

# E-LEARNING IN BANGLADESH: IMPLEMENTATION AND EVALUATION OF A PILOT PROJECT

Alam, M.J.B.I , Kabir, S.M.LI and Elizabeth, H.2  
1Bangladesh University of Engg. & Tech. (BUET), Dhaka-1000, Bangladesh  
2University of Alberta, Edmonton, Alberta, Canada  
E-mail: jobair@ce.buet.ac.bd

## ABSTRACT

This article reports on e-learning initiative at Bangladesh University of Engineering and Technology (BUET). In the context of a developing country like Bangladesh, the process of design and implementation of e-learning framework required to be accommodated satisfying a number of constraints. This paper describes the constraints and design framework to overcome those obstacles. It also presents an evaluation of the pilot project and future plans in this regard.

## 1. INTRODUCTION

In the field of education the last decade is characterized by a growing interest in e-learning with a recognizable trend of enhanced application of e-learning technologies. The process has been expedited by ever increasing scarcity of trainers, escalation of cost of education and rapid growth of technology. Particularly the growth of computer and Internet technology has enabled e-learning to evolve into a feasible alternative learning paradigm. Commensurate with the evolution, concepts like Virtual Universities and Twenty-Four Hour learning have become reality [1, 2].

E-learning has a very distinct role to play in the context of scarcity of resources in developing countries. The most significant limitation of educational framework in these countries is the dearth of educational institution and qualified trainers for higher studies. There exist only few institutions facilitating continuing education for the professionals. But, the need for such facilities for professional development of the technologists is well recognized. Its demand is further enhanced by rapid evolution of technology and role of the technologists in economic development of the country. Despite having the potential to contribute in the educational advancement of developing countries, e-learning needs to be designed carefully to overcome the technological and infrastructural limitations.

This article describes the process of implementation of e-learning framework in Bangladesh and evaluates the performance of the pilot project.

## 2. E-LEARNING NEED ASSESSMENT

In developing countries like Bangladesh facilities for need specific training, repository for commensurate resource materials and qualified trainers for providing such training is extremely scarce. This is particularly true for the technologists where continuity of education is vitally important with the dynamic and rapid evolution of technologies.

Development of E-learning/Distance Learning facilities is commensurate with the capacity building and modernization process of Bangladesh University of Engineering and Technology (BUET) and congruent with the long term objective of the institution regarding facilitation of continuing education satisfying the temporal and spatial constraints. E-learning is expected to facilitate the following.

- a) Enable dissemination of expertise and state of the art knowledge to the field level technologists in an efficient and cost effective way.
- b) Facilitate continuing education for the technologists, researchers and academicians at a very low cost through arrangement of advanced lectures provided by the international experts.

Here it is worthy to mention that e-learning/distance learning is not supplementary to conventional learning methodology rather complementary to the conventional system. In fact it facilitates continuity of marginal development in professional technical expertise in the most cost-effective manner.

BUET's effort towards the development of e-learning/Distance Learning facilities is congruent with the global trend in advanced education. Considering the future demand, BUET is emphasizing on the development of such facilities. In this regard the institution pursues a long run objective of facilitating continuing education to technologists of the country as well as enhancing learning scopes for its academicians.

Although with the technological innovations and increased availability of resources the popularity of e-learning has been increasing in the developed countries, it is still widely used as a complementary tool for teaching purpose. In fact technology assisted e-learning is used to enhance the scope of students to learn more, get access to the resources whenever possible and required, and use technology for understanding the mechanism of the problem more comprehensively.

BUET recognized the importance of continuing education and about ten years ago started delivering Professional Development (PD) courses through the Directorate of Continuing Education (DCE). E-learning is considered as a delivery method as the participants are having problems coming to campus and for many potential candidates participation in the program is not feasible because: 1) it is inconvenient to stay away from home, 2) accommodations are expensive, and 3) it is difficult or impossible to be away from work. Despite the above constraints, demand has been quite high for PD courses and DCE has evolved into a self sustained organization. Realizing the potential of e-learning in this connection the University of Alberta and Canadian International Development Agency (CIDA) extended their cooperation providing technical and logistic support to develop the required framework.

In the initial stage the application of e-learning at BUET is focused on Professional Development program and is intended for facilitating continuing education of the technologists. In order to facilitate a gradual transition from conventional classroom-based learning framework to e-learning without compromising the quality of education provided by close classroom interaction it is required to design a hybrid mechanism for teaching and learning which is pursued by many academic and training institutions in the developed countries[3].

### 3. DESIGN OF E-LEARNING FRAMEWORK

The overall system of e-learning to be designed for BUET involves the university at the core of the program. As the provider BUET is expected to facilitate continuing education through professional development programs for the local engineers and technologists. On the other hand, utilizing facilities like video and IP conferencing, BUET will arrange for participation of the academicians, resource persons and policy makers in professional development programs offered by other internationally renowned institutions. The system overview, depicted in Figure 1, presents a comprehensive framework with a long term objective of developing a sustainable e-learning institution. The system is designed in a modular and structured way so as to enable phase wise development.

#### 3.1. Components of the System

The system comprises of two major components which are described below. In the first component, BUET will function as the facilitator of e-learning for the local participants. In the other component BUET will act as the beneficiary of the e-learning services offered by different international agencies and universities.

**BUET as the provider:** In this component BUET will facilitate offering professional development programs for the practicing engineers, technologists and public and private sector officials working in the relevant fields. Considering the technical limitations (on-line access to web and other relevant facilities), it is envisaged that e-learning based on alternate technologies may be used to optimize the effectiveness. Internet facilities through web sites, mailing lists and discussion boards can be utilized whenever possible.

**BUET as the recipient:** In this role BUET will arrange the logistics to receive advanced courses for the

policy makers, academicians and researchers offered by the experts working in organizations like World Bank, CIDA, ADB and universities. It will fulfill the need for advanced training for the academicians to develop the course materials for the professional development programs. It will be facilitated through video conferencing and online communication using broadband Internet facilities.

### 3.2. System Architecture

System architecture consists of the technical aspects on both upstream and down-stream ends of the e-learning facilities to be developed. On the upstream side video and ip conferencing can be used through global e-learning network. On the down stream side multimedia CD, web, e-mail and discussion board based systems seem to be most suitable which are shown in Figure 2.

Considering the factors which include unavailability of on-line Internet facilities to the learners living in the remote areas of the country, low (limited) bandwidth availability in general, high cost of establishment and online usage, and limited knowledge of the learners regarding computer operations, the system is designed in hybrid fashion incorporating online facilities such as web, chat and e-mail as well as offline facilities such as CD. In this connection it should be mentioned that CDs are not merely electronic conversion of course contents. Rather these texts will be a combination of hypertext, images, audio, video, animation etc. This will enable efficient learning of the participants in the program through providing an interactive, interesting and modern alternative learning framework [3 and 4].

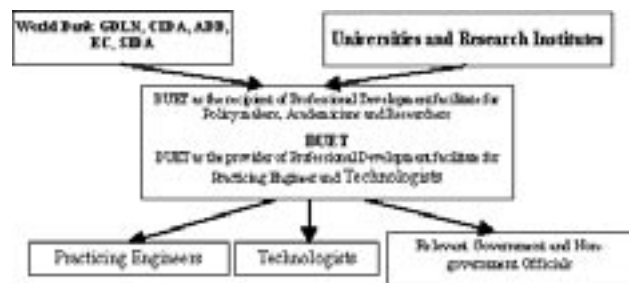


Figure 1: E-Learning Framework for BUET

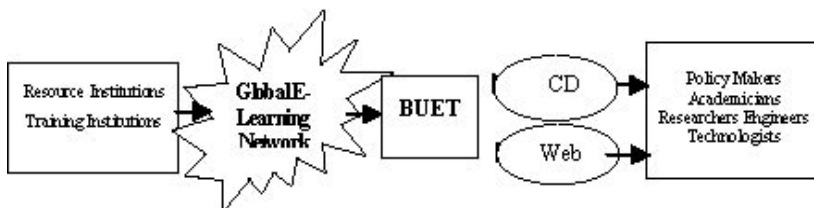


Figure 2: System Architecture for E-Learning Facilities

The expansion of the facilities to regional centers which include Institute of Engineers, Bangladesh and regional universities are also considered in long-term plan.

## 4. IMPLEMENTATION PROCESS

Following the framework proposed by Slay (1997), Rossiter (2002) and Allen (2003), the implementation process was designed [5, 6, and 7]. Particular attention was given to instructional design, display and communication and interaction issues [8, 9 and 10]. The steps followed in this regard are described below.

### 4.1. Needs Assessment

In April 2002 the need for e-learning was assessed through a set of workshops with employers and potential participants. The need for professional development for graduates due to rapid changes in technology was well recognized by both the employers and employees. But the employers were reluctant to relinquish employees for a long period of time. Participants welcomed the concept of e-learning, where participants could learn at their own time staying within their own premises.

Despite approving e-learning as a very suitable approach for learning, the participants identified the following relevant issues which needed to be considered carefully while designing the framework.

- Unavailability of online facilities in workplace.
- Inadequate skill to use computer
- Low bandwidth and limited facilities (only e-mail in most of the cases).
- Arrangement of workshops to facilitate experiments and hands-on training essential for technical education.

Needs assessment program also concentrated on identification of possible courses to be delivered through e-learning framework. Consequently, the following two courses were identified to be the most demanding topic in contemporary context of the country.

- Energy Sector Technology and Policy Overview
- Contract Management

In the Professional Development Needs Assessment workshop a few other courses were also identified which include environmental management, mineral resources exploration technology and air pollution.

### 4.2. Planning, Design and Implementation

University of Alberta (UoA), Canada, with financial assistance from CIDA, delivered technical training to four BUET faculty members (two e-learning specialists and two content developers) at the Center for Advanced Technological Learning (ATL) in UoA. In addition to technical aspects the training program also concentrated on alternate ways of delivering courses, overall program design, marketing and promotional issues, and sustainability aspects. CIDA also provided necessary financial assistance to develop an e-learning laboratory in Institute of Information and Communication Technology (BUET). Experts from the Center of Advanced Technological Learning (ATL), UoA regularly monitored the development and operational process of the program.

BUET designed a program based on the results of the needs assessments and satisfying the local constraints. The course design included the following components:

- The program would accept participants with minimum computer skill.
- Online components would be applied in limited extent due to inadequate accessibility.
- Course material would be presented on CD and used for self-study.
- E-mail would be used for disseminating information about the course, assignment, course upgrades. It would be mandatory for all participants to have an e-mail address.
- All materials and information would be available online (Website) as well as on CD.
- Discussion boards would be available for student communication.
- Facilities for communication with the instructors would be available and especial attention would be provided to ensure interaction and communication.

The e-learning staff and programmers at BUET developed the course framework and materials with assistance from experts of the University of Alberta. At the same time the instructors worked on the content development following the conventional approach for e-learning course development, as summarized by Allen

(2003) and Morrison et al. (2004) [7 and 10]. Following strategies proposed by Chiu and Hsu (2004) special attention was provided for devising active cooperative learning framework [11]. Also, as suggested by Lee and Dziuban (2002), particular emphasis was provided for quality assurance strategies [12].

BUET started advertising the two PD courses at the beginning of July 2004. Registration took place the third week of July and initially approximately 40 participants registered for each course.

A workshop was arranged to introduce the course to the participants. Course materials were also distributed to experts/professors in the field who were requested to provide their feedback on different aspects during a two day workshop held at BUET. During the first day, experts provided feedback on the content and presentation of the course materials. An orientation meeting with participants took place on the second day. The goal was to demonstrate how to participate in the program and to outline the skills required.

The courses continued for four months. Regular assignments were posted accordingly and email communications among the students and instructors were maintained regularly. Despite whole hearted effort about forty percent of registered participants dropped out of the program.

### 4.3. Program Evaluation

Effectiveness of the program may be assessed through the evaluation of the participants, effect on other programs and interest from stakeholders. Following section presents an evaluation of e-learning initiative at BUET from the above mentioned perspectives.

In general the participants were satisfied with the quality of the materials, teacher student interaction and course deliberation techniques. The potential areas of improving the course, as identified by the participants, include the following:

- More diagrams and pictures should be provided.
- Prompt response should be ensured.
- More interaction and interactive activities should be incorporated through simulation and case studies.

Successful implementation of e-learning facilities at BUET has a long term effect on educational paradigm of the institution. Different international agencies have shown keen interest for further development of the program. School on Internet (SOI), sponsored by Japan Advanced Institute of Science and Technology, Japan, has selected BUET for arranging on-line courses and facilitated necessary logistics in this regard. The university has also been selected for developing e-learning courses on programming language for a project involving Asian and European universities sponsored by European Union.

## 5. LIMITATIONS OF THE INITIATIVE

Although the pilot project has been designed for the professional development program targeting the technologists, it has been envisaged with a long term aim of having a broader audience. In this regard it is worthy to recognize the limitations of the program and design specific processes to overcome the problems in the future. In developing countries like Bangladesh, infrastructural limitations are required to be considered carefully which include lack of computers, technical assistance for maintenance and availability of electricity. In this regard it is worthy to supplement the course materials with hard copies. Such initiative will also assist in making the program more practical as it is usually suggested that reading of printed materials is easier than the same for the electronic documents.

Particular attention should be provided in instructional design while developing the course materials. Course materials should be developed focusing on active case-based learning paradigm. Regular interaction with the participants should be made mandatory on part of the facilitators. In order to provide better interaction regular workshops can be arranged. Incorporation of experimental and training sessions may be very effective for learning in professional courses.

## 6. CURRENT DEVELOPMENTS

Based on the experience of pilot project the e-Learning initiative has recently been extended by offering the facilities to the students and faculties of BUET. With the assistance from European Union and Japanese Government, BUET has become active partner in the global e-Learning program through CodeWitz and School on Internet (SOI) Projects. In CodeWitz project, with partnership of Tampere Polytechnic of Finland, modules for learning computer programming are being developed. In SOI project wide variety of on-line courses are offered from renowned institutions with an objective of local capacity building.

## 7. CONCLUSION

E-Learning has become a feasible tool for facilitating education for a wide spectrum of participants using a variety of technologies. Despite technological limitations, e-learning might be successfully implemented in developing countries like Bangladesh and possesses the capabilities for overcoming many problems associated with traditional classroom based learning framework. This paper described the process of successful implementation of e-learning program in Bangladesh.

Considering the rapid expansion of the usage of mobile communication devices in the country, development of technology and reduction in cost, well designed e-learning framework is expected to contribute significantly in educational development and thereby having a long term effect on poverty alleviation.

The initiative can further be enhanced by exploring newer technologies like m-learning to be incorporated into the program. Research should also focus on improving interactivity in the course materials.

## REFERENCES

- [1] Cornford, J, "The virtual University is... the university made concrete?" *Information, Communication and Society*, 3(4), 2000, pp. 508-525.
- [2] Daniel, J.S., *Mega-universities and knowledge media: Technology strategies for higher education*. Kogan Page, London, 1998.
- [3] Naidu, S. and Oliver, M., "Computer Oriented Collaborative Problem Based Learning: An Instructional Design Architecture for Virtual Learning in Nursing Education", *Journal of Distance Education*, Vol. XI, No.2, 1996.
- [4] Mohler, J.L., "Desktop Virtual Reality for Enhancement of Visualization Skill", *Journal of Educational Multimedia and Hypermedia* Vol. 9, No. 2, 2000, pp. 151-165.
- [5] Slay, J., "The Use of the Internet in Creating an Effective Learning Environment", *AusWeb97 Third Australian World Wide Web Conference*, Southern Cross University, Australia, 1997.
- [6] Rossiter, J., "Towards a Pan-Canadian E-Learning Strategy", *Proceedings of International Conference on Hybrid Learning*, Edmonton, Canada, 2002.
- [7] Allen, M.W., *Guide to E-Learning*, John Wiley and Sons Inc., USA, 2003.
- [8] Fleming, M.L., "Display and Communication", Chapter 9, In Gagne, R.M. (ed). *Instructional Technology Foundations*. Hillsdale, NJ: Lawrence Erlbaum, 1987.
- [9] Ely, D.P., "Emerging Paradigms in Diffusion and Implementation". In C.R. Dills and A.J. Romiszowski (eds.) *Instruction Development Paradigms*, Englewood Cliffs, N.J.: Educational Technology Publications, 1997, pp. 155-161.
- [10] Morrison, G.R., Ross, S.M. and Kemp, J.E., *Designing Effective Instruction*, John Wiley and Sons Inc., USA, 2004.
- [11] Chiu, C.H. and Hsu, C.C., "A Framework for Computer System to Support Distributed Cooperative Learning" *Association for the Advancement of Computing In Education*, 12(1), 2004, 9-26.
- [12] Lee, J., and Dziuban, C., "Using quality assurance strategies for online programs" *Educational Technology Review*, 10(2), 2002, 69-78.