

E-learning for Tertiary Level Education in Least Developed Countries: Implementation Obstacles and Way Outs for Bangladesh

Khaled Mahmud, *Member, IACSIT*

Abstract— Successful implementation of e-learning is dependent on successful delivery of contents, courses and training via electronic media including the Internet, intranets, extranets, satellite broadcast, audio/video tape, radio, interactive television, and compact disk read only memory. Weaker economy and absence of adequate infrastructure facilities are main obstacles of effective e-learning practices in least developed countries. As a member of least developed countries, Bangladesh has lots of challenges regarding e-learning. This study illustrates technological, psychological, socio-cultural and economic factors that would affect successful implementation of e-learning for higher education in Bangladesh. Unwillingness to change the learning atmosphere, poor level of competency in English, lack of funds and technical resources in universities, lack of confidence to practice computer applications coupled with absence of infrastructure such as electricity and telephone lines in many parts of the country are the most difficult issues to address. A five point scale to measure computer knowledge level and another five point scale to measure the e-learning knowledge for least developed countries are used in the study. The benefits and potentials of e-learning far outweigh its challenges. The paper concludes recommending some measures to resolve these issues by cohesively working together of the government and the private sectors.

Index Terms— E-learning, Least developed countries, Tertiary level education, Bangladesh.

I. INTRODUCTION

The rapid growth of Information Technology (IT) has made learning very quickly to happen. Keeping pace with this change requires new thinking about how we acquire knowledge and skills as well as how we develop learning resources. The advent of Information and Communication Technology (ICT) and the Internet has greatly influenced the way knowledge is conveyed. This has resulted in the development of e-learning.

E-learning or electronic learning has been defined in number of different ways in the literature. In general, e-learning is the expression broadly used to describe “instructional content or learning experience delivered or enabled by electronic technologies” [1]. Some definitions of e-learning are more restrictive than this one, for example, limiting e-learning to content delivery via the Internet [2]. The broader definition, which will be used for the purposes of this article, can include the use of the Internet,

intranets/extranets, audio- and videotape, satellite broadcast, interactive TV, and CD-ROM, not only for content delivery, but also for interaction among participants [3]. More recently, this definition can be further expanded to include mobile and wireless learning applications [4] [5].

In general, the content for e-learning is in the electronic form and is stored either in CD ROM or on the servers. Students access these contents directly from standalone computers or from the servers through the networked computers. The contents are usually developed to be engaging and interactive and the students are supported “virtually” by the instructors [6]. Currently, increasing number of universities and educational institutions are adopting e-learning to enhance the effectiveness of their operations. The concept of e-learning is expected to develop as technology advances.

Least developed countries (LDC) are suffering from low technological advancement due to their poor economic condition. They cannot even ensure basic education facilities. E-learning is luxury for them. Bangladesh is one of the LDCs in Asia [7] who is ranked 7th in the world population [8]. As a representative of least developed countries, Bangladesh also does not have enough technical capabilities and infrastructural facilities to implement e-learning. But it has started practicing e-learning within its limitation which can be example for the rest of the least developed countries. In this study we have focused on the main challenges to implement successful e-learning and how the obstacles can be overcome. We have limited our scope for tertiary level of education only. To implement e-learning successfully with the economic condition of LDCs, the first and easier step is to educate the students of higher levels. Then gradually it can be spread to the grass root level.

II. LITERATURE REVIEW

The extent of e-learning technology use in course delivery varies widely. The variations in the configuration of e-learning offerings can be described through a number of attributes, as listed in Table 1. These attributes can be classified into the dimensions of synchronicity, location, independence, and mode. An e-learning course component can be described by indicating which one of the two attribute values from each dimension is applicable. The definitions of these attributes are discussed in a variety of sources including [9] [10].

TABLE 1 DIMENSIONS OF E-LEARNING

Dimension	Attribute	Meaning	Example
Synchronicity	Asynchronous	content delivery occurs at a different time	lecture module delivered via email
	Synchronous	content delivery occurs at the same time	lecture delivery via web cast
Location	Same place	students use an application at the same physical location	using a GSS to solve a problem in a classroom
	Distributed	Students use an application at various physical locations	using a GSS to solve a problem from distributed locations
Independence	Individual	students work independently from one another to complete learning tasks	students complete e-learning modules autonomously
	Collaborative	students work collaboratively with one another to complete learning tasks	students participate in discussion forums to share ideas
Mode	Electronically only	all content is delivered via technology, there is no face-to-face component	an electronically enabled distance learning course
	Blended	e-learning is used to supplement traditional classroom learning	in class lectures are enhanced with hands on computer exercises

E-learning can be synchronous (real-time) or asynchronous (flex-time). Synchronous e-learning includes technology such as video conferencing and electronic white boards [11], requiring students to be present at the time of content delivery. Asynchronous applications include programmed instruction and tutorials that allow students to work through the screens at their own pace and at their own time. Most of the courses available on the Internet are based on this asynchronous model [9]. Students can be involved in e-learning from distributed locations, as in distance learning, or from the same place, such as using a group support system in a classroom to work on an assignment [12]. E-learning applications also differ in the levels of collaboration that they involve. Some courses are entirely independent and individual, while others incorporate some elements of group learning such as discussion forums or chat rooms. The mode of course delivery can be entirely electronic (with or without an instructor) or take a more blended approach integrating electronic and classroom delivery to varying extents. Many current e-learning offerings follow the latter mode, taking advantage of the benefits of various types of delivery [10].

The e-learning models of higher education today find their roots in conventional distance education. Initially introduced to allow individuals in remote and rural areas to gain access

to higher education, distance learning has evolved significantly over time. Technological advancement has been the major inspiration for change, beginning with the integration of radio broadcasting in the 1920's [13]. More recently, the advent of the Internet has enabled tremendous innovation in the delivery of post secondary education [14] [15]. As time goes by, more and more people gain access to the Internet, the cost of computer ownership decreases, and overall computer literacy increases [13]. These trends provide educational institutions an ideal channel for the delivery of educational content.

To implement e-learning successfully, technology and infrastructural facilities are must. But LDCs are very poor in this sector compared to developing and developed countries [16]. Figure 1 provides disaggregated picture, which compares the performance of LDCs, lower middle income groups and high income group countries with regard to a number of different indicators. The chart indicates that the LDCs have inadequate access not only to information and communication technology (ICT) infrastructure such as computers and the Internet, they also have low training facilities and low tertiary enrolment rate.

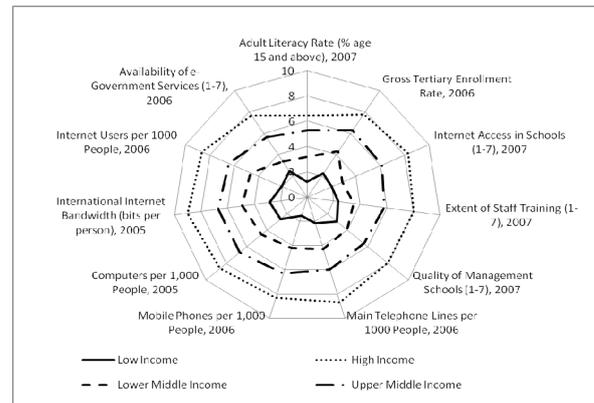


Figure 1. Comparative standings of LDCs to developing and developed countries

Due to low technological advancement, implementations of e-learning in tertiary level education in LDCs are facing lots of obstacles. The e-learning was first introduced in Bangladesh in 1956 by a radio-broadcasting program, and later expanded much by the establishment of Bangladesh Open University (BOU) in 1992. However, BOU is still using mostly traditional one-way media and far behind to use modern interactive Information Communication and Technology (ICT) in delivering its courses. Personal Computers gained popularity in the early 1990s when they became more user-friendly and affordable, but the real boost came in 1998 when the Government exempted computers and ICT accessories from taxes, a move that coincided with substantial price reductions in the global market. The consumption of ICT in Bangladesh is rapidly increasing both in public and private sectors [17].

III. RESEARCH METHOD

A. Study population

The population of the study is students of different universities.

B. Sample size

The sample size of the study was 213.

C. Sampling technique

Random sampling technique was used for sample collection.

D. Primary data

Primary data were collected randomly from 213 students from different public and private universities.

E. Secondary data

Secondary data were collected from books, newspapers, journals, annual reports, internet etc.

F. Data collection tool

Semi structured questionnaire.

IV. FINDINGS OF THE STUDY

The study found many challenges to implement e-learning in tertiary level education of Bangladesh. The challenges are discussed below:

A. Scarcity of ICT Resources and Institutional Infrastructure

There are many practical difficulties in implementing e-learning programs in universities due to lack of resources. Computers and Internet connectivity are the most important requirements for e-learning. Bangladesh, one of the 10 under developed countries of Asia has relatively lower personal computer owners. Not only that, Bangladesh also is suffering from lower training facilities, lower enrolment in tertiary level of education and lower internet usage but higher price basket for internet. Figure 2 shows the comparative standings of Bangladesh according to a number of different indicators.

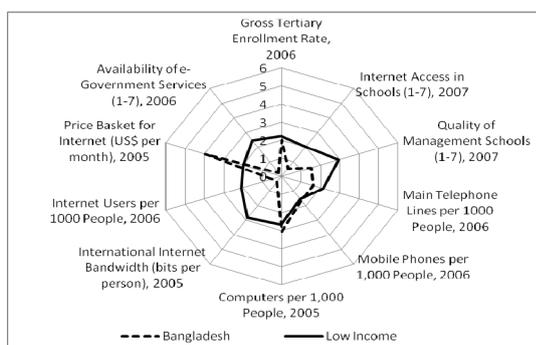


Figure 2. ICT standings of Bangladesh in comparison to LDCs

From the survey it is found that among the university students, 26% has a personal computer. Though the rate is significantly higher than the country average but still not satisfactory enough. Furthermore, especially in the humanities departments of most the universities have few computers for the teaching purpose and for students' use. Only one or two computers which they claim to have are used in clerical and other administrative works. Faculties of those departments mostly depend on their personal computers or do not use any. More or less in almost all the public and private universities have computer facilities for science and technology departments. But a big portion of them are out of

order or being installed with older and out of use version of software.

B. Internet Connectivity and Bandwidth Issue

Due to bandwidth and connectivity limitations, downloading the web contents of e-learning is slow in Bangladesh. This creates frustration and boredom among learners and affects the eases of learning. As per our survey, the average bandwidth experienced by the students is 5.6 Kbps. And the average Bandwidth do not vary much from different places (University, home or cyber cafe). Internet usage rate of Bangladesh is one of the lowest in the world. According to CIA world fact book only 0.31% of the total population used Internet in 2006. A linearly regressed line from the data of 1997 to 2006 estimates internet usage rate of 0.37% and 0.40% in 2008 and 2009 respectively. Figure 3 shows the trends of percentage of internet users over time in Bangladesh.

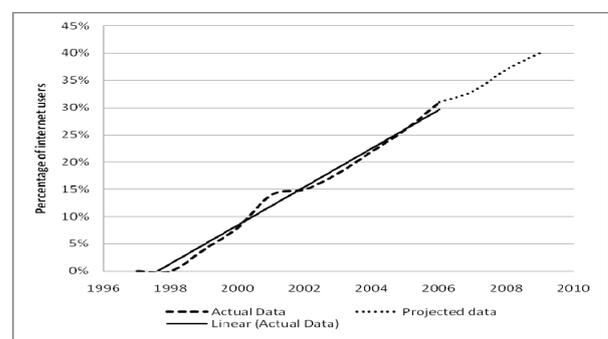


Figure 3. Percentage of Internet users in Bangladesh

This indicates that internet users in Bangladesh is increasing, but the rate is very slow. In the rank of internet use Bangladesh is 98th among the world, which is very alarming [18].

C. Difficulty in Engaging Learners Online

Engaging learners actively is one of the key factors in determining the success of an e-learning program. Online learning requires a very high degree of self-motivation which is found to be lacking among our learners. Due to unavailability of internet and low bandwidth very few are there who can use internet daily basis. So, it is very difficult to engage learners online. Our survey found that among the university students, 44% use Internet as a medium of communication, learning and other academic purposes though the usage rate, frequency and purpose vary greatly. Students use internet from various places. Figure 4 shows different places of using internet.

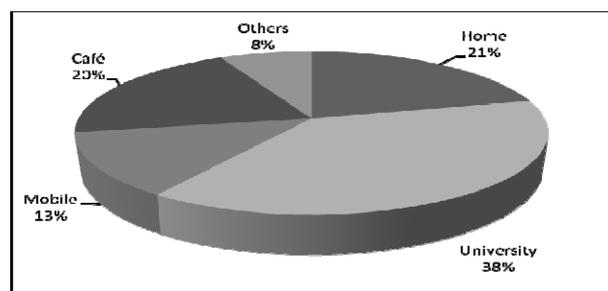
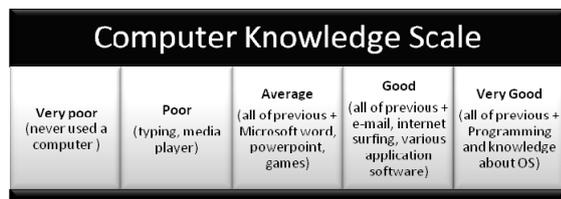


Figure 4. University students' source of using Internet

It is obvious that, students use internet mostly from their university. As most of the students do not have personal computers and internet usage price is relatively high though bandwidth is low, students are discouraged to use personal or dedicated internet line. Beside home, they go to cybercafé and use their mobile phone for internet. They also use internet line of their friends or relatives occasionally.

D. Lack of Confidence in Using Computers

Most students in Bangladesh currently are not quite familiar of utilizing all resources available on the web based packages. Students tend to focus on the use of the web-based package as an aid of collection of data and information. The most students use internet to search the material presented in lectures. It is just another form of using ICT. This is simply because students are not familiar with the more interactive ways of web skills. To find out the computer knowledge level of university students in Bangladesh, a five level computer knowledge scale (CKS) is used. This scale is proposed and developed by the authors to find out the computer knowledge level of LDCs. The meaning of each level of the scale is given below:



According to the knowledge scale the study has found the graph in figure 5 which depicts the level of computer knowledge of respondents (university students of Bangladesh).

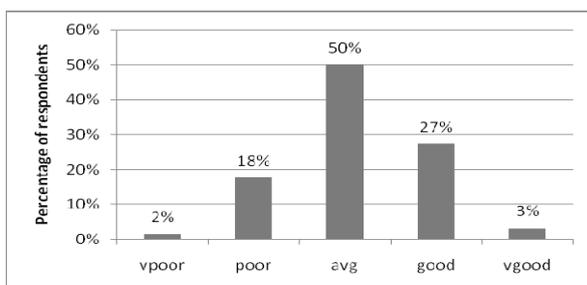


Figure 5. Level of confidence in using computers

From figure 5 it is clear that most (50%) of the students are familiar using basic computer usage, while moderate number (27%) of the students are familiar with frequent internet use. To successfully implement e-learning, good computer knowledge is very essential.

E. Poor Competencies in English

Bangladesh commonly uses their native languages and the use of English among the public is remarkably low. Most of the documents for e-learning are written in English. On the other hand there are very few experts who can translate those materials into their native languages efficiently and effectively. This is a main reason for students to oppose new technology-based education in LDCs. It is observed that most of the university students feel difficulties in reading English

documents. It is noted that there are considerable number of teachers whose proficiency in English is not sufficient for preparing e-learning teaching materials in English. The teaching materials prepared by teachers with poor English make disastrous effects on the students in the long period.

F. Lack of Awareness

Generally there is still a lack of awareness amongst the students and faculty members. Many parents also feel the traditional learning mode is better. Very few people are apt to try new things while they are getting good level of output from the older ones. To get the level of awareness of e-learning among Bangladeshi university students, a 5 level e-learning knowledge scale is developed and used. The scale is given below:



According to the survey, most of the respondents fall in the group of poor knowledge in e-learning. Figure 6 shows the knowledge level about e-learning among respondents of the survey.

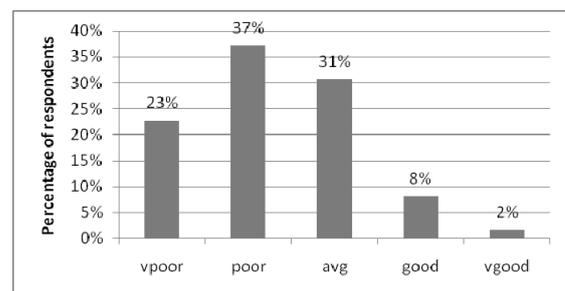


Figure 6. Percentage of knowledge level of e-learning

Figure 6 shows that more than 60 percentages of the students are not that much familiar with e-learning. They also use less media of learning. In Bangladesh still the traditional way of learning is dominating. The lack of awareness of e-learning is one of the obvious obstacles in Bangladesh.

G. Unwillingness to Change Learning Environment

The changing of the learning environments has faced the resistance by students and teachers. To address this issue, several writers have stressed the need to examine educational resources during their design phase by usability testing. The main objective of this type of learning is to create good communication among students and teachers. The secondary objective is to empower the student to take charge of learning and make appropriate decisions. Therefore, to overcome this problem, loads from the teachers should be removed by supplying e-learning materials to them directly. The results of the questionnaire survey about the willingness of changing the learning atmosphere with technology reveal that 69% of the respondents are unwilling to change their learning atmosphere with technology. They prefer traditional method of learning

with pen and paper.

H. *Ethically Harmful Internet Contents*

Some parents fear that students might access to adults' materials, once they are exposed to the internet. Parents believe that this might affect children's healthy growth both mentality and physically. Exposure to pornography is likely to affect their moral life. According to the survey, 75% of the respondents think that there should have proper control on the web so that students do not get access to ethically harmful websites in the name of e-learning. In universities there is some control over the browsing of websites. But people think that there should be a single authority all over the country to maintain all the rules and regulation of using internet for learning.

I. *Load Shedding of Electricity*

Bangladesh is facing huge load shedding of electricity. Almost all parts of the country are suffering load shedding of electricity everyday at least four to five hours. Every summer Bangladesh face huge load shedding problem. According to the official statistics, the country's electricity shortage gone up 1000 megawatts (MW) to 1259 MW with the demand of 4806 MW on 2006 [19]. Authority said in 2009 about 1400 MW to 1800 MW electricity shortage will be faced, which is almost twice more than last year and the country need about 5000 MW. In Bangladesh electricity power is not generated as much as our demand. So, using technology heavily in such condition is really a problem which implies that successful implementation of electronic learning despite of electricity failure would be a real challenge here.

J. *Lack of Training Facilities*

In Bangladesh, there are no special e-learning training facilities in different Teachers' Training Institutes. All the stuffs are developed or used are done by personal level of expertise. Very few are following standards at the time of preparing learning materials like power point slides or web pages. Lack of proper guidance and training in these low economic countries are also a very important issue to be addressed.

K. *Software Piracy Problem*

Bangladesh has a piracy rate of 92% [20], is the largest user of pirated softwares in the Asia-Pacific and fourth largest in the world. Considering the facts that almost all the softwares that are used in computers, from the operating system to the games that are used on computers, are pirated in one form of another. To implement e-learning successfully with all legal software and documents, the contents should be cheaper. Otherwise, it will not be possible for LDCs to buy and develop the learning stuffs. The high price of the softwares, inspiring piracy, is also a challenge for Bangladesh to successfully implement e-learning.

V. CONCLUSION

The study found several major reasons for the resistance. Unwillingness to change the learning atmosphere, lack of motivation to learn the new technology, coupled with the very conservative anti-technology attitudes and lack of

confidence to practice computer applications are the most difficult issues to address. The loss of student-teacher interaction and the loss of on campus living opportunity also contribute to the resistance against e-learning. Poor level of competency among students and teachers in the English language is another factor that contributes to the unreceptive attitude. Financial difficulties faced by parents, absence of infrastructure such as electricity and telephone lines in many parts of the country, and lack of funds and other resources at universities to improve their computer laboratories are also major impediments to the introduction of the new technology that requires a substantial capital investment.

According to the study, it is necessary to take initiatives to overcome problems related to technological, psychological, socio-cultural and economic factors that would affect commencement of e-learning in Bangladesh. Any attempt to introduce the e-learning technologies without paying adequate attention to these issues mentioned above will not bring anticipated results.

VI. RECOMMENDATION

The benefits and potentials of e-learning far outweigh its challenges. Thus, it is imperative that institutions and government come together to resolve the issues discussed above. Some of the recommendations that can be adopted are listed below:

A. *Improving Accessibility and Connectivity*

Accessibility and connectivity needs to be further improved. This can be achieved through the upgrading of technological infrastructure as well as the lowering of the internet usage fees to a more affordable level.

B. *Introducing Cheap Computers*

Improvement of infra structure of ICT and introduction of schemes to buy computers at affordable price should be prerequisite for e-learning. It would be blessing if students can get computers less than 200 USD. It is also expected that government would take proper initiatives in developing second hand computer markets.

C. *Introducing National E-content Development Center*

In view of the limited expertise as well as the high cost of developing content, it is proposed that an initiative be taken by the Bangladesh government to set up a national content development center. This center can serve to coordinate content development in the country, act as a repository for quality e-contents, train and develop e-content experts, develop and monitor e-content standards and promote knowledge sharing among e-learning providers.

D. *Establishment of National E-learning Council*

In order to ensure the success of e-learning in Bangladesh, a national e- learning council needs to be set up to champion e-learning. The council should be headed by the Minister of Education. The role of the Council is to develop policies and standard for e-learning initiatives, create awareness of e-learning, promote e-learning, monitor e-learning practices, initiate research in e-learning and promote international collaborations in e-learning.

E. Combined Approach in E-learning

We are in the introduction period of e-learning mode. So a combined approach should be adopted. The combined approach means creation of a learning environment that combines several different delivery methods such as face-to-face interactions, self-paced and individualized learning and online interactions. This has proven to be a successful delivery mode as can be seen by its popularity among our learners.

F. Mobile Learning Initiatives

Realizing the widespread use of mobile devices in Bangladesh, one of the ways to accelerate the acceptance of e-learning is to influence on the use of mobile technology that will ease mobile learning. Mobile learning will also help overcome the problem of accessibility and connectivity.

G. Training Programs

In order to address the issue of lack of motivation, it is suggested that schools and universities should take steps to impose computer literacy among all teachers and students prior to introducing e-learning. This should be done in a systematic manner through in-house workshops and training programs. Introduction of an incentive system for acquiring computer literacy may speed-up the process of introducing e-learning.

H. Level of English Proficiency of Teachers

The universities should take measures to improve the proficiency in English of teachers. It is recommended to develop course materials and relevant educational programs. If possible, these teaching materials should be delivered in the e-learning mode. It also needed to train technical writers. Steps should also be taken to improve the English proficiency of the students too.

I. Remove Anti Technology Attitudes

Therefore, technology-related activities should be made in an integral part of higher education, which provides opportunities for students to interact with resources that they might use later. Teachers must try to combine traditional instruction with the ICT-based education so that students view technology with a more positive attitude.

J. Increasing Interactive Education

The feedback from students should be continually being taken into account while designing and implementing the ICT-based education, which results in students' better appreciation of the purpose of introducing ICT into education. It is quite important to know that the adult learners are mostly benefited from the ICT because the e-learning system ensures the equity of learning opportunities must be made to produce student oriented and teacher-supported collaborative learning environments.

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Khaled Mahmud was born in Pabna, Bangladesh in November 18, 1984. He received his B.Sc in Computer Science and Engineering from Bangladesh University of Engineering and Technology. He is now working as a senior lecturer in the University of Information Technology & Sciences, Bangladesh. His international papers on education, telecommunication, governance and image processing have been published in different countries like USA, Malaysia, South Korea and Thailand. His research interests include technology, development and social issues. He is a member of IACSIT since 2008. He is also a member of Open Source Network, Bangladesh. He is working as the President of Student Leadership Program of Development Policy and Research Center. He is also working with International Research Center, situated in Paris, as a United Nations volunteer.