Envisioning ICT enabled teaching learning processes: Challenges & Possibilities

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Abstract-*Despite all reforms that have taken place since independence in the field of education, Education system in India still faces many challenges. Challenges that emanates from the enormity of young population that needs to be educated, inflexibility in education system that makes it resistant to change and multiplicity of language which expects transaction of knowledge not in one or two but in many languages. There is also a deep disquiet about several aspects of educational practices which includes reach and access to education, rigidity in the school system, textbook centric education, lack of teachers in schools and highly inflexible examination system. Though these aspects of educational practices which pose innumerable challenges are being dealt with number of times and in number of ways still there is a dire need for strong intervention. Information and Communication Technology, if not act as a panacea to all the problems but has a potential to solve many of these problems. If used systematically and strategically, ICT can play a significant role in improving the school education and has a tremendous potential for enhancing outreach and improving the quality of education. In this paper some major challenges faced by the education system will be discussed along with the ICT interventions that can support in overcoming such challenges. The paper will also outline ICT initiatives taken in India at school education level and attempts made at government level for the ICT enabled teaching learning processes.*

Key Words: ICT in Education, Educational Technology, ICT @School Scheme, Open Educational Resources

Introduction:

Since independence a number of policies and programmes have been launched to achieve Universalisation of Elementary (UEE) and Secondary Education in our country. The major initiatives at central level like Operation Blackboard, Non-formal Education Programme, District Primary Education Programme (DPEP), Nation-wide Mid-Day Meal Programme, Teacher Education through Mass Orientation of Teachers, Child Development Services Scheme (ICDS)-1975, Educational Technology Scheme-1972,and externally assisted projects such as – Uttar Pradesh Basic Education Programme, Bihar Education Project, Shiksha Karmi and Lok Jumbish Projects in Rajasthan, Mahila Samakhya Project, Andhra Primary Education Project did play an important role in enhancing the access and in improving the quality of education and led to the expansion of education system in the country with more than 1.36 million schools; 8,824 teacher education institutions; 523 Universities (Central-43, State-265, 80 state private and 130 Deemed to be Universities and 5 Institutions established under state legislation); and 33,023 Colleges in the Higher education sector. There has been considerable improvement in the extension of primary education, both in regard to enrolment and in reduction of dropout rates. Also our country engages nearly 135207057 students at primary and 57844942 students at upper primary level (DISE-2010-11) with 7 million teachers spread over around 1.36 million schools and about 83.13 per cent schools are in rural areas.

The above mentioned data do reflect a rosy picture but than this is one side of the coin as there are still many students who are not able to continue with their studies and there are many who do not get the opportunity to study at all. After spending huge amount of money on various policies and schemes, if India is still far behind in being fully literate and if basics like access to

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quality education continues to be an obstacle in the achievement of educational goals it shows that there is a dire need to have innovative and a robust plan to cover one and all under the umbrella of literacy. Also other challenges which Indian education system is facing are to be dealt differently. With Information and communication technologies becoming more accessible, reliable and mature the prospect of leveraging ICT for education is becoming increasingly feasible. ICT have enabled the convergence of a wide array of technology based and technology led resources for teaching learning. It has therefore become possible to employ ICT as an omnibus support system for education. It can provide a unique opportunity and could potentially promote education on a large scale. There has been number of schemes and policies to introduce ICT at school level in the past. There is a misconception that Information and Communication Technologies (ICTs) are the most sophisticated and expensive computer-based technologies. Though it includes computer-based technologies but it also encompass the more conventional technologies such as radio, television and telephone technology. There had been attempts in the past to harness the potential of these technologies but with limited success.

While definitions of ICTs are varied, it might be useful to accept the definition provided in National Policy on Information and Communication Technology in School Education: ICT are defined as all devices, tools, content, resources, forums, and services, digital and those can be converted into or delivered through digital forms, which can be deployed for realizing the goals of teaching learning, enhancing access to and reach of resources, building of capacities, as well as management of the educational system. These will not only include hardware devices connected to computers, and software applications, but also interactive digital content, internet and other satellite communication devices, radio and television services, web based content repositories, interactive forums, learning management systems and management information systems. From integrating conventional media to new media in education, there have been continuous and concerted efforts to improve the access and quality of education. Following are the major initiatives on introducing ICT in school education.

'ICT in school education' initiatives in India

The National Policy on Education 1986 as modified in 1992 stressed the need to employ ET to improve the quality of education. The policy statement led to two major centrally sponsored schemes name ET and Computer Literacy and Studies in Schools (CLASS). The ET scheme between 1986 and 1990 was entirely equipment driven. The ministry under this scheme distributed 2,28,118 radio cum cassette players (RCCPs) and 31,129 colour televisions sets to schools. According to Prof M. Mukhopaadhaya this step did not yield any desired results as it did not go beyond providing the equipment. The CLASS project which was launched in `1984 was a joint initiative of MHRD, Department of Electronics, and NCERT. It covered 2582 schools and 42 resource centres and made use of microcomputers provided by the BBC. The project was evaluated by SAC and it was revealed that there was a need for greater interaction between resource centers and schools, the need to reduce time gap between the training of teachers , the installation of systems, and the initiation of activities in the school, the imparting of adequate hand on experience to teachers and students and the provision of computer literacy programmes in the time table. The project only had a limited success. The class project was revised in 1993 and PC machines were distributed in schools. Subsequently CLASS 2000 was initiated by the government with the aim of providing computer literacy in 10,00 schools and computer assisted learning in 1000 schools and computer based learning in 100 schools. These hundred schools were called as smart schools and were designed to be the agents of change seeking to promote the extensive use of computers in the teaching and learning process, Both these schemes led to the more comprehensive centrally sponsored scheme- ICT @Schools in 2004. The scheme has four major components:

- The first one is the partnership with State

Governments and UnionTerritories Administrations' for providing computer aided education toSecondary and Higher Secondary Government and Government aided schools.

- The second is the establishment of smart schools, which shall be technology demonstrators.
- The third component is teacher related interventions, such as provision for engagement of an exclusive teacher, capacity enhancement of all teachers in ICT and a scheme for national ICT award as a means of motivation.4 Revised ICT@Schools Scheme
- Fourth one relates to the development of e content, mainly through Central Institute of Education Technologies (CIET), six State Institutes of Education Technologies (SIETs) and 5 Regional Institutes of Education (RIEs), as also through outsourcing.

ICT @ school scheme is a major shift from the schemes which were launched till 2004 in terms of ET intervention or ICT intervention. The focus shifted from making the hardware available in schools to how ICT can be integrated in school system and can be harnessed in teaching learning process. From providing computer aided education to establishing smart schools to teacher related interventions and development of e content, the scheme looked at ICT in education in a holistic manner. Infact based on the experiences gained in six years the scheme was revised in 2010 and the following components were added:

- Expansion with emphasis on quality and equity: A need was felt to expand the outreach of the scheme to cover all Government and Government aided secondary and higher secondary schools in the country with emphasis on educationally backward blocks and areas with concentration of SC, ST, minority and weaker sections. Along with that, there is a need for ensuring dependable power supply where the electricity supply is erratic and internet connectivity, including broadband connection.
- Demonstration effect: There is a need to set up smart schools at the district level to serve as demonstration models for neighbouring schools.
- Teacher engagement and better in-service and pre-service training: Since ICT education will be imparted to all secondary and higher secondary students, an exclusive ICT teacher is required for each school. Similarly, there is a need for pre service as well as in service training of all teachers in effective use of ICT in teaching and learning process.
- Development of e-content: There is also a need to develop and use appropriate e-content to enhance the comprehension levels of children in various subjects.
- A strong mechanism for monitoring and management needs to be set in place at all levels for ensuring optimal delivery of set targets.

ICT Policy in School Education

The tremendous potential of ICT for enhancing outreach and improving quality of education also led to another initiative of ICT Policy in School Education. This policy endeavors to provide guidelines to assist states in optimizing the use of ICT in school education within a national policy framework. The policy aims to promote universal equitable, open and free access to a state of the art ICT and ICT enabled tools and resources to all students and teachers, development of local and localized quality content and to enable students and teachers to partner in the development and critical use of shared digital resources, development of professional networks of teachers, resource persons and schools to catalyze and support resource sharing, a critical understanding of ICT, its benefits, dangers and limitations.

Challenges in Education and ICT intervention

As discussed earlier there are many challenges in front of Indian Education system. The report of the Yashpal committee of 1993 extensively reported such challenges and criticized the ills of the Indian Education system. The report highlighted the education system which has

become highly centralized, examination driven, joyless, impersonal and utterly irrelevant to the child's world. Such ills plaguing education system are discussed at length in National Curriculum Framework 2005. But ironically the solutions remained on the papers and very little seeped into the education system keeping it as it was ten years ago. The numbers did change in terms of high enrolment rates and low dropouts but the concerns of equity in education and issues of quality are still a major concern. Some of the challenges as discussed in the National Curriculum Framework are as follows:

Inflexibility in the school system:

The way education system has been organized has not changed much in the last 50 years. We live in totally different world now days as compared to the world 50 years ago, but as far as school system is concerned it's the same and does not fit students' changing needs at all. We still club the students according to their age and offer them the curricula with the expectation that one pace fits all, the education system still revolves around textbooks and examination. The focus in any school is not on learning but one is to complete the syllabus and second is to train students in such a way that they score good marks at the end of the year. Despite the fact researches have shown that the children learn in variety of ways, the textbook still remains the source of information. The year begins with the textbook and ends with the textbook. Unfortunately, if something changes and the textbooks are not updated keeping in view the latest developments, those developments are termed as out of syllabus rather than being the most important pieces of information that can connect the students with the world. Despite knowing that the students learn at different rates, yet we have forty minutes sessions where all students are expected to absorb information at the same rate. There is no provision whatsoever for the slow learners. Infact the system does not even provide a chance to a teacher to know who is lagging behind and why until the examinations. ICT can play an important role to counter this problem of Inflexibility. E-tutoring, video lectures, on demand lectures, online forums, e resources can help students to learn at their own pace.

Textbook and Teacher Centric Education

Children learn in variety of ways- through experience, making and doing things, experimentation, reading , discussions, asking, listening, viewing, thinking and reflecting and expressing oneself in speech, movement or writing both individually and with others. They require opportunities of all these kinds in the course of their development. In the current system the opportunity they have is the access to textbook and teachers. Child's process of discovery is limited to textbook and teachers and is most of the times they are spoon fed by the teachers and the textbooks. Restriction of classroom activities to what is written in textbook implies a serious impediment to the growth of children's interests and capabilities. ICT can play an important role in releasing the system from such rigidities. Classroom should be equipped with variety of resources and the teachers role is to enrich curriculum to expose the child to rich variety of resources and allowing them to question and explore instead of spoon-feeding. Teacher should create self-organized learning environment by allowing students to explore and find answers to questions themselves. For this teacher herself has to be aware of wide variety of resources available other than the textbook. There are number of digital repositories that host variety of digital content, appropriate to the needs of different level of students and teachers. In the last ten years many institutions in India have embraced this idea of having Open Educational Repositories to address the challenge of quality and equity. But these initiatives like National Science Digital Library(NSDL), the Open Source Courseware Animations Repository (OSCAR), the National Programme on Technology Enhanced Learning (NPTEL), the Virtual Academy for the Semi-Arid Tropics (VASAT) and Indira Gandhi national open university(IGNOU) are limited to higher education. National Policy on ICT in School Education proposed web based digital repository and the responsibility to build this repository was given to CIET, NCERT. The National Repository of Open Educational resources (NROER) was developed in collaboration with Homi Bhabha Centre for Science Education,

Mumbai. NROER is a comprehensive digital repository of resources that can be used by teachers in the teaching learning process. Conceptualized as a collaborative workspace, NROER provides a platform to teachers to create content which is localized and cater to the needs of their students. The idea is to make a variety of resources available to teachers so that they use the one which is most appropriate to their teaching style, the needs of students and aids the learning of the subject

Mission

- To store, preserve and provide access to variety of digital resources for students and teachers.
- To enable the participation of the community in development and sharing of digital resources.

Objectives

- To make quality educational resources available for teachers and students.
- To motivate teachers to create contextualized teaching learning resources.
- To encourage teachers to collaborate and curate new resources.
- To celebrate the best practices in content generation.

The media resources in the repository are organised according to subjects and grades. Each subject has a listing of concepts. Various resources are collected and created around these concepts. Teachers can access audio, video, learning objects, images, questions banks, activities & presentations etc related to these concepts. They can also upload resources which will be subjected to review by experts. In addition to accessing and uploading resources, NROER allows teachers to download, share, comment and rate media resources.

Content Generation as a centralized activity:

The content generation for school education has been limited to selected few. What is decided by those selected few are being taught in schools. Teachers who spend most of the time with students and understand their need well, rarely given a chance to participate in generation of knowledge. Since the knowledge is available everywhere teachers and students should also participate in the generation of knowledge. For example, there is hardly any good quality documentation on many facets of India's environment but such documentation can be created on the basis of students projects. The results of these projects can be uploaded on a publicly accessible website, thereby creating a transparent and comprehensive database on India's environment. Such information collated annually over the years can be an excellent resource. Including such knowledge generation activities as part of the educational process would also greatly enhance the quality of the educational experience. NROER provides this opportunity to teachers where they can contribute the resources and also get involved in the exercise of mapping the resources with the concepts available on the repository.

ICT can be used in number of ways and many of the problems plaguing Indian Education system can be solved through ICT intervention. Employing ICT judiciously to solve these problems require thorough understanding of ICT amongst teachers. Under ICT @ schools there is a provision to equip schools with computers and other Information and Communication Technology facilities. The responsibility of how ICT is being used at school level in teaching learning process and in overall management of school system lies with the teachers. All teachers in a school will be expected to become advanced users of ICT integrating ICT skills into their professional development as well as their teaching learning practices across all areas of curriculum. Also, the ICT Policy in School Education aims at preparing youth to participate creatively in the establishment, sustenance and growth of a knowledge society leading to all round socio-economic development of the nation and global competitiveness. National Policy on ICT in education proposed model curriculum for ICT in Education for teachers and students. The curriculum has been developed by CIET, NCERT to enable an exposure to students and teachers to the various possibilities of ICT and prepare them

for partaking the benefits of the ICT infused world. ICT curriculum is a major shift from what the country had seen till now as computer literacy programme, with a push this switch and click that button emphasis. Through such computer literacy programmes not only do we portray ICT as more difficult than it actually is, but also hinder intellectual development and creativity. Also, using computers and internet as mere information delivery devices grossly underutilizes their power and capabilities.

The ICT curriculum therefore anchors itself to the National Curriculum Framework. It also relegates the need to learn routines and procedures to incidental learning. The aim is to involve the teacher in a critical appraisal of the availability and appropriateness of technological solutions to address educational problems. For the student, emphasis is on creative use of the medium and widening of one's horizons.

The curriculum proposes six thematic areas in which ICTs can be explored. ICTs do not merely constitute a specific tool or application. Rather it is a new framework which we must prepare our children for in schools. These strands have been developed based on the various possibilities provided by ICTs and the skills needed for realizing these possibilities. These themes are further built in increasing layers of complexity - in terms of basic, intermediate and advanced.

The six themes in the curriculum are:

- Connecting with the world
- Connecting with each other
- Interacting with ICT
- Creating with ICT
- Possibilities in Education
- Reaching out and bridging the divide

Connecting with the world (CWW)

ICT tools enable anytime, anywhere access to information and resources. Given the proliferation of internet connectivity, the curriculum recognises the fact that being connected to the internet offers tremendous benefits to teachers in terms of capabilities to access information and resources of various kinds and to utilize them in their teaching-learning. Not only will these add to the range of techniques that the teacher uses, but also make a difference to their students' learning. Becoming aware of the range of materials the web offers to the teachers' own learning as well as teaching aids; critical appraisal of the information and resources; safe, productive, ethical and legal use of these resources; and protecting oneself and others from the harmful effects of the virtual medium are fundamental to teachers' and students' learning.

Connecting with Each Other (CWE)

ICT tools also enable a variety of ways to keep people connected. Synchronous and asynchronous modes also increase the degree of interactivity and helps create communities, which can then collaborate to create interest groups for a common cause. While at the bare minimum, it enables a very rapid way of communicating with a friend, it can be leveraged to break teacher isolation and promote professional growth.Becoming aware of the various communication possibilities, becoming interested in and participating in professional communities, keeping oneself abreast of the State of the Art are essential to keep the teacher in sync with developments of technology and updated about developments in her own discipline and in educational practice.

Creating with ICT (CWICT)

ICT tools are not seen as an end in themselves but as an opportunity to create and express. Modern ICT employ a variety of media forms – text, graphics, animation, audio and video, enabling a rich communication. Easy, friendly ways have been discovered to interact with ICT. Together they expand enormously the range of learning that can accrue. Software applications and hardware devices have become increasingly versatile and cater to a variety of learning needs. The wider the range of tools, devices, software applications and techniques that the teacher and student are aware of and can productively use, the wider will be the opportunities for their imagination and expression. Treating a computer as a mere information delivery device will lead to a gross underutilization of its capabilities and use in teaching learning.

Creating, curating, managing images and

documents, repurposing them into communications, gathering and processing data and presenting them, working with audio and video tools to create media rich communications, learning to program and control devices and processes, become important to the teacher. With access to a range of tools and devices, the repertoire of communication skills will also increase. The teachers' ability to leverage the interactive features into teaching learning will also extend the range of activities students can be involved in and learn from.

Interacting with ICT (IWICT)

ICT are evolving at a very rapid pace. The type of device, its operating processes, the purpose for which the tool is to be deployed – the range of essential learning in ICT is ever increasing. While the computer has evolved to take on more and more complex tasks, the interface itself has become simpler by the day. From the days of a command line interface to an app based touch interface, computers have become extremely productive devices, finding uses in more and more applications, particularly in the daily routine of every common man. Understanding how ICT systems operate and an appreciation of the range of ICT tools available today can help identify opportunities for teaching learning. Extensive use also helps make informed decisions in selecting most appropriate tools for education.

Possibilities in Education (PIE)

ICT capabilities have opened out a wide variety of educational applications. Software applications which extend learning, immerse students in experimentation and problem solving, make available data sets to process and retrieve information from are commonly used in education. Online resources – books, courses, media materials have also become common. Interactive possibilities, individual users interacting with packaged material or groups of people interacting with each other have also opened up ways in which education is being transacted. While the glamour and novelty of the medium attracts everyone, becoming a discerning, critical user of ICT is very essential. Sugar coating of information cannot constitute enriching of experience. Learning to acquire insights into how ICT operate and impact teaching learning, what forms of media and information can be appropriate to learning, how educational goals can become the arbiter of choices made in ICT, assessment and evaluation of ICT tools, devices, information and resources are very important if cost effective and meaningful ICT has to be promoted. This theme therefore forms the bridge between the aspirations of the education system and the run away developments in ICT. The theme will also involve the exploration and experimentation with open educational resources (OER)- access, use and evaluation, creation and contribution of educational resources, research and critical appraisal of the utility and effectiveness of ICT devices and tools, familiarity with virtual environments for self-learning and teaching-learning, familiarity with the web and its range of resources, productivity tools and their meaningful use, tools and forums for planning, organising, teaching learning, assessment and evaluation, tools and forums for professional growth.

Reaching out and bridging divide (ROBD)

ICT has become available widely, overcoming geographical and social boundaries. But this has not naturally ensured access to its benefits to all. ICT itself has evolved techniques – a DVD or a music player as examples of portability, forums as examples of public helplines and support, public sharing and open educational resources, a wide range of free and open source software augur well for improving access. Language barriers and professional isolation can deny students and teachers access to the wide range of digital information and resources. Becoming aware of, experimenting with, participation in and creation of resources and support aimed at those denied access will help reach out and bridge the divides. Physically challenged, particularly the blind and the deaf cannot access information as easily. The theme will involve an exposure to building digital communities, understanding the need for and evolving shared agenda, creating, sharing, and curating resources for the teacher and the student communities, community radio; local language tools and local content, translators

and translations, subtitling video; disability and assistive technologies- screen readers for the visually impaired; audio books; talking books; collaborative possibilities – wikis, open maps, data repositories and forums.

Conclusion

ICT intervention at school level is the need of hour as it can play a significant role in solving some of the problems that the Indian Education system is facing. Such interventions have to go beyond mere distribution of computers and related equipment. There need to be a synergy between what ICT can do and what are the requirements in the field of education. National Policy on ICT in Education do look at ICT intervention in a holistic manner which aims at making infrastructure available (Hardware and software, connectivity, power supply and computer lab) Besides this it also aims at digitization of available educational audio video and print resources, development of e content in multiple languages, teacher related interventions which includes capacity enhancement of all teachers in ICT and introduction of scheme for national ICT awards as a means of motivation. The challenge now lies in the implementation-making ICT infrastructure available, development of e content in multiple formats and multiple languages, training of teachers, teacher educators, policy makers in the use of ICT. To make this happen various organizations have to join hands and pool the resources which are available in abundance in our country. The effort has to be made to map these resources with the school curriculum. Also, teachers after being trained in ICT have to start contributing in the creation of content and offer individualized learning environment to her students.

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