

PROSPECTS OF E-LEARNING IN THE CONTEXT OF CURRENT ICT INFRASTRUCTURE OF BANGLADESH

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ABSTRACT

E-Learning has emerged as a very fast paced learning system at present. Development of computers and Internet technology are providing the necessary momentum for the E-Learning systems. To reap the full potential of this system we need to introduce it in our country. In this paper the current ICT infrastructure of Bangladesh has been explored along with the challenges and possibilities of introducing the system. A practical and suitable framework to utilize the benefit provided by E-Learning system is presented through this paper.

Keywords: E-Learning, SMW4, Internet kiosk, Optical fiber, Bandwidth

1. WHAT IS E-LEARNING?

Rapid development of technologies and computers has changed methods of education and training and caused the blossom of e-learning programs. The use of technology-based training and electronic training (e-learning) is one of major trends in the field of human resource development [1]. Various terms are coined to name these emerging training methods, namely, Asynchronous learning, Distributed learning, Online learning, Web-based learning, Computer-based training, E-learning and Distance learning.

Asynchronous learning focuses on the difference of time when learning occurs; online learning, web-based learning, e-learning and computer-based learning emphasize the learning technology and tools used; distance learning concentrates on the difference of places where a learner and a teacher exist.

E-Learning is defined as the “acquisition and use of knowledge, distributed and facilitated primarily by electronic means.” [1] Based on this definition, E-Learning would be evolved to systems consisting of a variety of channels and technologies and can take the form of courses as well as modules and smaller learning objects and may incorporate synchronous or asynchronous access and be distributed without geographical limits.

2. ADVANTAGES OF E-LEARNING

E-learning using technologies and computers to improve learner’s skills and knowledge has the several advantages. Some of them are worth mentioning:

- a) Space is not needed
- b) Learners do not need to wait until a class is available
- c) Learners can complete training when it is least disruptive to their schedule
- d) The methods can increase learner’s interest
- e) Deliver contents clearly and
- f) Feedback students easily

Due to these advantages, the popularity of E-Learning has dramatically increased over the past few years.

3. CRITERIA FOR EVALUATION

The increased investment in E-Learning has led companies to be concerned with the performance and efficiency of the method. That is to say, organizations are eager to know how effective E-Learning is. Based on

the literature related to evaluation of e-learning programs, three major factors were identified as the focus of e-learning program evaluation [1], namely,

- a) Cost efficiency
- b) Learner satisfaction and
- c) Learning resources.

4. DIMENSIONS OF E-LEARNING

To create well designed, learner-centered, interactive, affordable, efficient, flexible, meaningful, distributed and facilitated E-Learning environments various dimensions need to be explored. For a successful E-Learning environments the dimensions are institutional, pedagogical, technological, interface design, evaluation, management, resource support and ethical [2].

The institutional dimension is concerned with issues of administrative affairs, academic affairs and student services related to E-Learning. The pedagogical dimension refers to issues of teaching and learning concerning goals and objectives, content, design approach, organization, methods and strategies, and medium of e-learning environments. The technological dimension of the framework examines issues of technology infrastructure in e-learning environments. This includes infrastructure planning, hardware and software related issues. The interface design refers to the overall look and feel of e-learning programs. The evaluation for E-Learning examines both the assessment of learners and evaluation of the instruction and learning environment. The management refers to the maintenance of learning environment and distribution of information. The resource support dimension of the framework examines the online support and resources required to foster meaningful learning environments. The ethical considerations relate to social and cultural diversity, geographical diversity, learner diversity, information accessibility, etiquette, and the legal issues. For establishing successful E-Learning systems, we should address all the issues involving the various dimensions of the e-learning environment.

In the context of Bangladesh the technological and resource support dimensions are rather crucial than all the others for establishing a successful E-Learning environment. We will examine the current ICT infrastructure of Bangladesh to E-Learning readiness.

5. ICT INFRASTRUCTURES IN BANGLADESH

5.1 Telecommunication Infrastructure

Telecommunication sector in Bangladesh has been experiencing a huge boom in the last few years. Several private and public telecommunication operators have established their network all over the country. As they are expanding their operation to the most rural areas, they are also dwelling to improve the network performance and inclined to introduce latest technologies to the people. The rapid expansion of telecommunication infrastructure is phenomenal in this situation. The present status of the telecommunication and data communication infrastructure can be summarized in Table-I [3,4,5]:

Table I: Summary of Tele and Data Communication infrastructure

Category	Quantity
Fixed Phones Subscriber	1,007,450
Digitized Districts	64
Mobile Phones Subscriber	6,107,946
Mobile operators	5
Nationwide fixed Phone operators	2
Telephone Density	5.15 (per 100 inhabitants)

The recent growth of the phone subscribers in Bangladesh is apparent from Figure 1 [4]:

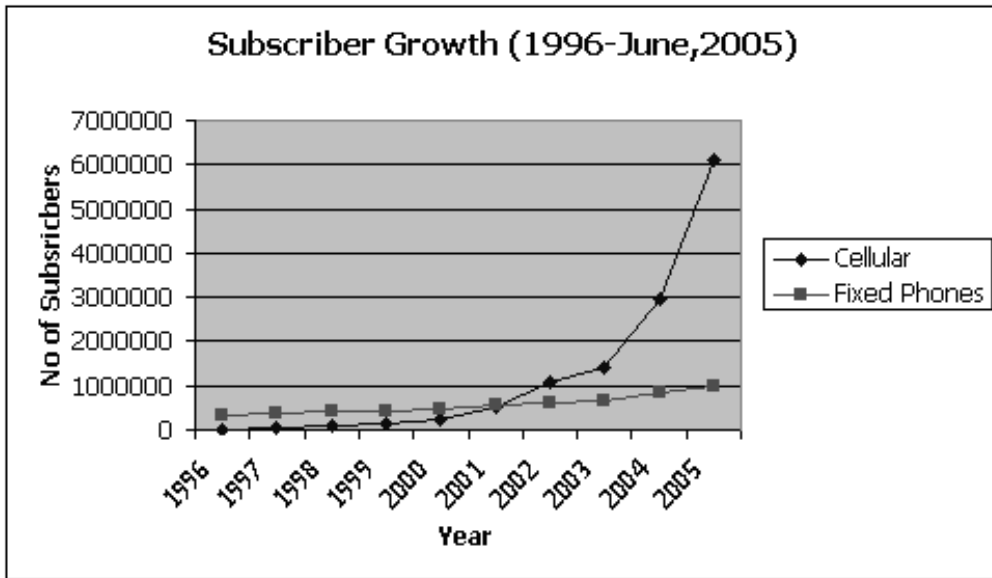


Figure 1: Phone subscriber growth (1996- June, 2005)

Bangladesh Telecommunication Regulatory Commission (BTRC) has granted 410 licenses so far. Details are shown in table-2 [4]:

Table 2: Telecommunication Licenses granted by BTRC

Serial	Category	Total
1	New Public Switched Telephone Network (PSTN) (15 Companies)	37
2	Old PSTN Operator License	3
3	Cellular Mobile Telecom Operator Licenses	5
4	Internet Service Provider (ISP)	219
5	VSAT- User	88
6	VSAT- Provider	30
7	VSAT- Hub	4
8	Domestic Data Communication Service Provider (DDCSP)	24

5.2. Internet Infrastructure

Use of the Internet in Bangladesh has started since 1993 by providing offline email services. But Internet services to the public were not open until 1996 and the first organization to get license as an ISP (Internet Service Provider) was Information Services Network (ISN - www.bangla.net). They set up a VSAT on June' 1996 and installed necessary machineries including the Internet Server and offered Internet services to the public through a dial-up network [6]. It was the beginning of a revolution in Bangladesh towards the digital age of twenty first century.

The public sector operator BTTB took Internet to the rural-semi urban areas of Bangladesh. Starting from Dhaka they have provided dial-up ISP services to all the 64 districts of Bangladesh. BTTB also have some facilities in some upazillas. It is promised that BTTB will connect all the 484 upazillas of the country within next two years. BTTB is using their countywide landline telephone exchanges to spread the Internet all over the country. Currently they have their DDN (Digital Data Network) exchanges at Dhaka, Chittagong, Rajshahi, Khulna, Barisal, Bogra, Comilla, Jessore, Rangpur and Gazipur and distributing bandwidth using DDN services too.

Currently ISPs are using only VSATs to connect with the rest of the world. Some private organizations have also got their own VSATs, while the rest get leased lines from the VSAT owners and provide Internet services.

Cost of accessing the Internet in Bangladesh is very high as compared to the average income of the people. Development of the software industry has suffered a lot due to the heavy charges of Internet and the slower data rate. ISPs are not capable of reducing the charges due to the higher cost of bandwidth. Having the submarine cable connection is supposed to solve the problem.

Mobile Internet has also been setup in Bangladesh. Grameen Phone, the largest mobile phone operator has already introduced WAP services. BDCOM a local ISP has got WAP Internet services. WAP has not been popular as the charges are very high compared to the landline. Above all SMS and MMS are more popular to the mobile users.

Current status of computer and Internet infrastructure is summarized in table-3 [4]:

Table 3: Computer and Internet Infrastructure

Number of ISPs	219 (80% ISPs are located in Dhaka)
Number of Internet Users	0.3 Million
Internet users	19.04 (per 10,000 inhabitants)
Computer ownership	0.782 (per 100 inhabitant)
No of active Cyber Cafes / Internet Kiosks	500
Cyber Café's / Internet Kiosks	0.19 (per 10,000 inhabitants)
Bandwidth provided by Cyber Cafes	32 kbps – 4 mbps
National bandwidth within the country	68 Mbps (data)
National bandwidth to and from the country	112 Mbps
Available Highest Bandwidth of link	10 Mbps

Cost of bandwidth (as in Dhaka city) are summarized in table-4 [6]:

Table 4: Charges of Bandwidth

Internet Access Charges (Dial –up)	1.50 Tk- 0.20 paisa/ Min
Unlimited Access (Dial-up)	Tk 1000/Month
Broadband – 64 kbps	Tk 10,000/month
Broadband – 128 kbps	Tk 15,000/month
Broadband – 512 Kbps	Tk 50,000/month

5.3 Internet infrastructure for the rural people

In reality none of the 87,500 villages of Bangladesh got any kind of Internet connection so far. Even E-mail (offline or online) services are not available. Private sector companies are reluctant to go to even the semi-urban areas due to the lack of economic viability.

Public sector operator BTTB is looking mostly at the district towns. Though they have decided to go to the upazillas, it might take more than two years to achieve that goal [6].

Govt. has two plans to be implemented under the Ministry of Science and ICT, which can improve the overall situation [6]:

- a) A plan to connect all the Secondary Schools to the Internet, which might take Internet to the villages, as most of the Secondary Schools are located in the rural areas.
- b) Govt.'s plan to connect all Ministries, Districts and Upazillas is another project, which is also in the early stage of planning. This project is supposed to take Internet services to the villages.

Some specific obstacles to extend ICT to rural areas are as follows:

- a) Electricity is yet to be provided to the most of the villages.
- b) Although some of the semi-urban places like districts and upazillas have access to the Internet, most of the people in the majority of the areas are yet to be connected.
- c) The poor people in the rural areas are not literate to use an all-English based ICT system.
- d) Internet is very expensive. Most people of the rural areas cannot afford to have a computer and Internet due to the high price.

5.4 Optical fiber link to the information superhighway

By the end of 2005, Bangladesh is going to be connected to the global information superhighway through SEA-ME-WE-4 (SMW4) submarine cable [7]. Based on this it is expected that the nationwide Internet backbone will also be established.

SMW4's main specificity is flexibility. Up to 20 million voice calls or 60,000 broadcast television channels at the same time can be accommodated due to the modern DWDM technology, which is capable to transport 64 wavelengths at 10 Gbps. Full-circuit routing, whether the operator owns a license in the destination country or not, is going to be the key feature of SMW4. An equipped capacity of 160 Gbps that will be upgradeable up to 1.2 Tbps, which guarantees enough capacity to meet the needs of Middle East, India, and other key destinations for the next decade. The project is going to support telephone, Internet, multimedia and various broadband data applications. The 14 countries linked are Singapore, Malaysia, Thailand, Bangladesh, India, Sri Lanka, Pakistan, United Arab Emirates, Saudi Arabia, Egypt, Algeria, Tunisia, Italy and France with an extra landing station in Chennai, India.

In April 2005 the laying down work of the cable line was being done and the 28 KM connecting loop cable line from Cox's Bazar to the deep sea was also being laid. It is expected that the proposed submarine cable line network will increase the access capability of Internet in Bangladesh. It is also expected that with the commissioning of this cable line, the cost of bandwidth will come down dramatically. The submarine cable line will go by the pass of Cox's Bazar of Bangladesh. It will be 22000 Kilometer long and the landing station of Bangladesh will be at Cox's Bazar. Cost of the total project for Bangladesh is estimated to be Tk 3000 million.

The Turkish company Hesfible is assigned the job of installing fiber-optic network from Cox's Bazar to Chittagong [8]. They will establish the network from the base station-Cox's Bazar to the port city of Chittagong. The cost of the 171-kilometer networking is estimated at Tk 28.41 crore. Under this scheme the company will also upgrade the 260-kilometer Chittagong-Dhaka optical fiber link.

The private cellular phone operators are currently utilizing nationwide 1800-kilometer long optical fiber network under Bangladesh Railway. Bangladesh Telegraph and Telephone Board (BTTB) have already established optical fiber link in most cities. The nationwide optical fiber backbone connected with the SMW4 submarine cable is the first step towards the next generation network in Bangladesh.

6. CONSTRAINTS

The various facilities and opportunities provided by the modern E-Learning environments are practically very difficult to reach in developing countries like Bangladesh. This is due to the serious limitation of basic infrastructural resources like electricity and telephone networks. Digital division within the same country – although most people live in countryside, they are exempted from the urban facilities, only urban peoples are likely to get advantages from such environment. On the basis of current ICT infrastructure, introducing of E-Learning faces lots of constraints that must be overcome. The constraints can be summarized as follows:

- a) High percentage of illiteracy.
- b) Low computer penetration.
- c) Low Telephone density
- d) Lack of continuous and uninterrupted supply of electricity
- e) Old and outdated technology
- f) Poor economic condition
- g) Absence of legal infrastructure
- h) Weak data communication infrastructure
- i) Lack of public awareness about ICT
- j) Lack of adequate human resources.
- k) Brain Drain

7. PROSPECTS

- a) E-Learning provides us with the opportunity to access the most up to date information and/or technology worldwide which is not achieved through our traditional system.
- b) Development of Human Resource up to the global mark.
- c) Students' interest in global education has increased in last few years- many students from our country go abroad to take international standard education in various fields. They will be certainly benefited from such environments.
- d) Despite of the above-mentioned constraints, Bangladesh saw a huge boom in computer utilization in various fields.
- e) Sub marine Optical Fiber backbone network is expected to provide us with the necessary bandwidth in affordable cost to access E-Learning resources.
- f) Increased opportunity in getting Global jobs.

8. A SUITABLE FRAMEWORK

As most of the people of the Bangladesh have no or limited Internet access, to provide them with adequate online facilities we should establish computer and Internet centers. These Internet kiosks (sometimes known as cybercafés) can serve as the community Internet access center. These centers can be utilized as the E-Learning center too. Though this concept conflicts with the state of the art concept of E-Learning, in the context of Bangladesh, it is essential to spread the facilities to most of the people nationwide. Distance learning program conducted by Bangladesh Open University (BOU), whose target is to spread education nationwide, conducts the program by establishing their centers at schools in each upazilla. Village peoples are getting education from this successful program. This framework can closely follow the framework of E-Learning. Now the steps should be taken from the public and private sectors to establish Internet kiosks at each upazilla with enough infrastructural facilities (hardware, software, internet connection) to provide opportunity of E-Learning to the mass people.

To spread Internet to the rural areas, Grammen Communications (a well known NGO, ISP and mobile operator in Bangladesh) established three Internet kiosks at Modhupur, Sorisabari and Mirzapur under Dhaka division [6]. These kiosks are termed as “Polli Computer and Internet Kormosuchi” (Village Computer

and Internet Program (VCIP)). Local people get access to the Internet at affordable cost through these kiosks. In our suggested framework, people can access the E-Learning system through such kiosks.

9. CONCLUSION

Regardless of various constraints discussed in this paper we are highly optimistic about the spread of E-Learning throughout Bangladesh. E-Learning framework can also take the effective role in enhancing the current education system in Bangladesh. The ICT infrastructural status is adequately prepared to welcome the E-Learning. For spreading E-Learning all over the country the proposed framework can play a significant role. To get the most benefit from the E-Learning system the proposed framework should be carefully planned and uniformly distributed throughout the country. Organizations from both public and private sectors should take the necessary initiative as early as possible to get the complete benefits from the system.

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