge to new information. We call this "velcro learning ". Information without context, interest, relevance or reinforcement is like one side of velcro - it doesn't stick. When relevant connections are made between past experience and new information, long term learning sticks are made and hence facilitate velcro learning.

The Learning Cone of Glasser and Marzano

Edgar Dale developed the Learning Cone back in the 1960's. It has been adapted many times through reaffirmed research by those such as Glasser and Marzano as given in Fig 10.



Fig. 10 Learning Cone

Research has determined after 2 weeks on average learners recall the following:

- Less than 10% of what they read
- About 20% of what they hear, such as in a lecture
- About 30% of what they see
- About 50% of what they hear and see (using 2 or more media simultaneously)
- About 70% of content that requires active participation, either in discussion or giving a talk
- More than 90% of content that involves these three methods - teaching it to someone else, followed by the application of the content in a real-life task or simulation.

All of this is on a continuum, from receiving the information to active engagement. Despite this research, many educators continue to teach using “stand and deliver, sit and learn” same as 100 years ago. We had movies, TV, radio, telephones, etc. To the digital world students of today, this stuff has always been around - they’ve internalized what has fundamentally changed our world over the last decade. Do we not need to reconsider our assumptions, then, concerning education? Are the old ways still working? Because of exponentialism, changes that once took decades now take days. 20th Century literacy, reading and numeracy is no longer enough.



Fig. .11 21st Century Fluencies

Conclusion

In the light of the above theories, trends and developments, the challenge for Higher Education is to rethink the current pedagogy and methodology to ensure that the students are equipped with the Information Fluency to learn independently. 'Fluency with Information Technology' is defined as the acquisition of three types of Information Technology, Skills, Concepts and Capabilities. Skills refer to proficiency with contemporary applications such as browsing, e-mail, word processing, etc. Concepts refer to foundational ideas such as how computers execute instructions, data representations, internet etc. Capabilities refer to higher-level thinking abilities such as logical reasoning, problem solving, complexity management, etc. Thus, Information Technology revolutionizes higher education, since exposure to techno-rich environments changes the cognitive architecture of students.

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