4.   Bhutan

Bhutan located at the eastern end of the Himalayas bordered by India and the People's Republic of China has been undergoing rapid political and social changes. Ending centuries of direct monarchic rule, Bhutan held its first democratic elections in March 2008. The new democratic system consists of an upper and a lower house; the latter forming the 47 seat National Assembly. Administratively, Bhutan is divided into four administrative zones called Dzongdey, which are further subdivided into districts, subdistricts, and villages. There are in all 20 districts or Dzongkhags in Bhutan.

Figure 5: Map of Bhutan
Source: www.wikipedia.org; www.cia.gov

Bhutan has a very small economy, but it has grown rapidly in the past few years, with the growth rate in 2007 reaching 22.4%. Bhutan's economy is primarily based on agriculture, forestry, tourism, and the sale of hydroelectric power, with more than 80% of the population dependent on agriculture.

Some of the key demographic and economic indicators are given as follows:

Table 11: Key Demographic and Economic Indicators - Bhutan

Parameter	Value	Year
Population	658,000	2007
Gross domestic growth (million US $)	1305	2007
GDP per capita (US $)	1981.8	2007
Human development index ranking	132/182	2009
Population below poverty line	31.70%	2005

Source: http://unstats.un.org; www.cia.gov; http://hdr.undp.org

4.1.   Background

The modern education system was introduced in Bhutan only in 1961 under the First Five-Year Plan. Prior to this, education was provided primarily through the Buddhist monasteries. During the First Five-Year Plan some 108 schools were opened and around 15,000 students were enrolled. Over the next four decades, the government expanded the modern education system from about 11 schools prior to the First Five-Year Plan in 1961 to 556 schools and institutes in 2009, spanning from community primary schools to tertiary institutes.

With the expansion in the education system, the total enrollment of students in Bhutan at all levels of general education and tertiary education has risen to 169,313 as of March 2009. Increased awareness about the value of education and the government's commitment to provide basic education to all is responsible for the increasing enrollments. The government of Bhutan provides 11 years of free basic education up till grade X after which students may complete their general education in classes XI and XII or they may join vocational training institutes and enter the job market. At the tertiary level, students may enroll for a degree or a diploma in an institute under the Royal University of Bhutan.

Bhutan has recently achieved its long time goal of Universal Primary Education. The gross enrollment ratio in primary education was about 115% in 2009. The overall survival rate in grades V and X has shown a marked increase from 2006 to 2009, with the average rate of survival at grade V being 93.6% in 2009 and for grade X, 77.6%. Further, more girls were likely to advance to grades 5 and 10 than boys. Nevertheless, Bhutan needs to continue improving quality of primary education, raise learning and test scores of pupils, and achieve full gender equality in primary education.

From 2002 to 2006, students attending secondary schools increased by 37%. A similar increase in numbers is expected from 2007 to 2012. The rapid growth of the education system presents several challenges:

- **Training of teachers:** Urban schools are generally overcrowded with 45 students per class while the rural schools suffer from a shortage of teachers.
- **Inadequate resources** for achieving universal primary education and for expanding secondary education.
- **Weak institutional capacity** at the central, district, and school levels to effectively manage growth of primary and secondary education systems.

Some of the key education indicators are given as follows:

Table 12: Education Parameters - Bhutan

Parameter		Value	Year
Adult literacy rate	Male	60	2000–2007
	Female	34	2000–2007
Youth literacy rate	Male	83	2000–2007
	Female	73	2000–2007
Gross enrollment ratio (%): Primary education	Male	103	2000–2007
	Female	101	2000–2007
Gross enrollment ratio (%): Secondary education	Male	51	2000–2007
	Female	46	2000–2007
Expenditure on education (% of GDP)		7	2003–2006

Source: www.unicef.org; www.cia.gov

According to the Asia-Pacific Development Information Program (APDIP, ICT Profile Bhutan), Internet and television were first introduced in 1999 in Bhutan. Bhutan Telecom has reduced telecommunications rates by almost 50% within two years. Internet charges have been reduced from $30 for 15 hours of Internet time to $18 since June 1999.

Some of the key ICT indicators are given as follows:

Table 13: ICT Indicators - Bhutan

ICT parameters	Value	Year
Internet users (per 100)	5.8	2008
Internet subscribers (per 100)	0.87	2008
Broadband subscribers (per 100)	0.3	2008
Mobile coverage (%)	21	2007
Mobile subscribers (per 100)	22.1	2007
Personal computers (per 100)	0.6	2006–2007
Internet affordability (US $/month)	15.1	2007
Mobile affordability (US$/month)	3.9	2007
Radio subscribers (per 1000)	16.5	
Households with TV (%)	57.7	

Source: www.itu.int; www.mdgs.un.org; World Development Indicators Database; www.cia.gov

4.2. Policy Framework and Delivery Mechanism

The MoE is responsible for policy planning, curriculum development, and administration of basic, higher secondary, tertiary as well as continuing and non-formal education in the country. The government of Bhutan recognizes the opportunity offered by ICTs for improving access and quality of education provided, given Bhutan's rapidly expanding education sector as well as its difficult geographical terrain. Further knowledge of ICTs is seen as crucial to integrate Bhutan into the global knowledge society, a process it has carefully embarked upon after years of isolation. The 26th Education Policy Guidelines & Instructions (EPGI-2007) state the aim of the Government to

make all those who complete basic education (i.e., class X) IT literate. To that end since April 2007, Bhutan Telecom has made all dial up Internet packages to schools free of cost. Therefore, all schools with computer and Internet facilities are urged to introduce relevant IT programmes for students and encourage the use of computers and Internet for learning especially after school hours and during the weekends, when the facilities are often underutilized and students have ample time to practise and learn. Along this line, the Curriculum and Professional Support Services Division (CAPSD) has developed a standard IT literacy framework, which schools are urged to use to initiate and carry out IT literacy programmes.

The Ministry of Information and Communications of Bhutan was established in 2003, followed closely by the initiation of an ICT policy process. Informed by Bhutan's Vision 2020 strategy paper, the development of the Bhutan Information and Communications Technology Policy and Strategies (BIPS) involved multiple stakeholders from government, semi-government, and private sectors.

The strategy focuses on the need to ensure awareness of ICT and the development of appropriate ICT skills at all levels to provide a boost to the domestic ICT industry. Steps to achieve this goal include the prioritization of ICT skills in recruitment for the public and private sector; the establishment of an ICT "Center of Excellence" through which partnerships with educational and international institutions will be formed and research and development carried out; the expansion of ICT institutes and training opportunities to all regions; the integration of ICT into basic education; and the implementation of a national awareness-raising campaign of the benefits of ICT.

BIPS 2004 (updated in 2009) highlights the need to create appropriate curriculum for ICT as a subject based on market needs, as well as curriculum for general ICT Literacy and competency for all school students. The strategies described in the BIPS pertaining to education are as follows:

- Develop a plan for a countrywide connectivity to ICT infrastructure, including schools, Geog centers and villages
- Identify educational partners in Center of Excellence
- Identify and establish linkages with international institutions
- Create curriculum for skills required in the market
- Ensure infrastructure for middle and high schools
- Develop an adequate ICT literacy curriculum for schools
- Establish e-learning nodes in all kiosks and telecentres
- Share educational resources throughout Bhutan

4.3. Initiatives

The MoE along with international donor agencies and other development partners is undertaking many initiatives to improve the quality of education, using new teaching methods, introducing technology in teaching/learning and so on. Some of the major initiatives using ICT applications for education are outlined as follows:

Radio Browsing Programme

Bhutan's tough terrain is a major challenge for communication. Radio in Bhutan reaches 90% of the population and thus proves to be an outstanding medium of education and awareness. Furthermore, low literacy rates and low electric grid coverage add to the effectiveness of radio as a mode of communication in the country. Bhutan Broadcasting Services is the national public service broadcaster providing radio and television services across the kingdom. The main objective of Bhutan Broadcasting System is to inform, educate, and entertain the citizen of Bhutan. Its FM radio covers all 20 Dzongkhags.

In 1997, the MoE launched a weekly radio programme called "Education calling Teachers" through which they aimed to spread awareness regarding new and innovative teaching techniques to teachers. The program also shared information regarding the MoE such as policy framework and guidelines set by them. However, in 2007, the programme was taken off air as a convenient time slot was not available.

In 2000, UNESCO suggested the idea of Radio Browsing where listeners ask experts to surf the Internet on their behalf and transmit information in response to their requests.

National Digital Library of Bhutan

Currently, a number of cultural agencies have begun to harness ICTs to assist in the preservation and promotion of culture, by building databases of cultural artifacts, or using digital video to record village rituals. However, these efforts are general disparate, un-coordinated and have limited outside access, which restricts their ability to promote Bhutanese culture.

The Bhutan Digital Library will assist in the coordination of these efforts, and enable Bhutanese individuals and communities to represent their traditions and perspectives domestically and internationally. This project aims to help arrange many of the existing cultural materials, as well as to document some of the aspects of Bhutanese life and traditions, which are not available at the moment, and allow people to access it from anywhere in Bhutan and throughout the world.

Bhutan "Support for Teacher Education" Project

In Bhutan, the two teacher education institutes, Paro College of Education and Samste College of Education, did not have the potential to teach computer skills to all trainees. The Singapore International Foundation provided assistance in developing an ICT-enhanced curriculum for teachers. The first phase was to equip all teachers with ICT skills and to help them prepare instructional materials. The second phase was to develop and launch a new selective ICT subject within the Bachelor of Education programme. The project aimed at encouraging teachers to move away from conventional teaching methods and adopt ICT in the teaching learning process.

ICTization of Schools

A 100 community primary schools were provided with two computers and a printer each, with free Internet facilities for a year where feasible. One teacher in each of these schools was trained in basic computing skills. This has helped in creating awareness among the primary schools especially in the rural areas.

Local Content Development and Dzongkha Localization

Local content development has been highlighted as one of the significant requirements for integrating the use of ICTs in Education in Bhutan. In this regard, the Department of Information Technology has initiated the Dzongkha Localization Project. Under this project, a beta version of Dzongkha Linux was released in 2006, through which local citizens can carry out simple desktop tasks and use word processing, spreadsheets, and PowerPoint in Dzongkha.

The OLPC Project

The One Laptop per Child (OLPC) project was recently launched in Bhutan in a pilot location with about 50 XO laptops being provided to students of Kuzhungchen community primary school in Kabjisa near Thimpu and 220 XO laptops to students of the remaining 24 community primary schools spread across the country. The XO laptop would be a useful tool to provide access to students in remote rural areas to the vast library of global information on the Internet, thereby empowering them for their own education by making learning an interactive and fun experience. The laptop has applications on animations, mathematics, language, word processing, and so on, that will enable students to learn concepts in a meaningful way. The project has been identified as a priority by the communications department and will target only rural community primary schools.

Several key constraints have been identified in the scaling up of this initiative such as high cost of funding, lack of reliable Internet in most locations, lack of electricity, and so on. However, the Bhutanese government with the support of donors like the telecommunications union and UNICEF is hopeful of making the project financially viable and a success.

Education Development Project

Under the Education Development Project, the World Bank lends financial support to the MoE in Bhutan to expand access to primary and secondary education and improve educational quality in schools in Bhutan. Funds received through this project are used to construct primary and secondary schools through out Bhutan. In terms of providing infrastructure to enable the integration of ICT in schools, under this project 20 schools were equipped with 20 computers each.

Healing the Divide

Healing the Divide (HTD) is a New York-based Non-Government Organization addressing various social issues in developing economies. In Bhutan, they partnered with the Royal Government of Bhutan to bring technological interventions in the education system. HTD provided teacher training, student training, and maintenance training to build a foundation for ICT-enabled teaching learning. Apart from providing training and ICT equipment in schools, they also enabled a local network between schools to enhance the education system.

Singapore International Foundation

Singapore International Foundation, in collaboration with the MoE and Royal University of Bhutan, initiated the Bhutan W.I.R.E.D (Weaving InfoTech Resources in Education) to ensure IT employment in Bhutan's education system. The three year project (2008–11) will also initiate four higher secondary schools and one lower secondary school. These schools will provide an

opportunity for teachers to become ICT literate and to learn how to infuse ICT to enhance their lessons on various subjects. Teachers will also be encouraged to transfer their knowledge to their colleagues.

Chiphen Rigpel

The government of India has granted financial assistance to the Royal Government of Bhutan to implement the "Chiphen Rigpel" (broadly meaning "empowering society, enabling a nation") project. This project (initially called the Total Solutions Project) was initiated in 2010 and would be implemented over a period of five years in collaboration with Department of Information Technology and Telecom (DITT), Ministry of Information and Communications, and NIIT India. The education component of the project is highlighted as follows:

- Implement teacher training programs to cover 5,000 teachers across Bhutan
- Equip all schools under IT @ Schools with software and educational material
- Provide Computer Aided education services for effective student training
- Establish seven training centers, two colleges of education and five higher secondary schools to spread IT Literacy within the Kingdom of Bhutan

Furthermore, the project also aims to facilitate the implementation of 261 learning stations and community information centers.

4.4.   Constraints

Bhutan has come a long way since the time that the 'modern' education system was introduced in the country. In order to further increase access to education and improve the quality of education Bhutan can leverage the use of ICT in their education system. While efforts have been made in this regard by donor agencies, NGOs and the government, certain constraining factors limit its usage. Some of these factors are discussed below:

High Capital Investment: Due to the rugged geographical terrain and dispersed settlement pattern, rolling out ICT to serve the entire population requires high capital investment. Furthermore since the country is landlocked, installation of ICT becomes an extremely expensive undertaking.

Lack of ICT Professionals: Since there is a lack of ICT professionals, limited local content is available. If efforts are made to increase the pool of ICT skilled manpower, professionals will be available to create appropriate applications and content in the local language.

Low ICT Literacy: Due to slow proliferation of ICT into institutions, schools and communities, most citizens do not have access to computers and other ICT facilities and therefore are not ICT literate.

4.5.   Insights

Bhutan is a late starter in the communications space, with the earliest efforts at introducing TV or other forms of information and communications technologies, dating back to only early 1999-2000. It is therefore positioned to reap the advantages of a late starter in the technology space by not having any legacy systems, having manageable amounts of data, access to relatively more cost effective technologies and opportunities for adoption of new (and open) standards. In addition, Bhutan is characterized by a unique environment for development of an ICT-based society by way of a stable and vibrant government; small population; widespread knowledge of English; good telecom network in much of the urban areas; and the Government's commitment to adopting ICT as a development tool.

Lack of funds for significant ICT adoption in schools is cited as a significant problem. Funds need to be generated to provide ICT facilities to schools at all levels. Private sector participation in the information, communications space has become prominent and will continue to grow in the tenth year plan as the government gradually withdraws from service provisioning to focus on policy and regulatory roles. Public-private partnerships have been successfully implemented and such collaborations will continue in the near future.

Of the 512 total schools and institutions in Bhutan, high speed leased line internet access is available in about 100 Secondary and Higher Secondary schools. Further Bhutan Telecom the national Service Provider provides an educational concession to schools for establishing connectivity. Given that the number of institutions to be covered are small in number, a focus on providing adequate ICT infrastructure to all schools should be prioritized.

4.6. Select Bibliography

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- National report on the development of education: www.ibe.unesco.org/International/ICE47/English/Natreps/reports/bhutan.pdf

- Singapore International Foundation – support for teacher education project: www.unescobkk.org/fileadmin/user_upload/ict/e-books/Teacher_Education_Case_Studies/Bhutan__Support_for_Teacher_Education__Project.pdf

Links to Initiatives

Government Links
- The 'Chiphen Rigpel' project: www.bhutan.gov.bt/government/newsDetail.php?id=1627

Private Companies
- Microsoft – Unlimited Potential E-centres: www.bhutanstudies.org.bt/admin/pubFiles/M-10.pdf

Non Government Organizations
- Singapore International Foundation: www.sif.org.sg/
- Healing the Divide (HTD): www.healingthedivide.org/

Other Important Links
- Bhutan Broadcasting Service: www.bbs.com.bt/
- Bhutan Digital Library: www.library.gov.bt/
- One Laptop per Child, Bhutan: wiki.laptop.org/go/OLPC_Bhutan
- UNESCO – radio browsing: www.unescobkk.org/education/ict/themes/non-formal-education/regional-and-country-examples/bhutan/