

Survey of Information and Communication Technologies for  
Education in India & South Asia



# DRAFT SURVEY INSIGHTS



The logo for infoDev, featuring the word "infoDev" in a blue, lowercase, sans-serif font. Above the "i" and "n" are five small blue dots arranged in a slight arc.

PRICEWATERHOUSECOOPERS 

Key Insights

## About the Report

The Survey on ICTs for Education in India and South Asia was commissioned by infoDev to be undertaken by PricewaterhouseCoopers, India. The Survey is a third in the series after similar surveys for the African and Caribbean regions completed in 2008 and 2009. The main objective of the Survey is to create a consolidated source of information on the experiences of using ICTs for Education in the South Asian region and to provide a framework of reference for policy makers.

## Structure of the Report

Volume I of the Survey of ICTs for Education in India and South Asia, is a series of Country Studies on each of the eight countries in the South Asian region. Each country study begins with a broad background of the country- the education system and the ICT scenario, it is then followed by a section on the policy framework and delivery mechanisms governing the use of ICTs in the Education space. Following this section major education initiatives using ICTs in each country have been profiled. The initiatives profiled focus more on the use of ICTs at the primary and secondary levels of education and only briefly touch upon the significant interventions using technology at the tertiary level. The last two sections of each country study have a discussion on the major constraints in integrating ICTs in Education and the key insights from each country study. The country studies begin with India and then proceed alphabetically.

Case studies for India include detailed studies of ICT initiatives in the education space in five Indian states namely Andhra Pradesh, Delhi, Karnataka, Rajasthan and West Bengal. The states profiled for case studies were identified at an initial stakeholder meeting, keeping in mind the geographical distribution, availability of information and success of ICT initiatives. For Pakistan the role of ICTs in Open and Distance Education and Teacher Education have been profiled as two case studies.

Volume II, is a series of Thematic Essays that address key issues across the focus countries, such as policy coherence in the use of ICTs for Education, use of ICTs in non formal education and the issues around capacity building for effective application of ICTs for education. The topics for the thematic essays were finalized at an initial brainstorming workshop, where stakeholders were introduced to the Survey, the methodology to be followed and the scope of such a Survey within the given constraints.

## Report Limitations

However there are several limitations of a project of this nature covering a wide geographical span and directed at a fast changing scenario:

- The Survey has primarily been based on secondary research and face to face or telephonic interviews and workshops with relevant stakeholders. It is thus not an exercise in primary data collection.
- While effort has been made to ensure that data collected covers all major initiatives, given the vastness of the geography and the dynamic nature of the use of ICTs, the initiatives outlined will be more illustrative than exhaustive.
- Effort has been made to present the most relevant and updated information, however because the field is rapidly evolving, the data represented here is 'current' at the time of study.
- The Survey has focused more on Primary and Secondary Education, but has covered significant initiatives in tertiary education, vocational, non formal & mass education, distance education where these are significant for the region or the country.
- The purpose of the survey is to create a repository documenting innovative initiatives using ICT in Education, in addition the survey will provide a basis for designing strategies for effective integration of ICT in Education, based on trends and experiences documented.
- While sophisticated content is being developed and deployed through cutting edge technologies in controlled environments, this survey will focus more on innovative ICT applications that have maximum impact on a large number of potential learners, and overcome significant delivery and quality constraints in the developing country context.

## Introduction

Use of ICTs for Education in the South Asian countries can be viewed from two perspectives. The first is squarely placed in the 'development' discourse and broadly comes from an ICT for Development approach. In this approach technology is seen as a tool for achieving a set of goals that signify a certain state of development as historically understood. In this paradigm use of technology is advocated to reach the unreached, provide support to those who do not have access to quality hard infrastructure, quality teachers and quality educational resources. This includes use of ICTs for various non formal education programs, adult literacy, informational and educational services for farmers, fisherman etc and creating telecentres where citizens can have access to services and information.

The second perspective is that of the e learning paradigm. The e learning paradigm is in effect a response to the needs of the emerging 'knowledge society', where ways of learning and applying that knowledge are changing at a fast pace. It reflects the requirements of 21<sup>st</sup> Century teaching learning skills. As remarked by Alvin Toffler- 'The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn' Thus the e learning paradigm sees technology as a platform for fundamental innovation in the way teaching-learning any where in the world is being undertaken. It focuses on creating more learner centric environments, replacing one way instructional model with collaborative learning models and knowledge creation and knowledge sharing

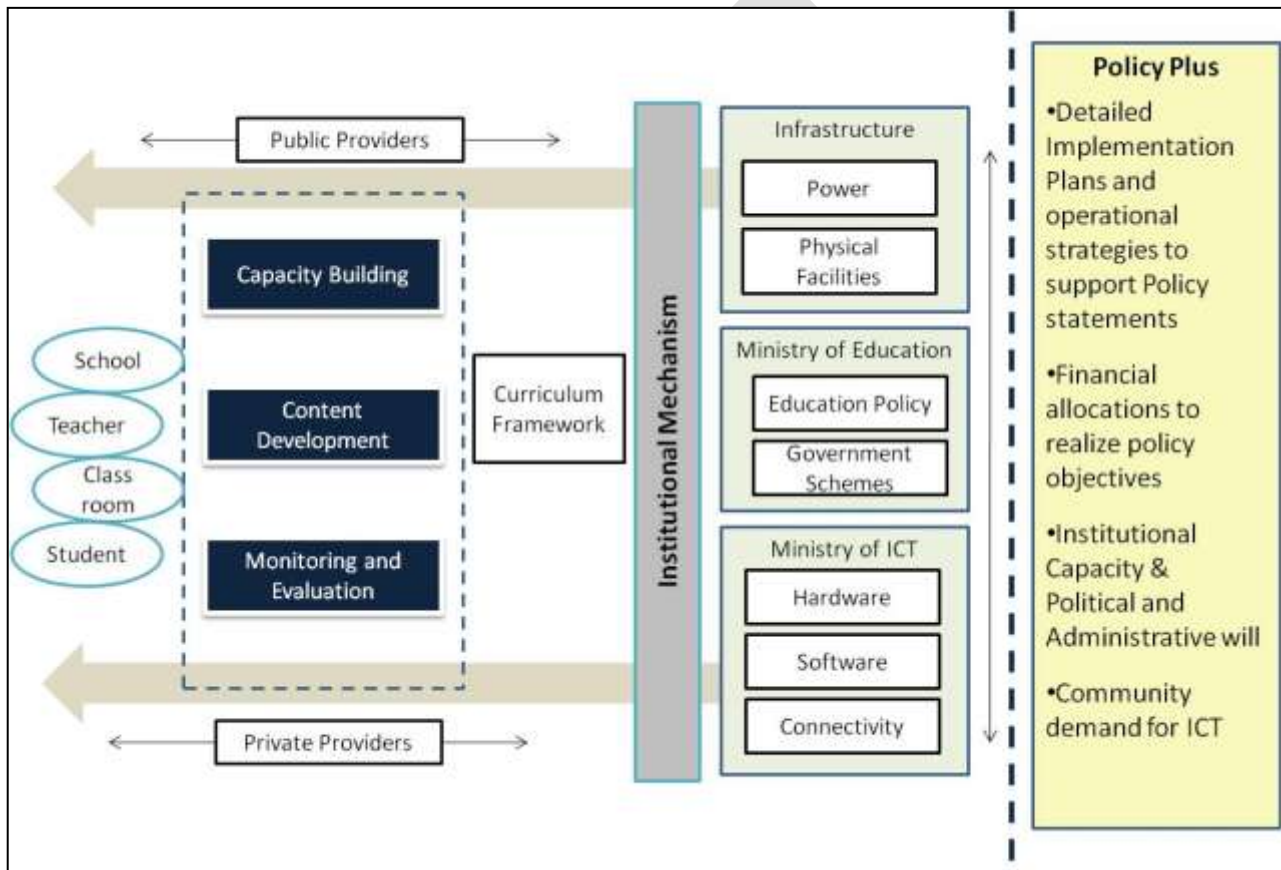
While this distinction can be largely theoretical, it is useful in allowing us to understand the complexity of the ways in which ICTs are being used in the education space in these countries. The use of ICTs in the education space in the South Asian countries is complex because it straddles both these perspectives- in certain environments ICTs provide a way to overcome existing gaps and in certain other environments ICTs provide a platform for fundamental innovation in existing pedagogical practices. Thus in the South Asian region a diversity of solutions is required that meet the needs of all levels and kinds of educational activities from non formal education, to awareness generation, to the use of state of the art technology for advanced e learning practices.

This Survey primarily sought to present a snapshot of the different kinds of initiatives in which ICTs are being used for Education in India and South Asia. Given the rapid changes in the field, the vast spectrum of initiatives using ICTs and the extremely contextual reasons for success or failure of ICT enabled educational initiatives, it is almost impossible to prescribe definite solutions, however through the course of the study several key insights emerge that may be useful in designing future projects and programmes. Some of these key insights are discussed here:

## Key Insights

### 1. ICT for Education Ecosystem

In studying the various ICT for Education initiatives in the different focus countries, it emerged that initiatives are successful precisely because they are able to pull together many different elements in an organic and integrated manner, supported by a robust yet flexible policy framework. Very broadly a graphical depiction of what may be understood as an **ICT for Education Ecosystem** can be shown in the figure below.



Core infrastructure policies provide for electrification and physical facilities, the Ministry of Education has the responsibility for articulating the larger Education policy and the Ministry of ICT is responsible for putting in place a broad communications policy as also policies on developing hardware, software and connectivity. Coordination between the different arms of the government especially the education and ICT ministries is essential to ensure coherence at the policy level. These policies may then be translated into initiatives and schemes by both public as well as private providers, through different

mechanisms. Initiatives specific to ICT for Education would have several critical elements such as capacity building, content development and monitoring and evaluation strategies. These put together would then be geared towards the student in his environment, ensuring that ICT initiatives actually result in improved teaching learning. In addition to these policy elements several critical factors like detailed implementation plans to operationalize policy statements, financial allocations, institutional capacity and also community demand for ICT are all essential to ensure that use of ICTs are effectively integrated in the education system. Any effort that does not focus on all these aspects in an integrated manner often was found to not yield requisite results.

## **2. ICT Initiatives as a Platform for Innovation in Education**

Through the survey it has also emerged that on many occasions the use of ICTs in the developing country context, is seen as a means to overcome some of the chronic systemic problems in the education system- like poorly trained teachers, high dropouts because of lack of motivation, and problems of pedagogy. In initiatives that are thought to be 'successful' use of ICT becomes, perhaps even unintentionally, an opportunity for pedagogical reform, new teaching learning practices, greater motivation for teachers and students. All of the above positive results can occur irrespective of ICT tools, but in the most successful initiatives using ICTs this is often seen to be the case. Education systems in the South Asian countries are typically slow to change and innovate and use of ICTs provide a useful platform for kick starting this innovation, if designed properly. The crux therefore is to design suitable initiatives that go far beyond setting up IT labs where students learn Paint, Word etc and to integrate ICTs in the teaching learning practices. That is not to make the case that ICTs actually solve all these structural problems, but like e- governance initiatives in the region, they afford an opportunity for what is called 'process re-engineering' of outdated and outmoded practices. This aspect could be one of the strong motivations for introducing ICTs in the education space.

## **3. Aspiration for Information and Communication Technologies**

Another significant understanding through this study has been that in the developing country context, demand for ICTs is an aspiration and governments in developing countries will have to answer this aspiration. In most interactions with stakeholders during the course of this study, as also in the schools that were visited amongst the students (and often the teachers as well) there was an enthusiasm to learn 'computer skills'. While this may not be representative of all learning spaces, but by and large there is a positive perception of 'Computers' being necessary to getting good jobs and succeeding in the current economic environment. Digital literacy is a morale booster, it improves self confidence which will get encashed in appreciation of learning achievements. The growth of IT as an industry in the region, led by the Indian experience has provided an avenue for boosting economic performance and providing employment to the youth. It is for this reason that almost all the countries in the region have put in place detailed IT policies, and established IT Ministries and Departments to provide impetus for the development of the information and communication technology industry. Consequently in most countries introduction of ICTs in education began with the imperative of having a qualified pool of human resources in information technology. There is a greater focus on the incorporation of ICT as a subject in the curriculum than on using ICT as an instructional aid to improve overall education quality.

This has meant that the focus of ICT at the school level has quite often been IT Education based on a defined curriculum at the secondary and senior secondary level. However, to truly realize the benefits of ICTs in the education space governments and educational institutions will have to look beyond this approach to leverage ICTs for improving the over all teaching learning environment and practices.

#### 4. Open and Distance Learning Systems

Open and Distance learning systems are well established in almost all the South Asian countries especially at the higher education level. Open Universities, schools and distance education programs like the Indira Gandhi National Open University and the National Institute of Open Schooling in India, Allama Iqbal Open University, in Pakistan, Bangladesh Open University, Sri Lanka Open University, were all historically set up in the newly independent nations of South Asia to promote mass education using traditional print, as well as video and radio based teaching learning materials. With the availability of new and emerging technologies these systems have begun to utilize the internet, CD Roms, video conferencing and other multimedia tools to provide more effective learning. While some newly established open learning institutions like the Virtual University in Pakistan rely almost entirely on technology to deliver quality education, some traditional distance education institutions have been unable to adequately leverage the opportunities made available through technology. Open and Distance Learning institutions enroll at present a vast number of students, (National Institute of Open Schooling India enrolls over 1.5 million students at the secondary and higher secondary level, Allama Iqbal Open University has over 1 million students) and a focus on improving the quality of teaching learning through adequately leveraging ICTs, would have a tremendous impact.

Further, given the evolution of teaching learning requirements in the 21<sup>st</sup> century, open learning systems have an opportunity to provide the answer to some of the most critical problems of our existing education model and must be adequately supported to focus on providing high quality education. The issue of perception is a significant concern in this regard, as open systems are often perceived to be of poorer quality than formal schools and universities. Governments and educational institutes need to undertake extensive rebranding efforts through ensuring high standard of quality, leveraging expertise of experienced faculty, recognition of degrees from open systems domestically and internationally, partnerships with industry for placement of students, and other efforts to promote open learning systems as quality institutions.

#### 5. Computer Laboratories and PC based education initiatives

Perhaps the most visible efforts to introduce ICTs in education across the countries in South Asia are focused on creating computer laboratories in schools especially at the secondary and higher secondary level. In almost all the IT policies and often in the Education policies of the focus countries, introduction of IT as a subject in the curriculum and the corresponding establishment of computer laboratories is a key focus.

However Computer laboratories in government schools suffer from the following critical problems:

- Typically access for students is limited to one period of 45 minutes per week which is extremely inadequate
- Hardware and software maintenance is an area of enormous concern. Once the computer has a malfunction it takes weeks/months to repair the machine. (In the Schools that were visited for the Study even in urban and peri urban areas several computers were not functioning because of either hardware problems or because of virus attacks)
- Internet access for schools is limited, available internet speeds are very slow even in Kendriya and Navodaya Vidyalaya category of schools in India, which are comparatively more endowed government school systems.
- Computers in the labs are being used only to learn basic computer literacy such as use of Word, Paint, creating documents etc
- Subject matter teachers are not trained in using ICTs

At their worst these kinds of computer laboratories lie in disuse, with problems of maintenance and low interest or capacity amongst students and teachers to use them effectively. This is the case with many schemes for IT enablement in government schools in India and other South Asian countries. However at their best in select private schools (Beaconhouse Schools in Pakistan) these laboratories serve as resource centres providing an opportunity for students to use them effectively for enhancing their understanding of concepts and having access to an array of learning materials.



Education Technology Laboratory



Therefore, laboratories per se might succeed or fail- the distinguishing factor is not the physical space of the laboratory but what is taught in these labs and how it is being taught. If the laboratory is used once a week by students for a 45 minute period where under the supervision of an 'IT Teacher' they learn about MS Word and Paint, the impact on learning will be negligible. Instead, if the computer lab becomes a resource centre where computers are used to teach concepts in other subjects as well, provide access to new learning material and allow students to collaborate on learning and sharing, the integration of ICTs is much more effective. Therefore, while creating computer laboratories may be a viable solution in South Asia because of limited resources for providing '1 to 1 Computing' and 'ubiquitous learning' spaces, it is at the level of the curriculum, content development, capacity building and maintenance of hardware and software that governments and institutions need to focus, to ensure that the lab translates into a space for learning across the curriculum. An interesting example in this case is the Beaconhouse School System in Pakistan, where instead of having a specific IT curriculum the IT program is called 'Emerging Technologies Across Curricula'.

Therefore the debate about whether it should be lab based approach or a 1 to 1 computing approach, (that is perhaps going to be determined by innovation in technology, cost of devices etc) is less significant than the debate on how ICTs are being used and to teach what. In the lab model- availability of relevant content and capacity building of teachers to integrate technology in their teaching learning are two critical aspects. Care also needs to be taken that in such initiatives technical support for maintaining hardware and software is available especially in rural areas where often, once the computers break down it typically takes months for them to be restored. A call centre approach may be explored with defined service level agreements (SLAs) for the maintenance and upkeep of the hardware and software.

In the large public school systems in South Asian countries, several models of operationalizing these laboratories have been used from laboratories where hardware and software is procured and installed by the government and the institution entirely, to initiatives in which the government outsources the setting up and running of these laboratories to private players. While large scale BOOT models for ICT enablement of schools often suffer because of lack of sustainability once the third party has finished its contractual obligations and installed hardware and content developed by it, initiatives where in-house expertise is sought to be developed (using Open Source or proprietary software) often lead to wastage of resources and the results are not commensurate with the effort being put in. A more detailed study of different models of IT enablement and their relative success in different environments needs to be undertaken and based on the context, different models need to be adopted.

## 6. Use of traditional media like Radios and TV

Use of traditional media like television and radio is concurrent with though more widespread than use of newer technologies like the internet and computers. Given that the reach of radio and television in all the focus countries is greater than most other technology options, radio and TV still present a viable option for delivery of educational content. At present most governments in South Asian countries provide dedicated educational channels on TV or educational programming on existing TV channels. Likewise the use of radio for delivering education content is widespread, and in some countries like Nepal (Radio Sagarmatha), Sri Lanka (Radio Kothmale) community radio has had some success in creating innovative models for providing educational messages and creating community awareness. In some countries private educational TV channels too have proliferated in the education space such as Toppers, Tata Sky Fun Learning etc in India.

The traditional TV and radio programmes have been a useful supplement to distance education programmes and self learning across the South Asian countries, however there are several disadvantages of these broadcasts in terms of lack of flexibility and limited interactivity. With the new generation of technological innovations, on demand options and interactive features have been incorporated in some TV programmes and to a lesser extent in radio programs. Given the reach of TVs, and radios the relative low cost of hardware and installation, TV and radio will continue to play a role in technology enabled learning space in South Asian countries.

## 7. Mobile Technology for Education

In most South Asian countries there is relatively high penetration of mobile phones and widespread network availability. While some pilot initiatives are underway to explore how effectively mobile technology can be used in the education space, in the existing scenario it was seen that use of mobile phones is predominant in informal education programmes such as for promoting adult literacy, disseminating information for farmers and fishermen, support services in education programs, and distance learning programmes. The typical uses of mobile phones include generating reminders, creating alerts, scheduling appointments, administrative support tasks such as retrieving MIS reports etc. Given the limitation of the screen size and amount of data being exchanged; in their current commonly available models, mobile phones are not being utilized extensively in actual educational content delivery in formal education.

As this is a rapidly evolving scenario in terms of innovations in devices and options for connectivity and data exchange, some of these constraints might be overcome in the foreseeable future and therefore mobile technology remains a possible option to be leveraged in the education space.

## 8. ICTs in Non formal Education

Attempts to encourage full and effective participation in non-formal education now forms a central part of current educational and economic policymaking even in most developed countries – under the various banners of creating ‘learning ages’, ‘smart countries’ or ‘knowledge-based societies’. ICT has been viewed by many Governments as having profound and far-reaching implications for the ways in which to achieve these aims. Over the past thirty years, Non-Formal Education (NFE) initiatives in developing countries have effectively used Information and Communication Technologies for mass literacy campaigns, training of health workers, and capacity building under the rural community development projects. NFE has a critical role to play in reaching marginalized groups, and ICTs are a tool in the effective performance of this role. All the South Asian countries afford interesting examples of ways in which ICTs have been used for non formal education be it for adult literacy, for creating community awareness or for community empowerment and development. Community Multimedia Centres, Learning Centres and Telecentres are public spaces where community members can access information through computers, internet, radio or the telephone. Depending on the availability of relevant applications and useful knowledge for local communities, these initiatives have succeeded or failed in different environments. While in Nepal it is acknowledged that telecentres were not successful because of lack of relevant applications and content that was useful for the local communities, in India the experience of Village Knowledge Centres created by a community organization like MS Swaminathan Research Foundation have been immensely successful.



*NIIT, Hole-in-the-Wall Learning Station*

## 9. Content Development and Sharing

In the context of all of the above insights it emerges through our study that perhaps the most significant attribute determining the success or failure of ICT initiatives in the education space is often contingent on the kind of content used, and the ability of the teachers and students to integrate technology in their teaching learning practices. Having access to quality Open Educational Resources and online learning materials, and using them judiciously is the single most important determinant of the impact technology will have on the learning achievements of students.

Content creation has to be democratized and made more responsive to the local context. While content creation by the teachers and students themselves is a positive trend enabling ownership; one needs to weigh the pros and cons of not having a professional content development team who can involve teachers and faculty in the process. Further a much larger range of content has to be available, and several models to facilitate this content generation need to be explored. There are no clear guidelines and/or standards for content development. There needs to be a balance between relative flexibility of the final users to decide on suitable content, and certain broad guidelines to assist them in judging the best possible solution while ensuring that certain minimum standards are maintained.

Another important aspect in content development is that creating high quality digital resources does not imply simply digitizing traditional print based content and using multimedia tools. Content of this nature has limited impact and often leads to wastage of limited resources. High quality instructional material should be created applying principles of learner centric approach, interactive, participatory and collaborative learning models. This requires technological, subject matter as well as pedagogical expertise.

## 10. Systemic Capacity Building

Capacity building at a systemic level for all stakeholders from teachers, to school leaders, to education administrators is therefore increasingly being recognized in all the countries as critical to the success or failure of an initiative. Some of the most successful ICT for Education initiatives are targeted towards teacher education and training, Intel's Teach programme and Microsoft's Shiksha are noteworthy examples in this regard. If ICTs are to be integrated organically in the teaching learning process then teachers and supervisors at the school level, as well administrators in government departments will have to be brought on board. The role of teachers as mentors and facilitators will be emphasized and teacher attitudes and apprehensions will also need to be taken into consideration.

## Common Constraints

Most of the countries in the region face similar constraints: limited resources, poor infrastructure, weak implementation capacity of the government, lack of coordination between different government policies, lack of relevant and high quality content in local languages, poorly trained teachers, inadequate monitoring and evaluation strategies are some of the main constraints.

- Infrastructure remains a critical bottleneck in almost all the focus countries as of now. This includes both IT and non IT infrastructure. Low levels of electrification and frequent power outages are cited as by far the most significant problem for effective use of ICTs in education in non urban areas in all the focus countries. While internet connectivity is low at present across the South Asian countries, efforts are underway to improve the same. In urban areas private Internet Service Providers are competing for the market, for Educational institutions connectivity is either being offered at a subsidized rate or free of cost to government schools wherever possible. Funds from the Universal Service Obligation Funds are also being committed to providing true broadband right to the village level. Key constraints in developing adequate ICT infrastructure are:
  - Significant difference in access to connectivity & electricity between rural & urban areas
  - Lack of resources for maintenance and upkeep in rural areas
  - High cost of connectivity
  - Lack of institutional frameworks and robust implementation capacity
- There is a need to ensure integration between stated policy objectives in the ICT and Education policies and initiatives, and administrative capacity of Education departments on the ground.
- Monitoring and evaluation strategies are typically weakly articulated and implemented in most of the focus countries. Further existing monitoring and evaluation strategies in Education initiatives are mostly focused on program evaluation and EMIS type tools, instead of being based on evaluation of learning levels of students.

Inadequate emphasis on capacity building, sharp differences in access to education and gender inequity in the use of ICTs are some of the other common constraints for all the countries in the region. In some countries uneven terrains can make it very difficult to have a balanced distribution of ICT.

These are problems that we have found to be common across the South Asian countries with differences in degree. However each country in keeping with its geography, economy and history has different opportunities for overcoming these constraints.

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