ICT in Education

The convergence of many ICT tools and technologies along with ubiquitous internet and mobile tools has provided unique opportunities for harnessing the true potential of ICT for improving the educational practices. The Government of India through its national ICT policy in education along with many other initiatives under digital India is moving ahead to transform the educational practices. In this background it is important that we bring together different stake holders in one platform to debate and discuss upon various aspects related to technology integration in education. Therefore this conference is expected to address the many challenges and new directions presented by technological innovations in Indian educational settings.

There are various challenges and problems in ICT integration in school education. This conference may not be a mere repetition of the same exercise of identifying these challenges alone. The Government is fully aware of most of these challenges and have already initiated many schemes in overcoming these challenges. The focus of conference should be on how the school and teacher education system can harness the true potential of these initiatives and need to provide policy perspectives and recommendations in terms of using current and emerging ICT tools and technologies in improving learning among children and adults of our nation.
There were many initiatives in integrating ICT in education by central and state Governments in terms of creating resources, providing infrastructure and training the teachers and teacher educators. Many National and international business organizations and NGOs were also involved in a number of projects for the schools. These efforts consists of developing training resources, creating e-content, designing e-learning platforms, creating IT infrastructure and organising training. As a result of all these efforts, there were many pockets of innovation but there was no synergy among the projects, no systematic scaling-up of projects and no plans for its sustainability.

Having realised this problem, the Government felt the need for national programmes to help school integrate ICT in education and reap its benefits for improving learning. There are many initiatives currently in progress to realise this and what follows is an overview of these initiatives.

**Digital India Programme**

In order to transform the entire ecosystem of public services through the use of information technology, the Government of India has launched the Digital India programme with the vision to transform India into a digitally empowered society and knowledge economy. Under this project, in one of the vision areas- digital Infrastructure as a utility to every citizen- Among other things, the Government will ensure the availability of high speed internet as a core utility for delivery of services to citizens and cradle to grave digital identity that is unique, lifelong, online and authenticable to every citizen. In another vision area - Digital Empowerment of Citizens- among other things, the Government also aims for universal digital literacy, universally accessible digital resources and availability of digital resources / services in Indian languages.

The assumption of the Government is that a well connected nation is a prerequisite to a well served nation. Once the remotest of the Indian villagers are digitally connected through broadband and high speed internet, then delivery of electronic government services to every citizen, targeted social benefits, and financial inclusion can be achieved in reality.

To this end the Government will ensure that all panchayats in the country have high-speed connectivity, the Department of Telecom (DoT) has established Bharat Broadband Network Ltd. (BBNL) to roll out the National Optical Fibre Network (NOFN). BBNL will lay out the optic fibre cable terminating in each of the 2,50,000 gram panchayats in the country, providing 100 Mbps link to be used as information highway by all the stakeholders to ensure that digital inclusion reaches all villages across the country. This
will ensure digitization and connectivity of the local institutions, such as panchayat office, schools, health centres, libraries, etc. The industry has also come forward to support the e-literacy goal through the National Digital Literacy Mission.

Digital resources are truly universally accessible when they are easily available and navigable everywhere and by everyone. Open resources have the advantage of being widely and inexpensively available and also being widely usable and customizable. Digital resources created or implemented along these lines can be accessed everywhere compared to resources developed from proprietary systems. Owner departments and agencies have the responsibility of ensuring that their digital resources are of high quality so that access and customization are not problematic.

India has a remarkable diversity in terms of languages written and spoken in different parts of the country. There are 22 official languages and 12 scripts. Knowledge of English is limited to a very small section of the population in the country. The rest often cannot access or comprehend digital resources which are available mainly in English. To overcome this barrier the Government is formulating a new mission mode project named as e-Bhasha to help develop and disseminate digital content in local languages to India's largely non-English speaking population. The disabled friendly content and systems are being developed as per accessibility standards.

Under the Digital India programme, the government is also committed to providing access to digital resources for citizens with special needs, such as those with visual or hearing impairments (which may be partial or complete), learning or cognitive disabilities, physical disabilities which hinder operation of ubiquitous access devices such as phones, tablets and computers (the information under this section “Digital India Programme” is adapted from the “vision areas of digital India” retrieved from http://digitalindia.gov.in/content/vision-and-vision-areas)

Other Government Initiatives

- **SWAYAM** (Study Webs of Active-Learning for Young Aspiring Minds) Programme Professors of centrally funded institutions like IITs, IIMs, Centrally universities will offer online courses to citizens of our country. All courses will be made available free of cost for learning. In case the learner requires a Verified Certificate, a small fee will be applicable.

- **The National E-Library** has been envisaged as an online portal that will democratize access to knowledge by ensuring that quality content from central universities and premier educational institutions are available in a digital format that
can be easily accessed by students, working professionals and researchers across the country through laptops, smart phones, tablets, PC’s.

- **NMEICT** The National Mission on Education through Information and Communication Technology (NMEICT) has been envisaged as a Centrally Sponsored Scheme to leverage the potential of ICT, in teaching and learning process for the benefit of all the learners in Higher Education Institutions in any time any where mode.

- **The National Repository of Open Educational Resources (NROER)** offers digital and digitisable resources (audio, video, interactive images and documents) in different languages along with online activities.

- **National Policy on ICT in School Education 2013** aims at preparing youth to participate creatively in the establishment, sustenance and growth of a knowledge society leading to all round socioeconomic development of the nation and global competitiveness.

- **National ICT Curriculum** aims at realising the goals of the National Policy of ICT in Schools Education and the National Curriculum Framework. Given the dynamic nature of ICT, the curricula, emphasising the core educational purposes, is generic in design and focuses on a broad exposure to technologies, together aimed at enhancing creativity and imagination of the learners.

- **Shaala Darpan**, parents will get entire information at a unified platform about their children in respect of the attendance status, performance, health challenges and entire academic record from Ist to XIIth standard. Students will have facilities of e-tutorials and learning aids to enrich their knowledge.

- **e-basta** In line with the government's Digital India initiative, C-DAC has created a framework to make school books accessible in digital form as e-books to be read and used on tablets and laptops. The main idea is to bring various publishers (free as well as commercial) and schools together on one platform. It allows authorized school teachers to compile course material and textbooks and e-books as per a school’s preferences, for each class.

- **GIS mapping of schools** at elementary as well as secondary level initiated and completed for 13 States with work underway for another 8 States. This enables mapping infrastructure gaps and responding to the felt needs of the people in providing schooling facilities.

- **Swayam Prabha**- A scheme to allow 32 Direct-to-home (DTH) channels to broadcast programs for school and university students

- **e-pathshala** - Digital text book (flip and e-pub format) and other educational resources for school education as online and mobile application.
- **National ICT award** - National ICT award is given annually to the school teachers for innovative use technology in learning.

- **e-PG Pathshala** - High quality, curriculum-based, interactive content in different subjects across all disciplines of social sciences, arts, fine arts & humanities, natural & mathematical sciences, linguistics and languages at PG level is being developed under this initiative named e-PG Pathshala.

In this background it is must that our education system needs to harness the potential of these schemes and initiatives in improving the learning and assessment practices in our schools and classrooms.

**Expectations of the National Conference**

In this document thirteen sub areas under the theme ICT in education are presented. Each of these presentations is followed with some leading questions which need to be addressed in the papers and various sessions and discussions to arrive at valid conference recommendations.

**ICT, Pedagogy, and Assessment**

- ICT tools should be leveraged to help teachers shift from transferring information to facilitate learners to create knowledge and help them to shift from an acquisition mode of learning to one that engages in higher order thinking, innovation, creativity and collaboration. There are many innovative pedagogical practices like flipped learning, MOOC, PBL, Makerspace, game based learning, and mobile applications. Technology tools like e-portfolio and rubrics can be used productively for authentic assessments. Learning analytics and other developments are promising developments in individualising assessment and providing feedbacks.

- **Questions:** Groups need to elaborate on ways and means to do it. What are the initiatives to shift the pedagogical practices that are predominantly teacher-centric to include more student centric pedagogy practices with the help of ICT tools? How to facilitate self directed learning among students? How to leverage ICT for formative assessment and summative assessment? How to use ICT for providing and engaging students in meaningful and authentic learning experiences? How to plan and implement alternative authentic assessment with the help of technology which focuses on real world problems? What is preventing our teachers to use innovative pedagogical approaches mentioned above, in the classrooms?
Open Educational Resources (OER) and Creative Common Licenses have been gaining wider acceptability among the educational community. Having realised its potential for improving the educational practice, it is high on the national agenda of many countries and India is not an exception. Many of the Government initiatives including NROER as mentioned in the previous section is developing web-based resources to meet the increasing demand of ICT-enriched teaching and learning environments. There are also attempts by some states in creating digital resources as in the case of KOER initiatives of Karnataka and Digital Collaborative Textbooks initiatives under ICT@School in Kerala http://www.dct.kerala.gov.in . However the extent of OER creation, use, reuse and adaption is still in its primitive stage in many countries including India. Lack of good quality educational resources in regional languages is another problem in integrating technology in school education. There is a necessity of developing repositories of open educational resources for school education in all subjects in Indian languages.

Questions: The conference could focus on how these resources could be used to enhance learning, what pedagogical practices using these resources can maximize learning and thinking? How can state repositories to be used as practice field for teachers in creating content and transfer these content to national repositories after validation?

There is a sizable population of end users who are not even aware of what is OER let alone where to find it, how to find it, how to use it, and how to create and modify it. How to create this awareness and required skills in using it? Creating a support system which facilitates the creation, use and management of OER is the first stage in harnessing the full potential of OER and the conference need to discuss the possibilities. Creating such support system necessitates a strong national policy guidelines, accessible tools and technologies for creating and adapting OER, technologies to host and deliver the OER resources, mechanisms to popularise its use and adaption and an institutional culture in which such practices are accounted and rewarded. Deliberations on these issues are of utmost importance.

Massive Open Online Courses (MOOC) in School Education

With a view to providing access to the best quality learning resources across the country, the project 'Study Webs of Active Learning for Young Aspiring Minds' (SWAYAM) has been started. SWAYAM provides an integrated MOOC platform and portal for online courses, using information and communication technology (ICT) and covering High School till all higher education subjects and skill sector courses to ensure that every student benefits from learning material through ICT.
Teachers, teacher educators and other experts need to create and provide online courses on school subjects.

- **Questions**: The conference will focus on exploring various issues associated with developing and delivering MOOCS in school subjects. How to integrate learning from such initiatives in to the existing context? Could it be used for enrichment or remediation? How to account for the learning from these courses in to the existing assessment contexts? Who will develop and how will it be delivered?

### Broad Band Internet Connectivity

- **As part of the Digital India Initiatives, the Bharat Broadband Network Ltd. (BBNL) will provide 2,50,000 gram Panchayats with high speed internet connectivity of 100 Mbps to be used as information highway by all the stakeholders to ensure that digital inclusion reaches all villages across the country. This will ensure digitization and connectivity of the local institutions, such as panchayat office, schools, health centres, libraries, etc. In addition with the wide spread access and use of 3G and now popular fourth generation (4G) of mobile communication technology standards will ensure high speed wireless internet access a reality. Under the Digital India programme the Government will ensure universal access to mobile connectivity by providing mobile coverage to around 55,619 villages in the country that do not have mobile coverage.**

- **Questions**: The conference should explore in such a scenario, what should be the policy directions in effective utilisation of this internet connectivity to transform the teaching, learning, assessment, and management practices in the schools.

### Access Devices

- **Teachers and students should be provided with adequate access to hardware and software. Providing adequate infrastructure in terms of computer laboratories, multimedia enabled smart classrooms need to be taken up with priority. Financial support could be made available to students and teachers to bring their own devices and this will help in overcoming one of the major concern of upgrading and maintenance of both hardware and software. The onus of maintenance and upgradation is passed on to the individual users. Also most of the time availability power supply is the major concerns in effective integration of technology.**

- **Questions**: The conference can focus on the issues related to allowing students, may be from primary stage onwards their own mobile devices (BYOD). What structural and pedagogical innovations are possible in such a scenario?

- **Measures to funding the creation of computer laboratories and smart classrooms and its upgradation and maintenance could be explored. Who should fund this and how**
the funding should be provided? Can someone from outside should decide what is needed in the school then purchase and dump that in the school or should the school be given more autonomy in deciding their technology requirements? Could they be provided with ICT funds to purchase equipment and develop infrastructure to support customized ICT programmes in their own schools? Could such autonomy bring ownership and accountability? Could they be asked to evaluate and benchmark their ICT practices and institutional arrangements against the established standards? Can we use solar panels and batteries to power the digital devices?

**Ubiquitous Technologies and everywhere learning**

- Coupled with high speed broadband internet and Wi-Fi access, development of more powerful mobile tablet devices with 3g and 4g features which is affordable to all children of this nation is necessary pre conditions for reaping the full potential of technology for learning. Added to this making free 3g/4g access to their mobile devices will extend learning beyond the physical confines of classroom and rigidly structured school time.

- **Questions**: The discussion could focus on the policy directives in relation to what pedagogical approaches will facilitate this mobile learning? Could teacher use flipped classroom approaches to harness the potential of this ubiquitous computing? Can we develop android mobile educational applications in Indian languages which could be downloaded from Google play store? Should we provide unmonitored access to internet? How to provide free access to 3g/4g access to students? What are the security concerns and how to address these concerns?

**Free and Open Source Software (FOSS)**

- The ICT curriculum states that the use of proprietary software would become very expensive and make the curriculum implementation unviable. Therefore, Free and Open Source software have been suggested throughout the curricula. The use of FOSS applications will also obviate software piracy and enable customisation. There is a necessity of making nationwide effort by central and state Governments in popularizing FOSS among all users. To this end proper policy guideline, training programs needs to be developed and deployed.

- **Questions**: Why people are not shifting towards use FOSS tools? How to popularise use of FOSS tools among teachers and teacher educators? What are the FOSS tools available for school education? Could there be a centralised platform for all FOSS tools which permits downloading, installation trial, feature reviews, tutorials and sharing ideas for effective use in education?
Human resource development

➢ There is a necessity to equip all teachers with the necessary ICT skills and knowledge on the appropriate pedagogical use of ICT in teaching and learning. To this end the national ICT curriculum has specified the syllabus and also developed the training modules.

➢ Questions: The conference need to deliberate up on the methodology to reach out to all the teachers in the country. How this can be integrated with the existing training programmes and activities organised by various entities? Could there be MOOCs on professional development in the area of technology integration in school and adult education? How to give more need based and school based training rather than one size fit all approach? Is training by a trainer/master trainers is always effective? Are there possibilities of developing communities of practices among teachers to share and learn together? How to encourage the teachers to get involved in self directed professional development in ICT integration? Is social networking an educational tool? How can we leverage social media for professional development?

ICT and Disabled Learners

➢ Under the Digital India programme, the government is also committed to providing access to digital resources for citizens with special needs, such as those with visual or hearing impairments (which may be partial or complete), learning or cognitive disabilities, physical disabilities which hinder operation of ubiquitous access devices such as phones, tablets and computers. The disabled friendly content and systems are being developed as per accessibility standards. We need to take special efforts to help the disabled by equipping our teachers and educational institutions to adopt innovative, cost effective assistive technologies to enable access to education for disabled children.

➢ Questions: What are the assistive technologies available for children with disabilities? How to help teachers develop awareness and the skill in using this? How to make these technologies available in every school to create an inclusive classroom? How to integrate training use of digital assistive technologies in pre-service training programmes? How to develop ICT based educational resources for learning and assessment of children with special needs? How to make the existing digital resources accessible to disabled learners? What is Universal Design for Learning? How to implement UDL in our classrooms?

Rewarding and recognising the performers

➢ National ICT award was initiated by the Government to encourage and motivate teachers in technology integration. Additionally there are also many state and private initiatives in rewarding teachers for innovations in this area.
Questions: Is there a necessity to motivate the teachers in technology integration, if they themselves are convinced about the strength of it in facilitating learning? If there is a necessity then how to strengthen the existing practices? Do they need to be provided with additional incentives, if so how? Can they be funded and encouraged to attend and present their innovations in regional, national and international conferences, seminars and workshops? Could there be financial support for teachers to take up technology integration projects? Can study tours and teacher exchange help in professional development? If so, how to implement the same?

Research in Technology Integration

There is a necessity of applied and action research in the area of ICT integration that could inform pedagogical and assessment practices in schools. It is only research which will tell us whether the use technology engaged the students in learning effectively. Research is needed to implement innovative practices of using ICT and to investigate how these practices lead to change in learning and achievement. Such research will help us sustain the good practices and make it scalable.

Questions: The conference could discuss on the issues raised here to reflect this in the recommendations. Are there sufficient amount of applied research to take an informed decision in our own diverse context to know what works and what doesn’t? Do our teachers and teacher educators involve in innovative practices, if so do they conduct an action research on these innovations and report/disseminate it? Do we have a database of all the researches in this area? Is there a Meta analysis of these studies to find the major recommendations? Could there be a R&D unit which focus on taking up applied research in this area to inform policy makers, planners, administrators, and teachers what works? What is the role of design based research in technology integration? Could there be evaluation studies? How and who will take up programme evaluation studies? Who and how will the result of such evaluation studies be used? What is Game based learning? What are the steps in developing and popularising game based learning?

ICT and Teacher Education

In the National Curriculum Framework for Teacher Education (NCFTE, 2009) considered among other things the Issues related to ICT in schooling as well as e-learning is in the centre-stage. The report states that ICT in spite of its potential to make learning liberating, its implementation is often not more than cosmetic. The curriculum recommends inclusion of ICT as an important curricular resource, according primacy to the role of the teacher, ensuring public ownership of digital resources, and promoting constructivist approaches that privilege anticipation and co-creation over mere access to ICTs.
Questions: How to transact ICT curriculum in teacher training courses more effectively than covering it as theoretical inputs? What are the problems associated with implementing technology pedagogy integration in teacher training institutions? How to develop the competencies in e-content development and providing e-learning among teacher trainees? How to develop the competencies among teacher trainees to use ICT as an enabler for collaborative and self-directed learning?

Managing Technology Integration Initiatives

There are many agencies involved in technology integration initiatives in the country. Central Government, State Governments, Business organisation like Google, Microsoft, Oracle, Intel, Azim Premji Foundation, excel soft, etc. and many NGOs. Many of these IT companies have developed e-content of various formats, e-learning solutions, and MIS and ERP solutions in addition to training teachers. They can play a vital role in supporting schools. There is a necessity to bring together the effort all these organizations to reach out to the nook and corners of this nation and avoid wastage of time and resources to reach out to all.

Secondly, at the school level itself there is a necessity of efficient ICT management structure to provide the necessary digital leadership to create digital culture where everyone collaborate make things happen. Participation from all stake holders for creating, maintaining, and upgrading ICT infrastructure is needed. Involvement of Panchayat, SMC, PTA, alumni and other stake holders in the implementation of ICT integration should be considered. Every school could use open source comprehensive educational management and enterprise resource planning (ERP) software/MIS for managing all their affairs effectively. Creating a digital culture through technology leadership is needed to transform the educational organisations.

Questions: How to bring together the efforts of all stakeholders to have unified approach? What are the potential industry partnerships? How to develop the technology leadership practices among administrators? How to maintain the ICT infrastructure? Could the school appoint a technical person to upgrade and maintain the system? Should this be given as AMC? Could we involve the linux user groups and other experts from the community? Is there a necessity for separate ICT in education policy and curriculum for each state? If so why? Do we have a technology integration plan for each school? How to develop and implement a workable school specific technology plan for each school?
Conclusion

There has to be shared vision and responsibility among all stakeholders for successful integration of technology in school and teacher education. Key leaders in the ministry of education, CIET/NCERT, State education ministry/SCERT/SIET and school leaders need to work together to create a system of responsibility and accountability in implementing policy guidelines, monitoring its progress, conducting evaluation studies through programme evaluation, generating feedback and revising the guidelines in the light of these evaluation studies. The conference is an attempt in addressing many of the concerns and questions generated and it is expected that the participants will keep these concerns in mind while presenting their research, innovations and practices in the conference.

ICT permits teachers to teach less and learners to learn more