Promoting the Use of Information and Communication Technologies for Primary and Secondary Education: The Case of the States of Chhattisgarh, Jharkhand and Karnataka in India

Discussion Paper

By

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LIST OF ABBREVIATIONS

AIR	All India Radio
BEO	Block Education Officer
BRC	Block Resource Coordinator
BRP	Block Resource Person
CALC	Computer Assisted Learning Center
CHIPS	Chhattisgarh Information Technology Promotion Society
CRP	Cluster Resource Person
DSERT	Department of State Educational Research and Training
ICTs	Information and Communication Technologies
IGNOU	Indira Gandhi National Open University
I&B	Information and Broadcasting
IRI	Interactive Radio Instruction
ISRO	Indian Space Research Organization
IT	Information Technology
IT Task Force	National Task Force on Information Technology and Software Development
JEPC	Jharkhand Education Project Council
JSK	Jan Shiksha Kendra
NCTE	National Council for Teachers Education
NGO	Non Governmental Organization
NPE	National Policy on Education
PPP	Public Private Partnership
RGSM	Rajiv Gandhi Shiksha Mission
Rs.	Indian Rupees
SSA	Sarva Shiksha Abhiyan
VEC	Village Education Committee

EXECUTIVE SUMMARY

The mandate of this report was to examine how the enabling environments promoting the use of information and communication technologies (ICTs) for primary and secondary education have been supported and successful in the states of Chhattisgarh, Jharkhand and Karnataka from 2000 to 2005. This assessment included an analysis of: the factors contributing to ICTs based education; the best practices and challenges influencing the practices in the field; and issues pertaining to ICTs enabled educational quality and access.

The methodological framework of the study consisted of an evaluation of the relevant state level policies promoting the use of ICTs for primary and secondary education, and an examination of the pertinent ICTs based programs and projects implemented in these three states. Field research was also carried out in Chhattisgarh, Jharkhand and Karnataka consisting of interviews with relevant government officials, officials and implementers from private entities and non-governmental organizations (NGOs), and primary and secondary school teachers.

The role of the respective state governments of Chhattisgarh, Jharkhand and Karnataka and the priorities set by them to emphasize, initiate, facilitate and implement programs and projects has had the most impact on contributing towards ICTs based primary and secondary education. Diverse political parties governing Karnataka and successive high-ranking officials in the state's Departments of Education and Information Technology have demonstrated a genuine interest and commitment towards promoting the use of ICTs for primary and secondary education. This impetus along with the coordinating work carried out by government officials at the district, block and cluster levels has paved the way for a multitude of projects and programs to be implemented in Karnataka.

There is a vocal effort on the part of the political leadership and state bureaucracy, albeit more at a higher level of governance, towards using ICTs for primary and secondary education in Chhattisgarh, however this attitude has not translated into a range and volume of programs or projects being implemented in the state. The political will of elected politicians and the commitment of high-ranking government officials in relevant departments to promote the use of ICTs for primary and secondary education is relatively much weaker in Jharkhand.

Private companies, especially information technology (IT) companies, have played a role either through public private partnerships (PPPs) or pilot projects in contributing to ICTs based primary and secondary education. The state of Karnataka, while limited by financial constraints, has nonetheless accentuated PPPs and played a very facilitative role in aiding private companies to implement pilot projects. Chhattisgarh and Jharkhand, while also limited by similar financial constraints, have mentioned the importance of PPPs but have largely not implemented them, nor have they facilitated many privately managed pilot projects in their territories.

NGOs, especially international NGOs, with the necessary start up funds and relationships with government officials in relevant departments and at the district and block levels have also successfully managed to implement some pilot projects. The state of Karnataka has been the most receptive to these NGOs and has facilitated the implementation of their projects, while Chhattisgarh and Jharkhand are just beginning to get more involved with these organizations.

A range of best practices have emerged from the programs and projects implemented in Chhattisgarh, Jharkhand and Karnataka. These include, among others: Radio based projects encompassing a high level of coordination with government personnel at the block and district levels, a high level of expertise of organizations producing content, good relations with teachers, and some level of community involvement were successful to a larger degree. Relatively successful PPPs were able to combine private companies technical expertise, content production and delivery, supply of hardware, adherence to timelines, and speed of; with the financial assets of the government; along with the resources of local communities.

Additional factors came into play as challenges including, among others: A lack of commitment to, awareness of and skepticism towards the use of ICTs for primary and secondary education on the part of high-ranking officials in relevant departments and government officials at the district, block and cluster levels hindered the implementation of programs and projects. Further payment issues and inadequate maintenance and upkeep of hardware hindered computer based programs; and scaling up of successful pilot projects was problematic due to financial constraints.

The measurement of ICTs enabled educational quality and access indicators, on the other hand, was problematic as the majority of the programs and projects implemented in Chhattisgarh, Jharkhand and Karnataka did not have adequate quantitative and qualitative monitoring and evaluation activities. Nevertheless, with the limited amount of data available some practices were apparent including, among others: radio based instruction, in diverse courses, allowed for greater student participation. There were increases in enrolment and improvements in attendance in the schools with computer labs or centers, and linkages between the ICTs based content and the course curriculum had an impact on learning gains of students.

The enabling environments in Chhattisgarh, Jharkhand and Karnataka promoting the use of ICTs for primary and secondary education have been supported and successful at differing levels based on each state's unique empirical context. While the relatively few pertinent policies promoting ICTs and primary and secondary education released respectively in Chhattisgarh, Jharkhand and Karnataka do not appear to have a direct or clear connection to the practices in the field; the volume and range of programs and projects being implemented in Karnataka are greater than those in both the newly created states of Chhattisgarh or Jharkhand due to the initiatives and impetus of the state government, greater involvement of private companies and NGOs, and the existence of a more developed infrastructure.

1 INTRODUCTION

The emergence and convergence of various ICTs such as radios, televisions, computers, the Internet, telephones, cell phones, videos, multimedia, CD-ROMs, software and hardware provide unique opportunities for promoting primary and secondary education, on a mass scale, in developing nations. There is a general consensus among practitioners and academics that in diverse socio-economic and cultural contexts ICTs can be successfully employed to reach out to a greater number of students and help in promoting learning and knowledge, along with exposing students to the technical skills required for many occupations. Additionally ICTs also serve as useful tools for training teachers, and in aiding them to teach course curriculums to students.

In India, since independence in 1947, various ICTs have been employed to promote primary and secondary education however there have been enormous geographic and demographic disparities in their use. Some states in the country currently have an enabling environment in place that allows for a greater use of ICTs for education, while other states lack such an environment making the use of ICTs for this purpose very sporadic.

This report examines how the enabling environments promoting the use of ICTs for primary and secondary education have been supported and successful in the states of Chhattisgarh, Jharkhand and Karnataka. The study, first, analyzes the factors**,** which have contributed to ICTs based education at the primary and secondary school level including the initiatives of the state, the role of private partners and NGOs, and the impact of pertinent state policies. Second, the study analyzes the best practices and challenges that have influenced the success and failure of the projects and programs, implemented in these states, including the role of government officials and the effectiveness of PPPs and pilot projects. Thirdly, the study analyzes how the use of ICTs for primary and secondary education, as a result of the projects and programs implemented in these states, has impacted educational quality and access including learning gains, changes in classroom environments, and increases in the number of students who are taught.

The mandate of the study was to address government run, or aided, primary and secondary schools in Chhattisgarh, Jharkhand and Karnataka. The time frame covered by the study is from 2000, when the states of Chhattisgarh and Jharkhand were created, to 2005.

The methodological framework of the study consisted of an analysis of the state policies of Chhattisgarh, Jharkhand and Karnataka in the sectors of education, IT, information and broadcasting (I&B), telecommunications, industry and social development. Extensive research was conducted to compile and examine the programs and projects, implemented in Chhattisgarh, Jharkhand and Karnataka, employing the use of ICTs for primary and secondary education. The sources used for compiling this information were interviews; relevant government departments, NGOs and private companies websites; reports and studies; newspaper articles, pamphlets and brochures; and Internet searches. Further, secondary literature consisting of scholarly reports and journal and newspaper articles pertaining to the use of ICTs for primary and secondary education and teacher training, and in some cases to the projects and programs implemented in these states, was also examined.

Field research was carried out in Chhattisgarh, Jharkhand and Karnataka consisting of interviews with officials and implementers from relevant government departments, private organizations and NGOs. A meeting was also held with a group of twenty primary and secondary school teachers in the village of Abhanpur in Chhattisgarh. All the interviewees were chosen for the potential insights they could provide regarding the enabling environment promoting ICTs for primary and secondary education in their respective states.

The organization of the report is as follows. The succeeding section provides a brief background of the national context within which ICTs are promoted for primary and secondary education, including an overview of select national policies and programs. The next three sections analyze the individual cases of Chhattisgarh, Jharkhand and Karnataka and each section includes: an examination of the state's pertinent policies promoting ICTs for primary and secondary education; a summary of the ICTs based programs and projects implemented in the state; and an assessment of the current situation in the state.

The penultimate section of the report addresses the enabling environments in Chhattisgarh, Jharkhand and Karnataka promoting the use of ICTs for primary and secondary education by discussing the factors contributing to ICTs based education, the best practices and challenges influencing the success and failure of the practices in the field, and issues pertaining to ICTs enabled educational quality and access. The concluding section entails a brief normative discussion focusing on certain factors, which will allow for greater enabling environments to promote ICTs for primary and secondary education in Chhattisgarh, Jharkhand and Karnataka.

2 NATIONAL CONTEXT

The national context within which the use of ICTs for primary and secondary education is promoted encompasses the national policies and directives emanating from the sectors of education, IT, telecommunications, and I&B; and the nationally directed and funded programs of the government of India. Some key policies and programs are discussed below.

2.1 National Policies

- **Education**

The National Policy on Education (NPE) released in 1986, which has since been updated with amendments, is the comprehensive policy framework for the development of education in India. The original policy did not specifically mention the use of ICTs for promoting primary and secondary education, but the 1992 Program of Action (POA) on NPE stressed the need to improve the access to computers in schools. Further, the Working group on Elementary and Adult Education for the 10th Five Year Plan (2002-2007) recommended that initially one or two schools in every cluster (a small administrative unit within a block consisting of 12 to 18 villages located at a distance of 7-8 km from each other) in the country should have facilities for computer based learning, which can be used by children in adjoining schools. The Department of Education also released a draft scheme of information and communication technologies in schools in 2004, which called for providing computer-aided education to secondary and higher secondary government schools in partnership with state governments and the establishment of schools that are technology demonstrators. Both the working group and the draft scheme called for collaborations with the private sector and IT institutes to achieve their stated goals.

- **Information Technology**

The Information Technology Act 2000 emphasized technical higher education, which would help students gain employment in the IT industry; and the Science and Technology Policy 2001 called for the teaching of science at school and college levels. However none of these policies specifically mentioned the use of ICTs for primary or secondary education. Nonetheless, the National Task Force on Information Technology and Software Development (IT Task Force) constituted in July 1998 made specific recommendations stating that computers and the Internet should be made accessible to schools, polytechnics, colleges, and public hospitals in the country by 2003. The Ministry of Information Technology further advocated the recommendations of the Working Group of IT for Masses, which called for 10 PCs in each school, local language software capabilities, Internet connectivity in every school, and the inclusion of the private sector in this massive effort.

- **Information and Broadcasting**

India has a rich history of using the medium of radio via the channels of All India Radio (AIR), and television through the national TV network *Doordarshan*, to broadcast

educational content for all grades and levels. The government has also proposed a new FM radio policy, which calls for building hundreds of stations across the country. There is no indication as to what effect this might have on radio broadcasts of educational programs for primary and secondary education, but the emphasis to cover more of the country's regions under a radio network will undoubtedly create more access to, and opportunities for, educational programming.

- **Telecommunications**

The National Telecom Policy 1999 aimed to provide a balance between the provision of universal service and high end services to meet the country's social and economic needs, however it did not specifically mention the primary and secondary education sectors. The policy had very lofty targets most of which have not been achieved, but by aiming to expand the telecom infrastructure in the country the policy did potentially facilitate the use of ICTs for education. Moreover, the Department of Telecommunications Perspective Plan for 1997-2007 and the Broadband Policy 2004 did accentuate the importance of new technologies in education.

Policies are roadmaps and vision documents of what governments aim to achieve in diverse sectors. A common theme in the national policies and directives enumerated above was an emphasis on the use of ICTs for primary and secondary education, even though none of the policies pertained specifically to this field. The promotion of the concept of PPPs, whereby the private sector would be invited and encouraged to partner with the government to play a greater role in providing educational services was also asserted. The national government also embraced various recommendations that called for attaining specific ICTs related targets for schools, however most of these targets have not been realized in the time frames that were proposed.

2.1 National Programs

Radio was the first ICT to be used for education in India and the nationally sponsored scheme on educational technology provided some radio-cum-cassette players and televisions to a limited number of elementary schools in the country. National level evaluation studies have indicated that the majority of the television sets and radio-cum-cassette players are in working condition though not necessarily in use.

- **Sarva Shiksha Abhiyan (SSA)**
  http://ssa.nic.in/

SSA is the government of India's flagship program for the achievement of Universalization of Elementary Education (UEE), as mandated by 86th amendment to the Constitution of India making free and compulsory education to the children of 6-14 years age a fundamental right. SSA is being implemented in partnership with state governments to cover the entire country. The program also has an innovative activities component for girls' education, early childhood care & education, interventions for children belonging to schedule castes and tribes, and community computer education especially for students at the upper primary

school level. SSA allocates funds to each district in the country for these innovative activities. Specifically for the computer education component SSA aims to create computer awareness and literacy among children and teachers at the elementary stage; to make teaching and learning effective and interesting through computer aided learning; to empower teachers; to generate supplementary material in digitalized and other forms; and to improve the quality of education, enrolment and retention.

- **Gyan Darshan**
  http://www.ddindia.gov.in/About+DD/Gyandarshan

Doordarshan's educational channel Gyan Darshan was launched on January 26, 2000 in a partnership with the Ministry of Human Resource Development (HRD) and the national government affiliated Indira Gandhi National Open University (IGNOU). This channel provides a blend of core curriculum based programs in the areas of primary, secondary, higher, distance, technical and vocational education. Gyan Darshan 1 is the main channel and includes the countrywide classroom programs. Gyan Darshan 2 and the Training and Development Communication Channel (TDCC) are one-way video and two-way audio satellite-based interactive systems for distance education. Gyan Darshan 3 is dedicated to technical education.

- **Gyan Vani**
  http://pib.nic.in/archieve/lreleng/lyr2003/roct2003/21102003/r211020039.html

In November 2001 an FM Radio channel, called Gyan Vani, operating through FM stations from various parts of the country was initiated. With 10 FM stations on air in the first half of 2003, the network is slated to expand to a total of 40 stations. Gyan Vani stations operate as media cooperatives, with day-to-day programs contributed by various Ministries, educational institutions and NGOs. The channel serves as a medium for niche listeners and for addressing local educational, developmental and socio-cultural requirements. The programs are broadcast in English, Hindi and regional languages.

- **EDUSAT**
  http://www.edusatindia.org/

EDUSAT, the first Indian satellite designed and developed exclusively for serving the educational sector was launched by the Indian Space Research Organization (ISRO) on 20th September 2004. This system is primarily meant for school and college level education, but it will also support non-formal education. However many implementers from NGOs and academics in the field claim that it is very premature to conclude what benefits EDUSAT can bring to the primary and secondary education sectors.

- **Teacher Training Programs**

The government of India has funded a distance education program to deliver training packages to teachers under the Special Orientation Program for Primary School Teachers. Further, the National Council for Teachers Education (NCTE) has made technological

literacy a compulsory component of secondary teacher education. IGNOU also provides teacher-training courses over radio and TV in select states.

The government of India has initiated various ICTs based programs for promoting primary and secondary education, nationwide, and continues to explore future opportunities in this regard. Yet the majority of officials interviewed for this study were of the opinion that there was only sporadic use of national radio and television based programs in the primary and secondary schools in Chhattisgarh, Jharkhand and Karnataka. Therefore the impact of these national programs on the primary and secondary education sectors in these states is quite nebulous.

A major exception is the work done by the government-affiliated agencies in Chhattisgarh, Jharkhand and Karnataka who are responsible for furthering SSA's mandates in their respective states. These agencies in turn initiate and fully or partly fund some ICTs based projects. Further as the SSA starting from 2004-2005 has started allocating Rupees (Rs.) 5 million yearly to each district in the country for innovative activities, including computer education, there is an increased optimism that more ICTs based programs and projects will be implemented in the future.

The government of India has and continues to promote the use of ICTs in primary and secondary education by releasing policies and initiating programs. However the stark reality is that each state in the country is ultimately responsible for addressing its education sector. Thus the onus falls on individual states in the country to create an enabling environment to promote the use of ICTs for primary and secondary education.

3 CHHATTISGARH

Chhattisgarh, with Raipur as its capital, was created out of the state of Madhya Pradesh on November 1, 2000. Chhattisgarh has a population of 20.8 million, one third of who belong to tribes mostly residing in the thickly forested areas in the Northern and Southern parts of the state. Identified as one of the country's richest bio-diversity habitats, Chhattisgarh has an abundance of mineral resources and also one of the premier electricity generating abilities in the nation. The literacy rate in the state in 2001 was 65 percent, with male literacy at 78 percent and female literacy at 52 percent. There are nearly 3 million children enrolled in pre primary and primary schools, and 860,000 children enrolled in secondary schools in the state. Chhattisgarh also has around 28,000 primary schools with 65,000 primary school teachers; and 6,000 secondary schools with 21,000 secondary school teachers.

3.1 State Policies

The state of Chhattisgarh has released very few policies that address the use of ICTs for primary and secondary education. Yet there is a vocal effort on the part of the political leadership and state bureaucracy, albeit more at a higher level of governance, towards using ICTs in the primary and secondary education sectors.

- **Chhattisgarh 2010 Vision Document**

  Chhattisgarh 2010, the vision document for the overall development of the state, demonstrates a high level of commitment to the education sector. The document emphasizes that mass media will be used extensively to educate the community, create necessary awareness, and provide role models to encourage girls to be educated. The state will initiate and continue with its efforts to make its citizens computer literate, and computer education will be made compulsory at all levels. To achieve these aims the state plans to develop partnerships with the private sector to enhance its service delivery, especially in the sector of higher education.

- **Information Technology Policy 2005**

  Chhattisgarh's Information Technology Policy 2005 lays considerable stress on building a comprehensive IT infrastructure down to the blocks and villages. This would not only help improve access, but would also aid in ushering social development by supporting rapid economic development, attracting investment, facilitating distance education, and improving all levels of education. The state has set the following ambitious targets for itself: 100% IT literacy in all high schools and colleges in a phased manner, and 100% IT literacy in all schools in a phased manner. ICTs will be used in school education in two distinct segments: computer literacy and skills in IT, and the use of ICTs to enhance the effectiveness of teaching in other subjects.

- **Social Infrastructure Plan**

  The Social Infrastructure Plan expounds that to achieve 100% literacy in the state the government needs to use ICTs to deliver education and training, and to institutionalize distance education. The plan also addresses the vast potential of computers in imparting education and information, and calls on the government to introduce computer education in schools from grade VII onwards. The government is also advised to focus most its resources on the primary and secondary education sectors, and to allow the private sector to play a greater role in higher and professional education.

The state of Chhattisgarh has not released a policy for ICTs and primary and secondary education specifically, but three other policies have addressed this field. However, the main focus of these policies is not ICTs and primary and secondary education, and therefore this field is addressed in a peripheral manner in the body of these policies. Further all the three policies call for achieving ICTs related targets at the primary and secondary school level, but none of the policies call for the initiation and implementation of any ICTs based programs or projects geared towards these educational sectors.

3.2 ICTs Based Programs and Projects

In comparison to the policies addressing the use of ICTs for primary and secondary education a greater number of projects and programs have been implemented in Chhattisgarh from 2000 to 2005. Most of the projects implemented in Chhattisgarh are a result of the initiatives of the state. NGOs and private companies have implemented the remaining projects in the state.

- **Indira Suchana Shakti (ISS)**
  http://chhattisgarh.nic.in/schemes/soochna_shakti.htm

  The government of Chhattisgarh in collaboration with a private company, All India Society for Electronics and Computer Technology (AISECT), launched ISS in 2001. The program was aimed at providing computer education, and access to ICTs, to about 250,000 girl students from grades IX to XII. The other aim of the program was to use a PPP to bring IT education to schoolgirls in a cost-effective manner. Boys' schools also had the opportunity to avail of the computer education on the payment of a nominal fee. At least five Pentium computers with Internet connection were provided to each school along with one IT instructor for 20 students. A total of 1248 co-educational girls' government high schools and higher secondary schools out of a total of 1605 such schools were covered. AISECT was provided space in the schools and permitted commercial use of the computers outside school hours.

- **Headstart Program**
  http://ssa.nic.in/reports1.asp

  Headstart was implemented in Madhya Pradesh and continued in Chhattisgarh, when it became a separate state, and aimed at: providing computer enabled education to all students

in upper primary schools; computer familiarization through once a week session in Jan Shiksha Kendras (JSKs) at the block level to all primary school students; training of teachers in basic computing skills; and providing computer access to the community. JSKs, which cater to 8-10 schools in each block, served as computer learning centers. Students of grades I to V were expected to come once every week to the JSK for appropriate demonstrations. Headstart was in operation in 271 clusters in Chhattisgarh and is now being run by the states' Department of Education affiliate the Rajiv Gandhi Shiksha Mission (RGSM), which carries out SSA's mandate in the state. Further expansion or improvements in the operations of the program depend on districts level decisions based on the availability of funds.

- **DOT-EDU Project**
  http://dot-edu.org/projects/india.htm

The dot-EDU program is being carried out in Chhattisgarh, Jharkhand, Karnataka and Madhya Pradesh and is being implemented by Education Development Center (EDC) under a grant by the United States Agency for International Development (USAID). The program's objectives are to provide teachers with training for both content enhancement and professional development, and to provide instruction in Mathematics, Sciences, Social Studies and English and Kannada languages using a multi channel strategy via interactive radio instruction (IRI), video programs, as well as CD and print based materials. Where video and computer instruction is possible, the dot-EDU initiative works with local organizations to create programs using these technologies. In areas that do not have the ability to use these technologies, the program concentrates on radio and print materials. In Chhattisgarh the program started imparting instruction in English via IRI to students and teachers in grades I-II, and was being carried out in Raipur, Kanker and Bastar districts. A total of 300 primary schools, with 100 schools in each district, were part of the project. In August 2005 EDC's IRI 'English is Fun' program began being broadcast all over the state after the government agreed to pay the program's broadcast fees.

- **Simputer**
  http://www.picopeta.com/chhattisgarh/

The Simputer, a low cost handheld computer device manufactured by PicoPeta Simputers Pvt. Ltd, can read a smart card and also has advanced audio and text processing capabilities in several Indian languages. It was used to enhance mainstream education at schools and tribal centers in Mahasambandh and Narayanpur districts of the Bastar region. The pilot project covered 2,000 students, but unfortunately the dissemination of this technology to other schools in Chhattisgarh has not occurred.

- **Bhoj University CLASS Project**
  http://www.bhojvirtualuniversity.com/default.asp

One school in Abhanpur block was provided with 10 multimedia computers by Bhoj University under the Computer Literacy and Studies in Schools (CLASS) project. The CLASS project was introduced nationwide in 1984-85 with the purpose of providing microcomputers to schools. However the project was discontinued and only reinstated for a

period of one year in 2001. Six teachers from a school in Abhanpur received 10 days of training in the use of computers. However no educational software or integration of technology skills of teachers and students with the curriculum was provided.

- **EDUSAT Elementary Education Project**
  http://www.edusatindia.org/

A pilot project commenced on November 19, 2005, which will link nearly 1,000 primary schools in Bihar, Madhya Pradesh, Chhattisgarh and Uttar Pradesh through EDUSAT. The project will be run by ISRO and IGNOU, with the former setting up the technical infrastructure and the latter developing courses and training teachers. The technical apparatus to be set up in these schools will be run on solar power and teachers will be trained to operate it. Teachers in these rural schools will also help IGNOU develop contextual teaching material. The project covers schools in Chhattisgarh's Kora district.

- **Chhattisgarh Information Technology Promotion Society (CHIPS) Knowledge Management Program**
  http://chips.nic.in/content/chips.htm

CHIPS, the state's nodal agency for promoting IT in Chhattisgarh, is planning to implement an electronic content based knowledge management program, which will contain educational material for schools, colleges and teachers. This program will store different types of educational content in audio, visual, and text formats including courses in diverse subjects for primary and secondary schools. CHIPS plans to have this program available in each block using the ISRO's bandwidth.

3.3 Assessment of Current Situation

Chhattisgarh currently does not have a cohesive policy framework in place to promote the use of ICTs for primary and secondary education, however the state government has funded some programs, including one through a PPP, and has also facilitated the implementation of other projects carried out by NGOs.

The programs and projects that have been implemented in the state have brought benefits to students and teachers. Students' attendance for computer lab sessions in the schools where the Headstart and ISS programs were implemented increased, and there were clear demonstrations that many students were eager to use the computers and their content. The content in the Headstart program was interactive and student centric and games were used to reinforce concepts, while students found the use of the MS Paint software, under the ISS program, to be creative and interesting. Evaluations of the Headstart program have also demonstrated that students have gained in Mathematical skills.

The majority of teachers at the Abhanpur meeting felt that the major benefits of using radio programs were that much needed knowledge and information could be disseminated, more effectively, to a larger share of students and a broader awareness could be spread in the

community. Additionally the program coordinator of one NGO felt that the English radio programs in the state have also been beneficial as students can, instead of just learning the English alphabet, now converse and learn problem-solving skills in the language during the course broadcast.

However various issues were also raised with the projects and programs in the state. In the Headstart program children from all schools in the cluster were expected to benefit, however in practice the students who studied near the JSKs, where the computers were located, benefited the most as trips from other schools to the JSKs were quite infrequent. For the ISS program AISECT had problems getting payments from the state due to which it withdrew many of its computer systems from the schools. In addition most of the schools were equipped with too few computers to adequately benefit the girl students.

A common problem in both these programs was that many computers were not in working order; there were recurring hardware, software and technology support issues; there were no linkages between the content of the programs and the students curriculum; and most of the teachers in the schools had no direct connections with using the computers and thus were alienated from the programs. Further, a high ranking official at CHIPS acknowledged that the organization's knowledge management program currently has a severe shortage of educational content and a lack of sanctioned funds. It is also not clear how schools in blocks that do not have the ISRO bandwidth will be able to avail of this program.

The role of agents' i.e. high-ranking government officials in the Department of Education and Department of Information Technology was paramount in promoting ICTs for primary and secondary education. In Chhattisgarh these officials demonstrated a genuine interest in ICTs based programs and projects, but due to a lack of funds and appropriate partnerships they seemed unable to push the use of ICTs for primary and secondary education agenda as much as they wished.

In the realm of PPPs the case of ISS demonstrated the benefits and problems associated with having private partners implement programs. Government officials admitted that the state had limited funds to achieve PPPs on a large scale and therefore did not foresee many programs being implemented under this type of partnership in the near future. Officials from pertinent NGOs argued that the state needs to work with them in rural and tribal areas, and claimed that their input was not being sought in the state's strategy for promoting ICTs for primary and secondary education.

Overall there was widespread acknowledgement that the aim of the state is to promote technical higher education by targeting universities and colleges, and then move down to address the use of ICTs for primary and secondary schools. A high-ranking government official said that the state is concerned about cost issues related to ICTs based programs, and wants to make sure that they are economically viable. Therefore the aim is not to just approach the field of ICTs for education in isolation, but to configure a system whereby other sectors are also involved. This could result in the potential implementation of a technological system that would provide not only ICTs based educational services, but also health and government services.

4 JHARKHAND

Jharkhand, with Ranchi as its capital, was created out of the state of Bihar on August 2, 2000. Jharkhand is a mineral rich state with huge reserves of natural resources, however it is also one of the poorest and most underdeveloped states in the country and nearly 40% of its population of 27 million is tribal or belongs to lower castes. The state has 21,700 primary schools with 56,000 teachers and 2.9 million students. The literacy rate in 2001 was 55% with 60% for men and 40% for women. There are also violent insurgencies in some regions of the state making the law and order situation in those areas problematic.

4.1 State Policies

Compounding the underdeveloped status of Jharkhand is the tenuous political climate in the state and successive elected governments have enacted very few policies addressing the use of ICTs for primary and secondary education.

- **Information Technology Policy 2005**

  The Information Technology policy 2005 recognized the strategic importance of ICTs as key components of socio-economic development, governance and enhanced service delivery. The policy primarily aimed to ensure significant growth in the employment generating potential of the IT sector by promoting technical higher education, and encouraging private sector investment in building and running private institutes in this educational sector. Additionally the policy also called for the improvement and spread of education to achieve 10% computer literacy in the state in ten years and 30% in 20 years; and for the state to make use of private networks, cable TV, wireless networks, and the Internet to link all schools, colleges, universities, engineering colleges and research organizations to specialized IT institutes. The formation of an Expert Advisory Group to consist of officials from the IT industry and academics, under the aegis of the Department of Information Technology, to recommend steps to use TV and the Internet to spread education to remote areas of the state was also proposed.

- **Industrial Policy of Jharkhand 2001**

  The Industrial Policy of Jharkhand 2001 called for achieving IT for all by 2010 by accelerating the computer penetration rate, and for setting up Cyber Cafes at each block headquarter. Another area where the policy focused its attention was on telecommunication facilities with extensive plans to link rural areas. Again there is no indication as to what effect this might have on the use of ICTs for primary and secondary education, but the emphasis to connect more of the state's regions in a communications network will undoubtedly create more access to, and opportunities for, educational programming.

The state of Jharkhand has not released a policy for ICTs and primary and secondary education specifically, and only two other policies have peripherally addressed this field. Further, though both these policies call for achieving ICTs related targets at the primary and secondary school

level, they do not stipulate initiating or implementing any ICTs based programs or projects geared towards these educational sectors.

4.2 ICTs Based Programs and Projects

Though there are a lack of policies addressing the field of ICTs and primary and secondary education, the state government has taken the initiative to implement some, predominantly radio based, programs. The state has also facilitated the implementation of a few other projects managed by NGOs.

- **Jharkhand Education Project Council (JEPC) Programs**
  http://www.jepc.nic.in/default.htm

  JEPC, affiliated with the state's Department of Education, carries out SSA's mission in Jharkhand. Using the AIR network JEPC produces and disseminates various radio programs such as *Suno Kahani* for grades II-V, which involves storytelling with questions. The *Nava Vihan* community radio program addresses issues regarding the importance of education for children and school enrollment. The *Prairna* radio program is broadcast twice a day to help teachers with their coursework, and to aid them in increasing their skill and knowledge. All these radio programs are broadcast in Hindi and use examples and stories that are contextually relevant. Under the SSA's mandate JEPC is also involved in a pilot program where students in 15 schools in the state will get computer education.

- **Center for Learning Resources (CLR) English Radio Program**
  http://www.clrindia.net/

  CLR's three-year IRI English program began in July 2003 and covers students from grades IV-VI in the entire state of Jharkhand. Radio lessons are broadcast in the morning and repeated in the afternoon for students studying in government schools. CLR has provided technical support by way of training and a guidebook for teachers.

- **DOT-EDU Program**
  http://dot-edu.org/projects/india.htm

  In Jharkhand the dot-EDU program imparts instruction in English via IRI and was initially implemented in 300 primary schools in Ranchi, Hazaribagh and Saraikela districts. 100 schools from each district were chosen for the project. In October 2005 the non-profit arm of the private company TATA Steel, based in the city of Jamshedpur in the state, agreed to pay the fees to AIR Ranchi to have the IRI program be broadcast in and around Arki block. Therefore at present 6,500 schools are covered by the program in Jharkhand. Directions for the program and translations of the vocabularies used are also given in two indigenous languages, besides Hindi, in the tribal regions where the program is being implemented.

- **Indira Gandhi National Open University (IGNOU) Primary Education Diploma Course for Teachers**
  http://www.ignou.ac.in/

In 2002 IGNOU, a national government affiliated higher education institution started a two-year diploma course in primary education, and 9,000 teachers are currently enrolled in the course in Jharkhand. Teachers are not only given print material, but academic support is provided through prerecorded programs on radio and TV six days a week. IGNOU makes the educational content for the program itself. As AIR Ranchi does not reach all of Jharkhand, programs are also broadcast from one AIR station in neighboring Bihar. On Sundays there is a one-hour interactive question and answer session held over the telephone and teachers call in with their queries regarding the course. IGNOU also conducts workshops and school based modules to aid the teachers.

- **Rural Tribal Classrooms Project**
  http://www.aed.org

In selected areas of Jharkhand the Academy for Educational Development (AED) working with a local NGO, ASSERT, has begun implementing a pilot project to explore the use of computers and digital cameras to promote culturally relevant educational content in the local language. Materials to be produced include a collection of supplementary reading material that will be in available both in Hindi and English for use in Social and Natural Sciences as well as English. In Hazaribagh district the program will demonstrate to teachers how to use the newly created materials to build reading, comprehension, vocabulary and conversation skills in student-centered ways.

- **Vidya Vahini**
  http://www.vidyavahini.ernet.in/content/vidya.htm

In 2002, the Indian government launched a project called Vidya Vahini to provide IT and IT enabled education to 60,000 schools over three years. Under a Vidya Vahini pilot project 140 government and government-aided schools in seven districts in six states, including Jharkhand, have been provided computers and Internet connectivity to enhance learning.

4.3 Assessment of Current Situation

Jharkhand currently does not have a cohesive policy framework in place to promote the use of ICTs for primary and secondary education however some projects, many of them radio based, have been implemented due to the initiatives of the state and NGOs.

Most of the officials interviewed in Jharkhand commented that students, teachers and village education committees (VECs) were eager to work with radio-based programs. According to the head of one NGO radio programs have had some measure of success because there has been good coordination with government personnel at the block and district levels, a high level of expertise of organizations making the content for the programs, good relations with teachers and

motivated teachers, and some level of community involvement as parents are proud to see their children learn from radio programs. The regional director of IGNOU in Jharkhand was also satisfied that the state had facilitated the success of their radio program by disseminating relevant information to the teachers, and helped expedite program broadcasts through AIR Bihar.

However as knowledge about advanced ICTs such as computers in the rural parts of the state is very low, and the infrastructure very weak, many officials and implementers argued that large-scale efforts using computers were not feasible in Jharkhand. They also stated that having computers at a cluster level would only be good for teacher training, as it would be very hard to bring students from nearby schools to the cluster where a computer lab would be located.

In the area of PPPs the state does not currently plan to partner with the private sector to implement any ICTs based projects citing a lack of funds. Interestingly though TATA Steel one of the largest private companies in the state, which is also involved in many social programs has partnered with an NGO, EDC, and is paying the broadcast fees for the IRI program in one block. There are also very limited contacts between local NGOs working in the field of ICTs and education and relevant government departments, therefore currently there is very little scope of them partnering together to implement any projects.

It is a stark reality in Jharkhand that the elementary education sector is at a very primitive stage with high drop out rates and a lack of schools and trained teachers. In this context a high-ranking official from the Department of Primary Education stated that the aim of the government is, first, to be able to provide the diverse population of the state with basic primary education. He also argued that the state has to work under SSA for the next 10 to 15 years before it can reach its basic education goals, and in this scenario there is a very limited role for ICTs in promoting primary and secondary education in Jharkhand. Yet what seems to be missing in the state's approach is the view that ICTs based programs can be initiated simultaneously to aid in the government's efforts to lift the primary and secondary education sectors to a minimum threshold level. Adding to this notion the Director of a NGO, based in Ranchi, argued that to overcome this deficiency more awareness and knowledge, about this field, has to be disseminated to government officials and other stakeholders.

5 KARNATAKA

Formed on November 1, 1973 Karnataka with Bangalore as its capital is one of the more developed states in India, and is the leader in the sectors of IT and biotechnology in the country. With a population of 53 million Karnataka is also widely regarded as one of the more progressive states in the Indian union. The literacy rate in Karnataka in 2001 was 67.04%, a jump of 11% since 1991, with the literacy rate at 76.29% for men and 57.45% for women. In 2004 Karnataka had 51,263 primary schools with 6.5 million students and 60,540 primary school teachers, along with 8,216 secondary schools.

5.1 State Policies

A high-ranking official in the Department of Public Instruction (DPI) claimed that there is no coordinated or planned policy or strategy to promote the use of ICTs for primary and secondary education in Karnataka; and very few policies have been released, which address the use of ICTs for these education sectors.

- **Karnataka State Education Act 1983 (Amended 1998)**

  The Karnataka State Education Act does not mention the use of ICTs for primary and secondary education, however the DPI is one of the lead agencies in this field. The Department of State Educational Research and Training (DSERT), the academic wing of the DPI, works to improve the quality of education provided in primary and secondary schools. DSERT's Education Technology Cell carries out various ICTs based projects in schools.

- **Mahiti Millenium Information Technology Policy**

  The Mahiti Millennium policy aims to promote the use of ICTs for social and economic development in the state. In the realm of education the policy plans to take IT to all students, and also to set up training centers in schools. These centers, some supported by the private sector, will impart computer education as well as regular education in multimedia format to students. The policy further stipulates that private companies running such centers can employ them for commercial use before and after school hours.

The state of Karnataka has not released a policy for ICTs and primary and secondary education specifically, but two other policies have addressed this field. However, just as the case is in Chhattisgarh and Jharkhand, the main focus of these policies is not ICTs and primary and secondary education and therefore this field is addressed in a peripheral manner in the policies.

5.2 ICTs Based Programs and Projects

Even without a cohesive set of policies addressing the use of ICTs for primary and secondary education, Karnataka is one of the vanguard states in the country in this field. Diverse political parties that have governed the state and successive high-ranking officials in the Department of

Education and Department of Information Technology have shown a genuine interest and commitment towards promoting the use of ICTs for primary and secondary education. Thus due to the initiatives of the state, PPPs, and pilot projects of private companies and NGOs a multitude of programs and projects have been implemented in Karnataka.

- **Bahumukhi Radio Program**
  http://www.schooleducation.kar.nic.in/DSERT.htm

  The Bahumukhi radio program is being run by DSERT, in collaboration with several organizations, and consists of the development of a module on multi grade and multi level teaching. As part of this program radio lessons are broadcast for students and teachers at the primary and secondary school levels covering areas of the curriculum where students face hardships.

- **Keli Kali Radio Program**
  http://www.schooleducation.kar.nic.in/DSERT.htm

  The DSERT run Keli Kali radio program was initiated in 2000-01 and initially focused on grades III-IV students, but by 2004 students from grades V-VI were also targeted beneficiaries. The program enables teachers to employ methods such as using music, sound effects and dramatization of lessons while teaching the courses. Radio lessons are developed using teachers and experts from various parts of the state and periodic audio video conferencing has also been held to determine the impact of the program. DSERT provides the teachers a handbook to aid them with the radio lessons.

- **Bandani Radio Program**
  http://www.schooleducation.kar.nic.in/DSERT.htm

  DSERT in collaboration with AIR Bangalore began broadcasting BANDANI from all the centers of AIR in Karnataka for students in grades VI-VIII. Experts in English, Kannada (the state language), Science, Social Science and Mathematics prepare radio lessons to be broadcast in these subjects. The program uses methods like discussion, dramatization and special audio effects to make the lessons more interesting to the children. The teachers are provided a handbook to aid them with the radio lessons.

- **DSERT Elementary School Program**
  http://www.schooleducation.kar.nic.in/DSERT.htm

  DSERT in collaboration with ISRO embarked on a pilot project in 2004 to bring lessons in curricular and non-curricular fields to primary school students of Chamrajnagar district and secondary school students of Udupi and Sagar educational blocks. An interactive model is also proposed where calls received from teachers will be fed to an expert teacher in the studio classroom who will then answer their questions. DSERT also proposed to set up satellite receiving stations in 202 Block Resource Centers (BRCs) to facilitate teacher training in the distance education mode.

- **Teleconferencing Program**
  http://www.schooleducation.kar.nic.in/DSERT.htm

The Education Technology Cell of DSERT conducts a teleconferencing program, through receiving stations spread across 20 locations in the state, from the city of Mysore. This program is being used to interact with field functionaries, teachers, and teacher educators; to disseminate information relating to important departmental programs; and in training of master resource persons. Training programs for teachers, administrators and community members are also being conducted annually.

- **Text Books Online**
  http://dsert.kar.nic.in/textbooksonline/first.asp

The aim of this program is to provide easy on-line access to all DSERT textbooks by hosting them on a website. Students and teachers in Karnataka along with teachers from other states, education functionaries, researchers, individuals and organizations working in the education sector all over the country are expected to benefit from this service. Initially DSERT is providing access to all textbooks for all subjects in grade X in Kannada and English. The aim is to gradually cover all subjects in all grades.

- **World Links Karnataka Program**
  http://www.schooleducation.kar.nic.in/DSERT.htm

The World Links Karnataka Program was launched in January 2002 in collaboration with DSERT and covered selected schools. Since January 2002 105 teachers have completed the Phase I training 'Introduction to Internet for teaching and Learning' and the Phase II training is under progress. As an outcome of the training program teachers in these schools have had an opportunity to work in computer labs. Teachers have also accessed the Internet to develop curriculum-based resources for their courses.

- **DOT-EDU Program**
  http://dot-edu.org/projects/india.htm

In Karnataka the dot-EDU program imparts instruction in Mathematics, Sciences, Social Studies and Kannada via IRI. EDC organized several rounds of discussions and workshops among experts and teachers and from this process master plans and scripts were developed for teaching. By 2005 the project consisted of 72 radio programs (of 30 minutes each) and of 40 films, which were produced by private producers in the digital studios set up by EDC. The project also has a very strong monitoring component as both teacher practice and student learning are assessed before and after the implementation of the courses. The project was initially initiated in 342 primary schools in Raichur, Gulbarga, Bangalore and Chamrajnagar districts for students in grades V and VI. 72 schools were selected from Bangalore district and 90 schools each were selected from the three other districts. After the government agreed to pay the broadcast fees Chukke Chinna, the name of the program in Karnataka, began to be broadcast throughout the state for students in grades IV-V in July 2005, and for students in grades I-III in August 2005. EDC is also in the process of releasing a hybrid

software CD ROM in the field of science to be used by students in grades IV-V. The software utilizes among other things the characters, songs, and sound effects of the existing IRI programs, and is designed to involve the whole classroom, divided into teams, in interactive learning events.

- **Computer Assisted Learning Center (CALC)**
  http://www.azimpremjifoundation.org/

In 2001, the Azim Premji Foundation (APF) set up CALCs in 35 rural government primary schools to enhance the quality of learning of children through computer based lessons developed for the Karnataka state curriculum for grades I-VII. The program now covers 225 primary schools. Content based on animation and child centered interactive games was created for use in the CALCs in the subjects of Mathematics, Environmental Science, Geography, Kannada, Hindi and English. The computers and operating expenses for the first year are provided by the government, while the physical site of the CALCs and the security and maintenance of the centers is provided by the community from the second year onwards. Computer based content for learning and managerial support for setting up and running the centers is provided by APF. Many of the CALCs become kiosks after school hours enabling them to earn additional revenues to support the school and the program.

- **Mahiti Sindhu Project**
  http://www.niit.com

The state gave computer education and computer aided education free of cost under the Mahiti Sindhu project to students of grades VIII-X in government secondary schools. So for 1238 government secondary schools have been covered under this program and under phase II of the project another 1651 government secondary schools will be covered. The project is fully financed by the government of Karnataka and its timeframe is from 2001 to 2006. In addition to computer education students learn Mathematics, Science, Social Studies and English through CD ROMs, and are given hands on experience in e-mail and Internet applications. Four periods are set apart a week for this project and teachers of the selected schools are also trained during the project period. The project is being implemented through three private companies whose responsibilities are to supply hardware and software to the schools; to appoint two full time qualified teachers to each school; and to supply the required text books, furniture, telephones and Internet facilities.

- **Intel Teach to the Future Training Program**
  http://www97.intel.com/education/teach/

Intel Teach to the Future is a worldwide education program created for teachers to help them effectively integrate technology in the classroom to enhance student learning. The program started in Karnataka on 25 June 2001 and trained one teacher from each of the Mahiti Sindhu schools as Master Trainers for a period of 13 days. These Master trainers were then supposed to train other teachers in their schools. So far, 8000 teachers and head teachers from 1000 Mahiti Sindhu schools and 400 teachers and head teachers from 76 higher primary schools have been trained under this program.

- **America India Foundation (AIF) Digital Equalizer (DE) Program**
  http://www.aifoundation.org/

AIF's DE program is providing access to digital technologies to students from underserved communities in nine states in India including Karnataka. 104 centers have been established in these states and another 58 are being planned. The program provides the school with assistance to set up the DE center, which typically consists of 10 multimedia computers connected in a peer-to-peer network with a laser printer and necessary power conditioning equipment. Extensive three year training and mentoring to enable the teachers to create multimedia lessons for teaching is also provided. AIF provides the school with necessary financial support during the first two years while the schools make necessary arrangements for funds to sustain the centers from the third year onwards.

- **Auxiliary Data and Voice Integrated Channel for Education (ADVICE) Project**
  http://www.worldspace.com

WorldSpace (WS) has launched the ADVICE distance-learning technology project to provide access to quality education to people living in rural, remote and under-developed areas. The WS satellites system is used to provide graphical and textual information supported by live audio. On a pilot basis, about 15 receiving centers in Karnataka participated in an online Common Entrance Test orientation course where students in rural areas attended online classes in different subjects.

- **School Net India**
  http://www.schoolnetindia.com/

School Net India the educational infrastructure wing of Infrastructure Leasing and Financial Services (IL&FS) is building multilingual educational content online, as well as CD-ROMs, for use by teachers as supplements to classroom education. SchoolNet India has conceptualized and built the SchoolNet Computer Training Bus, which provides computer training for students from underprivileged backgrounds at government schools. The Training Bus has several IT facilities including a central server, Internet connectivity, printers, scanners, and video equipment to facilitate visual training. So far, this mobile training center has conducted classes in government schools and associations in and around Bangalore and Mysore districts.

5.3 Assessment of Current Situation

Karnataka currently does not have a policy framework in place promoting the use of ICTs for primary and secondary education. This lack of development at the policy level, however, has not prevented a multitude of programs and projects to be implemented mainly due to the initiatives of high-ranking government officials in the Departments of Education and Information Technology, backed by political leaders governing the state, and the facilitative work done by district and block level government officials. The state's emphasis on PPPs and involvement in pilot projects carried out by various NGOs and private companies has also contributed to the

high volumes of practices in the state. Additionally a more developed infrastructure in Karnataka has allowed for the implementation of a greater number of computer-based programs.

Various benefits have emerged for students and teachers from the programs and projects that have been implemented in Karnataka. According to the Director of an NGO in Bangalore a general awareness regarding the use of ICTs in education has been created in Karnataka, and even economically backward schools have more confidence in incorporating ICTs for learning. There have been increases in enrolment and improvements in attendance in the schools with CALCs, and the performance of students in grades IV-VI in mathematics was better in CALC schools than of those in control schools. Evaluations of the Intel program showed that after being trained some teachers began to use computer related activities in their regular teaching. Further, radio based programs have allowed for more students to be taught across the state and the IRI project, especially, has been very well received by students and teachers.

Nonetheless even with all the success the state has had in being able to implement and facilitate a multitude of programs, some issues still have to be addressed. The sustainability of the CALCs and other computer centers has been problematic once their funding and maintenance is shifted to the community. Evaluations of the Mahiti Sindhu project demonstrated that students acquired computer skills but many schools did not adequately exploit the IT enabled educational opportunities of this project, and the private companies involved in the project had problems getting payments from the state.

Karnataka is one the leading states in the country in PPPs in this field and numerous benefits have emerged from this type of partnership, however there was a general consensus among government officials that private partners want too much money from the state. On the other hand a high-ranking private official involved in a PPP with the state felt that the government needs to be clearer regarding what it wants to achieve in a specific project, and it should address payment and logistical issues in a better manner. Many interviewees were also of the opinion that the monitoring and evaluation of PPPs needs to be vastly improved.

The relations and contacts between NGOs working in the field of ICTs and education and relevant government departments is more robust in Karnataka than in either Chhattisgarh and Jharkhand, and the state has facilitated many international NGOs' pilot projects and even partnered with them in implementing some programs. However many officials from local NGOs commented that the state places more of a priority on building relations with the private sector rather then with them.

As is the case with the other states in this study there was a consensus among the interviewees that Karnataka places a greater emphasis on technical higher education and thus the use of ICTs for primary and secondary education is less of a priority. Government officials concurred that the technical higher education sector is important however they argued that the state is making serious efforts to use ICTs to teach students in grades VIII-X, while simultaneously trying to promote ICTs for the primary education sector. Commenting on the overall situation a high ranking official of a government body overseeing ICTs and education related issues claimed that while many achievements have been made, a huge amount of capital investment is needed for promoting the use of ICTs in primary and secondary education on a large scale and that

Karnataka, like Chhattisgarh and Jharkhand, realistically does not have the required funds for this endeavor.

6 ENABLING ENVIRONMENTS

The preceding analysis has demonstrated that the enabling environments in Chhattisgarh, Jharkhand and Karnataka to promote ICTs for primary and secondary education have been supported and successful at differing levels. While none of the three states have a cohesive policy framework in place to promote the use of ICTs for primary and secondary education, the volume and scope of the programs and projects being implemented in Karnataka is much greater than those in either Chhattisgarh or Jharkhand. This chapter brings together the analyses and examinations of the preceding sections to discuss the current enabling environments in Chhattisgarh, Jharkhand and Karnataka by concentrating on the factors contributing to ICTs based education, the best practices and challenges influencing the success and failure of the projects and programs that were implemented, and issues pertaining to ICTs enabled educational quality and access.

6.1 Factors Contributing to ICTs based Primary and Secondary Education

The national government of India has actively promoted the use of ICTs for primary and secondary education through policies emanating from diverse ministries and departments. While many of the targets advocated in the policies have not been realized, the release of the policies nonetheless has provided individual states in the country with some guidelines and recommendations pertaining to the use of ICTs for primary and secondary education. The national government has also initiated and implemented many radio and TV based programs employing ICTs for primary and secondary education, but the use of these programs in schools in Chhattisgarh, Jharkhand and Karnataka is quite sporadic.

The greatest exception has been the work done under SSA as state level agencies in Chhattisgarh, Jharkhand and Karnataka, carrying out the mandate of SSA, have implemented some programs and provided funding for other projects. Further SSA is also providing each district in the country with finances for implementing innovative programs, including those pertaining to computer education. Therefore the role of the national government in contributing towards the enabling environments promoting the use of ICTs for primary and secondary education in Chhattisgarh, Jharkhand and Karnataka cannot be denied.

However each state in the country is predominantly responsible for addressing its education sector, and thus the onus falls on individual states to create an enabling environment to promote the use of ICTs for primary and secondary education. Therefore within Chhattisgarh, Jharkhand and Karnataka itself the key factors contributing to ICTs based primary and secondary education are the initiatives and impetus of the state governments, the involvement of private companies and NGOs, the level of infrastructure and demographics. The relatively few pertinent policies released by these states currently do not appear to be contributing to ICTs based primary and secondary education in any significant manner.

- **State Governments, Private Entities and NGOs**

The role of the respective state governments of Chhattisgarh, Jharkhand and Karnataka and the priorities set by them to emphasize, initiate, facilitate and implement programs has had the most impact on contributing towards ICTs based primary and secondary education. A high degree of political will and the commitment of high-ranking government officials in the Department of Education and Department of Information Technology, along with the work of officials at the district, block and cluster levels, has paved the way for a multitude of projects and programs to be facilitated and implemented in Karnataka.

The government of Chhattisgarh, and high-ranking officials in relevant departments in the state, are vocal and supportive of the use of ICTs for primary and secondary education however they have not yet been able to match their enthusiasm with implementing a range and volume of programs and projects. In Jharkhand the political will of elected politicians and the commitment of high-ranking officials in relevant departments to promote the use of ICTs for primary and secondary education is relatively much lower. Therefore the state has initiated and funded very few projects in this field, and has also been slow and somewhat resistant to facilitate the implementation of programs and projects proposed by other entities.

Private entities have played a significant role, through pilot projects and PPPs, in contributing towards ICTs based primary and secondary education. Lead by IT firms, private companies' interests in education have increased greatly since India became a global destination for IT products and services. This development has induced the national government and individual state governments in the country to emphasize technical higher education as the IT sector is seen as a key generator of employment for skilled workers. IT companies are also eager to take advantage of growing pool of low cost technically skilled labor in India and there is a general consciousness among these companies to explore and invest in education, although most of this interest is at the level of technical higher education.

Nonetheless as indigenous IT companies in India have grown, and foreign IT companies have increased their presence, the corporate social responsibility programs of these companies and their non profit arms have increasingly begun to look into the role of ICTs in primary and secondary education leading to the implementation of some pilot projects. Karnataka has played the most facilitative role in aiding private companies to implement pilot projects, while Chhattisgarh and Jharkhand have not demonstrated such a level of involvement. A major factor for the high volume of pilot projects being carried out by private IT companies in Karnataka is that Bangalore is the IT capital of the country and therefore a lot of IT companies are based in the state. Chhattisgarh and Jharkhand being newer and relatively more underdeveloped states do not have a high volume of private IT companies with a presence in their territories.

With the national government emphasizing PPPs in education, the state governments of Chhattisgarh, Jharkhand and Karnataka have also simultaneously stressed the value and importance of this type of partnership. State governments have been responsible for funding projects and private partners have been paid for their expertise, content and hardware provision, and speed of implementation. Actions to proceed with PPPs have been led by the Departments of Education and Information Technology who are responsible for realizing such partnerships for

the primary and secondary education sectors, and for singing memorandums of understanding (MoUs) with private companies. Karnataka, while stressing the limitations of PPPs due to cost issues, has nevertheless been more involved in advocating and realizing them. Chhattisgarh and Jharkhand while having similar concerns as Karnataka have not shown much initiative, with the exception of ISS, to implement PPPs.

The third main entity that has contributed to ICTs based primary and secondary education in Chhattisgarh, Jharkhand and Karnataka are NGOs. A differentiation has to be made between local NGOs operating in these three states and international NGOs that have their own source of, mostly foreign based, funding. Local NGOs, predominantly, do not have the financial resources or the connections with pertinent government officials or relevant departments to initiate ICTs based projects. International NGOs with the necessary start up funds and relationships with relevant government officials have successfully managed to implement pilot projects, and in some cases even expand the scope of their projects. Once again Karnataka has been the most receptive to these NGOs and has facilitated the implementation of their pilot projects, while Chhattisgarh and Jharkhand are just beginning to get active with these types of organizations.

Apart from these three main factors, issues related to the infrastructure and demographics also play a part in contributing to ICTs based primary and secondary education. Karnataka has a more advanced infrastructure in place, than either Chhattisgarh or Jharkhand, which has enabled the implementation of a greater number of projects and programs employing advanced ICTs such as computers. Chhattisgarh and Jharkhand, on the other hand, have low population densities and large tribal populations that live in remote and largely forested areas. This reality makes the scalability of programs more problematic in these two states, with the exception of mostly radio programs, rather than in Karnataka where population densities are higher and a lower proportion of the population lives in remote and inaccessible areas.

- **State Policies**

A coordinated and cohesive policy framework to promote ICTs for primary and secondary education is currently lacking in Chhattisgarh, Jharkhand and Karnataka, as only a very limited number of policies have been released in each of these states that address this field. Additionally the main focus of these policies is not ICTs and primary and secondary education, and therefore this field is addressed in a peripheral manner in the body of the policies. There is also a lack of enumeration and emphasis in these policies for initiating and implementing specific ICTs based programs or projects for primary and secondary education. Further none of these policies discuss the types of incentives that would promote an increased use of ICTs for primary and secondary education; how to replicate and institutionalize successful practices; and also fail to address the mitigating factors and obstacles in this field.

Senior level government officials interviewed in Chhattisgarh, Jharkhand and Karnataka further claimed that their respective state policies addressing the use of ICTs for primary and secondary education were mainly vision documents covering broad thematic areas, and thus were only expected to address this field in a peripheral manner.

All of the implementers and officials from private companies and NGOs interviewed for this study were of the opinion that the few policies addressing the use of ICTs for primary and secondary education, released in their respective states, had very little or no impact on their programs and projects. A vast majority of these interviewees were also unaware of what these pertinent policies had enumerated regarding the use of ICTs for primary and secondary education.

Therefore it can be concluded that the few pertinent policies released, between 2000 and 2005, by the states of Chhattisgarh, Jharkhand and Karnataka have not had a clear or direct effect in contributing towards ICTs based primary and secondary education.

Yet at the same time it also cannot be denied that an environment exists in Chhattisgarh, Jharkhand and Karnataka, which has allowed for the release of policies addressing ICTs and primary and secondary education, and therefore there are some positive developments that have emanated from their release. These include,

- A certain level of awareness, while far from adequate, has been spread about ICTs and primary and secondary education.
- The concept of PPP has been promoted, which is one factor contributing towards ICTs based primary and secondary education.
- The training of teachers in ICTs has been promoted.
- The importance of employing ICTs for girls' education, and for making girls competent in using computers has been highlighted.
- The different state departments whose mandates oversee ICTs and primary and secondary education, and who have released policies that peripherally address this field, have interacted and collaborated with each other at some level.
- Some policies have set targets to include and cover a greater share of a state's territory in a communications network. This development as and when it is realized can potentially create more access to and opportunities for ICTs based educational programming.

6.2 Best Practices and Challenges

The analysis and examination of the projects and programs implemented in Chhattisgarh, Jharkhand and Karnataka has demonstrated a range of best practices and challenges.

- **Best Practices of Projects and Programs**

The best practices emanating from the projects and programs implemented in Chhattisgarh, Jharkhand and Karnataka included,

- The involvement and commitment of the role of the agents' i.e. high-ranking officials in the Department of Education and Department of Information Technology, and of ministers and politicians to a certain degree, taking an interest in and having an awareness and knowledge of ICTs and education issues was

essential in the implementation of a program or program. These key officials were the main stimuli pushing for the inception, facilitation and implementation of state run programs and PPPs. The role of other agents' i.e. government personnel at the district, block and cluster levels in coordinating programs was equally important.

- When private companies and international NGOs were able to establish contacts and ongoing dialogues with high-ranking government officials in relevant departments, and coordinate with districts and block level officials, their pilot projects were greatly facilitated by the state.
- If international NGOs and private companies had the required start up funds, the necessary technical and management expertise, and the ability to produce contextually based content their pilot projects were successful to a higher degree.
- International NGOs, which were able to build relationships with state agents and entities managed, in some cases, to increase the scope of their projects as was the case with EDC's IRI program in Karnataka and Chhattisgarh.
- Relatively successful PPPs were able to combine the technical expertise, content production and delivery, supply of hardware, adherence to timelines, and speed of implementation of private companies; with the financial resources of the government and the commitment and work of high ranking and cluster, block and district level officials; along with the resources of local communities.
- Successful radio based programs and projects encompassed a high level of coordination with government personnel at the block and districts levels, a high level of expertise of organizations making the radio based content, good relations with teachers and motivated teachers, and some level of community involvement.
- If an adequate infrastructure consisting of regular electricity during lab hours, well maintained and functioning hardware, and network connectivity was in place, which was the case more so in Karnataka rather than in Jharkhand or Chhattisgarh, computer based programs were successful to a certain extent.
- Computer centers and labs that were well maintained by private partners contributed towards building a nascent infrastructure, and provided facilities that can be further developed in the future.
- Innovative practices to address the financial demands of the private sector were demonstrated by PPPs in Karnataka and Chhattisgarh, as these states allowed their private partner to make commercial use of computer labs before and after school hours.
- Computers stationed at the cluster level were suitable for teacher training.
- Radio based programs, incorporating the use of telephones, allowed for teachers to provide feedback to the implementers of programs and at the same time allowed for answering teachers' queries.
- A consortium called the Resource Agency Network, facilitated by EDC, was created in Chhattisgarh where NGOs periodically come to discuss a range of issues.
- The partnering of a private company with an international NGO led to the dissemination of the IRI program allowing more students to avail of this ICT based learning, as was demonstrated by the case of TATA Steel and EDC in Jharkhand.

- **Challenges Faced by Projects and Programs**

Other issues came into play as challenges faced by the projects and programs implemented in Chhattisgarh, Jharkhand and Karnataka. These included,

- A lack of awareness and commitment, and skepticism, towards the use of ICTs for primary and secondary education on the part of agents' i.e. high-ranking officials in the Department of Education and Department of Information Technology, and government officials at the district, block and cluster levels presented a huge hurdle in the facilitation, initiation and implementation of programs and projects.
- The transfer of government officials who were committed to promoting the use of ICTs for primary and secondary education led to the abandoning, or delay, of the conceptualization, initiation or facilitation of projects and programs.
- Political factors such as the election of a new government that did not prioritize certain ICTs based programs and projects led to them being discontinued.
- In PPPs private partners had problems getting payments from the state and governments didn't address logistical issues adequately. Private partners on the other hand were guilty in some cases of inadequate maintenance and upkeep of hardware in computer labs.
- There was also a lack of transparency in the deals and MoUs signed between the state and private entities, and the channels to provide feedback to the government in PPPs were limited.
- Private partners in PPPs did not adequately get involved with, or emphasize, factors related to background research and community development, and considered them to be in the domain of the state's responsibility.
- The high costs related to PPPs have been a major hurdle in their dissemination.
- Local NGOs did not have adequate contacts with high-ranking government officials in relevant departments and there were very few mechanisms for these NGOs to provide any inputs to the state.
- Overall there was no coordinated strategy by the government to involve and work with pertinent local NGOs in any of the three states.
- Pilot projects initiated and implemented by international NGOs and private companies, with the help of the state, were largely successful. However, their successes were mainly visible only at a pilot level and the scaling up of successful pilot projects, with very few exceptions, is not occurring. Quite often these projects are too expensive and thus remain as successful pilots.
- Some schools complained of not being able to listen to IRI programs clearly and some teachers did not have the adequate background to successfully integrate the radio courses in the curriculum. Fox example some teachers had studied English decades earlier and that to only at a grade VIII or IX level, and therefore they were not able to interact with the English radio courses effectively, even after being trained.
- An underdeveloped infrastructure including irregular and poor electrical supply, lack of facilities to maintain hardware, and inadequate networks is a major block in implementing computer based programs and projects.

- In many of the computer centers and labs the student to computer ratio was very high and there were recurring hardware, software and technology support issues.
- Many computer programs did not adequately involve the teachers in the schools.
- Bringing students from different school to one school in a cluster, which had a computer lab or center was challenging. In practice the students who studied near the lab or center where the computers were located benefited the most, as trips from other schools to the labs and centers were quite infrequent.
- The sustainability of the computer centers is problematic once their maintenance and financial upkeep is shifted from private partners to the community.
- There was a lack of active and consistent community participation in the majority of the programs and projects, and there is a lack of effective and sustainable methods to increase community participation.
- Mechanisms pertaining to conducting background surveys and monitoring and evaluating projects and programs, with some exceptions, were inadequate.

6.3 ICTs Enabled Education Quality and Access

The use of ICTs for primary and secondary education as a result of the programs and projects implemented in Chhattisgarh, Jharkhand and Karnataka has had an impact on educational quality and access, yet there are major issues pertaining to the measurement of these indicators.

Monitoring and evaluation of learning gains, teaching practices, classroom environments, students participation and other activities are required and necessary for addressing ICTs enabled educational quality and access. However one of the major hurdles in assessing these indicators was that the majority of the programs and projects implemented in Chhattisgarh, Jharkhand and Karnataka did not have adequate quantitative or qualitative monitoring or evaluation activities. Further even if any monitoring and evaluation activities were conducted they did not adequately measure indicators pertaining to ICTs enabled educational quality and access. Some exceptions were EDC's IRI program, APF's CALCs, and the ISS and Headstart programs.

Nevertheless even with the limited amount of data available some practices pertaining to ICTs enabled education quality and access were gleaned from the projects and programs implemented in Chhattisgarh, Jharkhand and Karnataka. These included,

- Radio based programs helped increase the number of students that can be taught diverse subjects.
- IRI based instruction in different courses allowed for greater student participation.
- IRI courses in English gave students the opportunity to converse in the language and allowed them to employ problem solving language skills during the course broadcast.
- There were increases in enrolment and improvements in attendance in the schools, which had computer labs or centers, and there were clear demonstrations that students were eager to use the computers and their content.

- Interactive and student centric modules and games, in computer based programs, used to reinforce concepts received positive feedback from both students and teachers.
- The use of creative content such as painting software held students' attention and interest.
- The use of ICTs in schools had an impact on the learning and classroom environments. Although more research and evaluations are required in this regard.
- Contextually based content taking into account local cultural, social and economic realities positively impacted learning gains of students.
- Programs using computers and other advanced ICTs such as CD ROMs for learning helped students and teachers build secondary skills i.e. the knowledge and ability to use and manipulate certain types of technologies.
- The use of different types of ICTs lead to different learning gains and varying changes in learning and classroom environments, although more research and evaluations are required in this regard.
- Linkages between the ICTs based content and the regular school course curriculum had an impact on learning gains of students.
- The amount of contact time students had with the ICTs had an impact on their learning gains.

7 TOWARDS GREATER ENABLING ENVIRONMENTS

The political, social, economic and cultural situation in Chhattisgarh, Jharkhand and Karnataka varies greatly, therefore each state has to address the use of ICTs for primary and secondary education taking into account their local realities. This concluding section entails a brief normative discussion addressing certain issues, which when adapted to the local context, will allow for greater enabling environments to promote ICTs for primary and secondary education in Chhattisgarh, Jharkhand and Karnataka. These include,

- The state, with its institutions and bureaucracy, is the predominant actor and factor in determining the success, or failure, of using and promoting ICTs for primary and secondary education. Therefore the leadership role of the state, including the involvement and coordination of high-ranking officials in relevant departments, is vital.
- In every block there are block resource coordinators (BRCs) who are subordinates to the Block Education Officer (BEO), block resource persons (BRPs), and cluster resource persons (CRPs). These officials and authorities are key change agents that can spread awareness about ICTs and education. Further, active coordination has to occur with these officials to ensure the implementation of programs or projects.
- High-ranking government officials in pertinent departments, government officials at the districts and block level, administrators, teachers, private organizations, NGOs and communities in general have to be made aware and informed of the potential uses of ICTs in primary and secondary education.
- The notion that ICTs based programs and projects are a luxury needs to be addressed. State governments annually earmark funds for the primary and secondary education sectors, the allocation of a portion of these funds specifically for ICTs based programs needs to be explored.
- As the government is the prime entity in building and expanding the state's infrastructure, mechanism to look into those aspects of the infrastructure that facilitate greater dissemination of ICTs enabled education needs to be explored.
- Initiatives to conceptualize and implement projects are mostly based on small group decisions, while the process involved in bringing a program to fruition including planning and review mechanisms are not accentuated. The state needs to address and emphasize the holistic process involved in implementing a program, and direct the attention of high-ranking officials and personnel at the district and block levels towards it.
- Departments of Education need to explore passing guidelines stipulating the incorporation and integration of ICTs with certain parts of the course curriculums in use in the state. This type of action will facilitate the promotion of ICTs in primary and secondary schools.
- In many cases government schools pay as much for electricity as private households, therefore if schools are expected to host computer centers or labs on their premises, legislation to provide these schools a discount on, or even free, electricity is needed.
- States need to explore the use of ICTs for education in innovative ways. Technological systems which can potentially combine services in this field with health and government services, leading to lower setting up costs, need to be explored. The use of mobile vans (containing various ICTs) and solar energy for computers in remote areas also need to be looked into.

- The feasibility of releasing a policy specifically pertaining to education and ICTs at both the national and individual state levels, with one of its major components being the primary and secondary education sectors, has to be explored. The release of such a policy will allow for more information on relevant ICT based interventions to be disseminated and also lay out a clearer mandate for government officials, at various levels, and other stakeholders.
- Without the existence of a specific policy addressing the use of ICTs for primary and secondary education future policies in the sectors of education, IT, telecommunications, and social development among others have to translate their desired goals and visions for this field into action. Future policies need to enumerate specific goals such as the types of programs that can or are going to be implemented, the types of partnerships that can be utilized, the specific learning changes that will be targeted, and the types of monitoring and evaluation mechanisms that will occur.
- Further, policies released in the future also need to incorporate critical discussions on the types of incentives that will promote an increased use of ICTs for primary and secondary education; address how to replicate and institutionalize successful practices; and tackle the challenges preventing the attainment of specific targets.
- Diverse state policies advocating the use of ICTs for primary and secondary education if implemented in isolation, and devoid of connections with each other, will not attain their stated goals. Therefore, there is a need for coordination and synergy between policies as complementary policies addressing different issues that impact this field such as universal access and service, hardware and software, economic and social development, gender, among others, will help in creating a greater enabling environment.
- An understanding of the context within which policies are formulated is essential as it demonstrates the relative input of different officials and entities, and the key ideas driving the policy formulation process. While the input of high-ranking government bureaucrats from the Departments of Education and Information Technology along with officials from the IT industry and academics is vital, there is also a need for officials from other departments in the areas of software and hardware, social and economic development, finance and rural development; and other stakeholders such as teachers, educators, pertinent NGOs and local communities to have some input and stake in the process.
- Reviewing, revising and updating policy goals and targets based, in part, on the success and failure of practices in the field needs to be emphasized.
- There is no doubt that PPPs are one important factor contributing to ICTs based education, however mainly due to cost issues the role of the private sector cannot become primary and therefore should be seen as a supplementary, and not as a substitute, to that of the state.
- State governments need to make concerted efforts to increase contacts and interactions with local NGOs specializing in ICTs and education.
- Local NGOs need to interact with NGOs in other states and with international NGOs working in similar areas. These types of interactions will provide local NGOs opportunities to: expand their mandates; learn how to scale up operations; learn how to establish contacts and work with governments; share organizational learning; and increase their knowledge and awareness of different types of ICTs.
- Partnerships between private companies and NGOs in implementing and increasing the scope of a project need to be emphasized and explored further.

- Ways to scale up pilot pilots that have brought benefits to students and teachers need to be explored and emphasized not just by the state but also by the entities implementing the pilot projects.
- There are no financial models to ensure sustainability of programs and projects that can be applied in different contexts. If a model for financial sustainability is to be found it will have to emerge from the local context of each state.
- The type of content delivered over ICTs is very important and needs to be culturally and contextually relevant, apart from being linked to the course curriculum.
- Teachers need opportunities to be exposed to and to have the context to understand the use of ICTs in primary and secondary education. Therefore a centralized, top-down training approach is not feasible as it takes the primary and secondary teaching force as a homogenous body without taking into account the diversity in their contexts.
- One-time teacher training workshops are not effective in helping teachers feel comfortable using ICTs, let alone in helping them successfully integrate ICTs in their teaching.
- The preparation of teachers including their knowledge of how to use ICTs for effective teaching and learning has to be improved; the quantity, quality, and coherence of ICTs based activities for teachers has to be improved; instructional support available to teachers who use ICTs has to be improved; and regular and customized training for teachers has to be the norm.
- Teacher training has to focus on orienting teachers to use ICTs to increase educational quality and to help them understand program and project based activities.
- Primary and secondary school teachers in government schools are not just expected to teach, but are also required to be part of many other government sanctioned activities such as conducting surveys, monitoring elections, taking censuses etc. This makes many teachers hesitant to voluntarily take ICTs related training as it is seen as another responsibility or burden. This issue has to be kept in mind by implementers.
- Monitoring and evaluation aspects of programs and projects need to pay adequate attention to issues pertaining to what students have learned; can and have students converted what they have learned into something productive; and what will happen to the learning gains of students once the projects and programs are terminated.
- It is also important that the needs of the communities in which projects are being implemented are monitored and evaluated.
- Instruments need to be in place to evaluate and assess ICTs enabled educational quality and access indicators including learning gains; changes in teaching, learning and classroom environments; the distribution and quality of participation of girl and boy students; and teacher learning and interaction.
- More useful analyses of the impact of ICTs on education quality and access can only emerge when the methods used to measure these indicators are designed taking the role of ICTs into account.
- If state governments lack the skills or the personnel to carry out background surveys and evaluations competent local NGOs, universities and even private entities should be employed for these tasks.
- More work needs to be done in regards to conducting background surveys of schools, teachers, communities and the infrastructure to determine what ICT, or combination of ICTs, will be the most appropriate for use in a program or project.

- Having a well thought out and researched plan that is conceived by taking into account local contextual realities, pertaining to the use of the local language and of providing contextual examples that students and teachers can relate to, will complement the use of appropriate ICTs.
- Regular review meetings at the block level for all relevant stakeholders will be positive developments to discuss how the implemented programs and projects are faring, and also aid in spreading awareness and knowledge about the use of ICTs in primary and secondary education.
- There needs to be more of a concerted effort to reach out to relevant departments in other states, and to other NGOs and private organizations, to get information about successful programs and projects, which can potentially be replicated after they have been modified to the local context.
- There is a major need for a platform or consortium that brings together state agents and bodies, NGOs, private partners, teachers, educators and community leaders to discuss and exchange ideas and share views and resources about the field of ICTs and primary and secondary education.

ICTs are, ultimately, only physical tools, which by themselves cannot bring benefits to students, teachers and communities at large. Therefore Chhattisgarh, Jharkhand and Karnataka's unique contextual realities including, primarily, the initiative and impetus of the state, the involvement of private companies and NGOs, and the level of infrastructure play determining roles in creating enabling environments promoting the use of ICTs for primary and secondary education. In this regard this report is an important link in the holistic project of examining how diverse enabling environments, grounded in the contextual realities of developing states, succeed or fail in supporting the use of ICTs for primary and secondary education.

APPENDIX A

List of Interviewees

PLACE	NAME	DESIGNATION	ORGANIZATION
Raipur, Chhattisgarh	A. S. Parial	Joint CEO	CHIPS
Raipur, Chhattisgarh	P. Chauhan	Joint Secretary	Rajiv Gandhi Shiksha Mission
Raipur, Chhattisgarh	Dr. P. Ashok Kumar	Regional Director	IGNOU
Raipur, Chhattisgarh	Dr. J. R. Jha	Program Coordinator	Xavier Institute of Development Action and Studies (XIDAS)
Raipur, Chhattisgarh	Viresh Jatav	Coordinator	Samarthan
Raipur, Chhattisgarh	Dr. M. C. Naik	Ex-Director	Chhattisgarh Council for the Promotion of Science and Technology
Raipur, Chhattisgarh	Dr. O. P. Vyas	Head, School of Studies in Computer Science	Pt. Ravishankar Shukla University
Raipur, Chhattisgarh	Deepak Dubey	Coordinator	EDC
Abhanpur, Chhattisgarh	Group of 20 Teachers	Primary and Secondary School Teachers	Teachers from government run primary and secondary schools in Abhanpur district
Ranchi, Jharkhand	S. K. Sharma	Director	Department of Primary Education
Ranchi, Jharkhand	Pankaj Sinha	Evaluator and Community Development Officer	Development Network
Ranchi, Jharkhand	G. V. S. R. Prasad	Director, Ranchi Office	ASSERT
Ranchi, Jharkhand	Baikuntha Pandey	Specialist, Pedagogy & Distance Learning	Jharkhand Education Project Council
Ranchi, Jharkhand	Niraj Sinha	Coordinator	EDC
Ranchi, Jharkhand	Dr. V.P. Rupam	Regional Director	IGNOU
Ranchi, Jharkhand	Ashok Bhagat	Secretary	Vikas Bharathi
Bangalore, Karnataka	Dr. Rao	Director	DSERT
Bangalore, Karnataka	Sanjeev Kumar	Commissioner	Department of Public Instruction
Bangalore, Karnataka	Hemanta Naik	Ex Coordinator of 9 Schools	Mahiti Sindhu Project
Bangalore, Karnataka	Ashish Sen	Director	Voices
Bangalore, Karnataka	Aishwarya B K	Specialist	Sudiksha
Bangalore, Karnataka	M. K. Senthil Kumar	Member- Technology Initiatives	Azim Premji Foundation

PLACE	NAME	DESIGNATION	ORGANIZATION
Bangalore, Karnataka	Surbhi Sharma	Trustee	Anchorage
Bangalore, Karnataka	Dr. S. N. Gananath	Director	Suvidya
Bangalore, Karnataka	Srimathi Prasad	Director	DE Program, American Indian Foundation
Bangalore, Karnataka	J. Shankar	Head-Technology Initiatives	Azim Premji Foundation
Bangalore, Karnataka	Anandan Ramasami	Manager-Business Development	IL&FS Education & Technology Services Limited
Bangalore, Karnataka	Neena Paul	Senior Manager-Education Services	IL&FS Education & Technology Services Limited

APPENDIX B

Select Online Resources

- Chhattisgarh 2010- The State Vision Document

http://chhattisgarh.nic.in/vision/new/Chp%207%20-%20Developing%20Human%20Capital.PDF

- Chhattisgarh IT Policy

http://chhattisgarh.nic.in/policy/IT%20Policy.pdf

- Department of Public Instruction, Karnataka

http://www.schooleducation.kar.nic.in/

- Department of Telecommunications, India

http://www.dotindia.com

- Department of Telecommunications Perspective Plan 1997-2007, India

http://www.dotindia.com/plans/perspective19972007.htm

- DSERT

http://www.dsert.kar.nic.in/frame.html

- Government of Chhattisgarh

http://chhattisgarh.nic.in

- Government of Jharkhand

http://www.jharkhand.gov.in/

- Government of Karnataka

http://www.kar.nic.in

- Government of India Broadband Policy 2004

http://www.dotindia.com/ntp/broadbandpolicy2004.htm

- Government of India Information Technology Act 2000

http://www.dotindia.com/Acts/itbill2000.pdf

- Government of India Telecom Policy 1999

http://www.dotindia.com/ntp/ntp1999.htm

- Government of India Draft Scheme of Information & Communication Technologies in Schools

http://www.education.nic.in/htmlweb/draft_ict_schools.htm

- Industrial Policy of Jharkhand, 2001

http://www.jharkhand.nic.in/

- ISRO

http://www.isro.org/

- Jharkhand IT Policy

http://jharkhand.nic.in/final_IT_policy.doc

- Karnataka State Education Act 1983, Amended 1998

http://www.schooleducation.kar.nic.in/PryEducation/Education%20Act.htm

- Karnataka Information Technology Policy

http://www.bangaloreit.com/html/govtinformation/policies.htm

- National Policy on Education, India

http://www.education.nic.in/htmlweb/natpol.htm

- National Task Force on IT and Software Development 1998, India

http://it-taskforce.nic.in/index.html

- Primary Education Karnataka

http://www.schooleducation.kar.nic.in/PryEducation/index.htm

- Recommendations of Working Group of IT for Masses, India

http://itformasses.nic.in/

- Secondary Education Karnataka

http://www.schooleducation.kar.nic.in/SecondaryEducation/index.htm

- Teacher Training, India

http://www.education.nic.in/htmlweb/teacheredu_scheme.htm

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- Center for Knowledge Societies (2003), *Rapid Assessment of ICTs for Education*. EDC.
- Education for All: National Plan of Action, India http://portal.unesco.org/education/en/file_download.php/9a2c6bbea059f70c23fd46a98ae9096bEFANPAIndia.pdf
- Elementary Education as a 'Fundamental Right' in India: Research-Policy Dynamics http://www.preal.cl/FIE/pdf/lopbc/Mehendale.pdf
- Elementary Education in India http://educationforallinindia.com/elementary-education-in%20india-analytical%20report-2003.pdf
- Information and Communication Technologies in Educational Management: The Missing Link in Developing Countries http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN012316.pdf
- Integrating ICTs into Education: Lessons Learned http://www.unescobkk.org/education/ict/v2/info.asp?id=16158
- Knowledge Maps: ICTs in Education http://www.infodev.org/section/programs/mainstreaming_icts/education/knowledgemaps_education/
- Meta-survey on the Use of Technologies in Education in Asia and the Pacific 2003-2004 http://www.unescobkk.org/fileadmin/user_upload/ICTs/Metasurvey/COMPLETE.PDF
- Needs Assessment of ICTs in Education Policy Makers in Asia and the Pacific http://www.unescobkk.org/fileadmin/user_upload/ICTs/e-books/ICTs_needassessment/assessmentfull.pdf
- New Technologies for Literacy and Adult Education: A Global Perspective http://ncal.literacy.upenn.edu/products/wagner_kozma.pdf

- Policy Reforms and Financing of Elementary Education in India: A Study of the Quality of Service and Outcome
  www.ncaer.org/WP93.pdf

- Primary Teacher Training in India: The Implementation of the DIET System and its Effectiveness in Primary Education
  www.ftokai-u.ac.jp/bulletin/2001/2001akai.pdf

- Technology in Schools: Education, ICTs and the Knowledge Society
  www1.worldbank.org/education/pdf/ICTs_report_oct04a.pdf

- The Future Role of Information and Communication Technologies in Education and Training in Asia and the Pacific
  http://www.adb.org/Education/educ-ICTs.pdf