

PROSPECTS AND CHALLENGES OF INTERNET BASED EDUCATION AND RESEARCH

Md. Saiful Islam

Institute of Information and Communication Technology
BUET, Dhaka-1000, Bangladesh
E-mail: mdsaifulislam@iict.buet.ac.bd

ABSTRACT

Internet based education is a form of distance education in which the course contents are delivered and the interactions are provided by the technologies and methodologies of the Internet. It may occur in places where there is none, extends resources where there are few, expands the learning day and opens the learning place. It is possible to connect people, communities and resources to support learning. It is a media rich online environment that allows people to interact with teachers and students multiple paths for understanding. Moreover, the independent time and distance of the internet allows learners to enrol in a course/ training or collaborate in a project from anywhere in the world at any time. In this paper an attempt is made to explore the prospects of different kinds of Internet based education and to identify the key barriers that are preventing the Internet from realizing its potential for enhanced learning.

1. INTRODUCTION

Prior to 1983, before computers became available Instructor Lead Training (ILT) was the most common form of Tutoring. ILT allowed students out of the office and into a training environment where students could interact with their tutors. However ILT usually meant high costs and office downtime with workers offsite. During 1984-1993, the entry of computers into the mainstream market place encouraged the development of more powerful and complex computer operating systems. Software like PowerPoint and HyperCard began to appear bringing with it more flexible data presented in a more appealing way and most importantly, more portable. Computer Based Training (CBT) was born [1,2]. As CD-ROMs began to appear in desktop machines, companies began to look into and invest in, CBT to train staff while they were still at their

desks. The benefits were the lack of office downtime and an anytime, anywhere training philosophy. As the World Wide Web (WWW) evolved, the first wave of Internet based education began in 1994. It is perhaps the most transformative technology in history, reshaping business, media, entertainment and society in astonishing ways. The advent of E-mail web browsers, HTML, media players and simple JAVA began to change the face of training and learning in the internet [2].

Today Internet is a tool that empowers society to school the illiterate, bring job training to the unskilled, open a universe of wondrous images and knowledge to all students and enrich the understanding of the lifelong learners. Internet based education is just the beginning, with something of far greater promise emerging in the middle distance. Yet technology, even in its current stage of development, can already allow us to realistically dream of achieving age old goals in education:

- To center learning around the student instead of the classroom
- To focus on the strength and need of individual learners
- To make lifelong learning a reality

Internet based education is made up of several methods of learning, which are enhanced or facilitated by technology. Online learning or Web based education is likely to be the fastest-growing method for delivering education and training in the coming days.

2. TYPES OF INTERNET BASED EDUCATION

The impact of new technologies on society and their corresponding influences on education systems has stimulated interest in studies which reveal interesting and effective practice incorporating

computer based techniques and research. Developments in multimedia materials, in networking that encourages and supports collaboration within the teaching/learning process and in software tools that enables students to become knowledge authors not only improve instruction, but can take on innovative roles that have the potential to educational practice.

In conventional system of education, the communication between learner and teacher is always synchronous --- in real time. But in Internet environment the communication may occur synchronously or asynchronously [4]. The asynchronous feature of Web based education is an important fundamental parameter and thus it is learning opportunity for anyone, anywhere, anytime. Internet based education can classified into the following categories:

1. Interactive tutorials
2. Virtual classroom
3. Collaborative project based education
4. Event based education and
5. Correspondence courses

2.1 INTERACTIVE TUTORIALS

With the emergence of the WWW, including tools such as forms, it is possible to implement interactive multiple-choice tutorials and tests via the Internet, building on the model of computer-assisted instruction. These tutorials and tests can be scored electronically. This type of application requires elaborate and rigorous design efforts up front, but may offer something that can be used repeatedly or revised fairly and easily from one semester to the next so that it offers great value and versatility for some types of educational applications. This offers the advantages of asynchronicity: students can work at any time of day or night from anywhere in the world.

We can expect to see this kind of application become increasingly sophisticated. For example, Internet market researchers and advertisers are developing interactive audience research tools on the World Wide Web that can perhaps --- with great care --- be adapted to education. With these tools, it may eventually be possible to gather and analyse data on student research and data gathering strategies on the World Wide Web.

This is a very important trend --- customizing information services and advertising to the individual user. It may have important implications for Internet based education and training: educators

can develop and build upon interactive student profiles that serve as a basis for understanding individual student needs and performance.

2.2 VIRTUAL CLASSROOM

The virtual classroom is a class that meets via the Internet using *groupware* and/or *listservs* as well as electronic mail and the WWW. Groupware is primarily asynchronous medium. The listserv is asynchronous. However, some groupware features, such as electronic mail, can be used as an asynchronous medium. A third type of technology - multi-user environments - can also be used to implement the virtual classroom.

2.2.1 Groupware

Groupware, also know as computer-supported cooperative work (CSCW) can link people on different computers using the same software program (such as Lotus Notes) to perform a variety of functions. Groupware provides a collaborative computing system featuring networking, communications, concurrent processing (working on the same document or chart simultaneously) and windowing environments (i.e., multiple windows on the screen simultaneously, including text, video and graphics windows).

Different groupware systems emphasize different features. Increasingly, groupware capabilities are available on the WWW. For example, software such as CU SEE ME makes it possible for desktop videoconferencing. Groupware systems, developed initially for use in business, have been used very successfully for implementing distance education. New York University uses Lotus Notes to implement distance education and at the Rensselaer Polytechnic University a groupware type program -- - BBN/Slate --- has been used, with exciting results, to teach physics.

2.2.2 Listserv

The listserv offers another approach to implementing the virtual classroom, centered on electronic text. The listserv can be supplemented by electronic mail, the WWW, and the telephone--- as well as the other tools in a panoply of exciting new software and hardware tools that are becoming a part of the rapidly evolving WWW --- audio, multimedia, 3D models, form-based surveys, videoconferencing, etc.

2.2.3 Multi-User Environments

Related to the listserv is a third possibility: the virtual classroom in a MUD (Multi-User Domain) or MOO (Multi-User Object-Oriented Environment) setting. This is real-time text-based communication; it's similar to Internet Relay Chat, except that it takes place in an imaginative context described via text and participants are usually playing some sort of role. Howard Rheingold (1993) explains that MUDs are "imaginary worlds in computer databases where people use words and programming languages to improvise melodramas, build worlds and all the objects in them, solve puzzles, invent amusements and tools, compete for prestige and power, gain wisdom, seek revenge, indulge greed and lust and violent impulses."

2.3 COLLABORATIVE PROJECT BASED EDUCATION

Internet based collaborative projects (ICP) use Internet technology to develop and implement shared ideas. ICP allow students and teachers the opportunity and power to exchange ideas, opinions, research, experience, data, expertise, artwork and multimedia presentations on any given theme or topic. Students and teachers are able to share these with a wide range of individuals of different ages, backgrounds, cultures and regions. Through involvement in ICP, students may be involved in exploring, observing, recording, constructing, problem solving, sharing, discussing, hypothesising, predicting, co-operating and understanding. Behind such online collaborations many valuable skills and understandings are developed and it is at the classroom level where most of the work is undertaken by both the students and the teacher. Students and teachers can identify a topic and then collaborate with others to share and extend information. Both the process and the product are personally relevant. It also means that projects can be more diverse. People can contribute local information to a national (or global) topic or can use diverse perspectives in developing understanding of a topic. Increasingly this type of project is being implemented in traditional face-to-face classes; it offers great potential for Internet-based education. A wealth of student projects from students of all ages can be viewed on the WWW [7, 8, 9]. These projects vary in quality but they point the way to exciting potential in distance education.

Involvement in Internet based collaborative projects are a great form of professional development for teachers. Participation in projects not only requires the use and development of certain technology skills such as the use of email and the WWW, but also requires the teacher to reflect on classroom management, teaching strategies and learning styles. Projects tend to be ongoing and hence provide substantial and meaningful professional development. In regards to the development of technology based skills, teachers tend to acquire these when they need them - in other words, just in time learning, which is for a very real need and purpose. Involvement in ICP ensures that the teacher considers and reflects on the changes that occur at the classroom level. This is an area which is often neglected in technology based professional development. When teachers address the issues of classroom management and teaching and learning issues, the professional development is much more likely to have an effect on student learning outcomes.

2.4 EVENT-BASED EDUCATION

The Internet offers people the opportunity to link together across great distances to share in a common experience via the desktop computer. This includes *cyber-events* --- interviews on-line with celebrities, concerts accessed via CU SEE ME --- videoconferencing via the WWW, and telepresence science field trips such as the Jason Project and NASA's TROV Project. In the Jason Project, children at different sites across the U.S. have the opportunity to teleoperate the unmanned submarine Jason, the namesake for this innovative science education project directed by Robert Ballard, a scientist at the Woods Hole Oceanographic Institute (EDS, 1991; Ulman, 1993; McLellan, 1994). Similar to this, NASA has implemented an educational program in conjunction with the Telepresence-controlled Remotely Operated Underwater Vehicle (TROV) that has been deployed to Antarctica (Stoker, 1994). By means of a distributed computer control architecture developed at NASA, school children in classrooms across the U.S. can take turns driving the TROV in Antarctica. Event-based educations are very high tech, very elaborately coordinated. But as the capabilities of the Internet evolve, this kind of Internet-based education will expand and flourish.

2.5 CORRESPONDENCE COURSES

This time-honoured approach to distance education has new potential with the Internet. Course materials such as the syllabus can be posted on the WWW and students, working individually, can submit their assignments via electronic mail or via interactive forms on the WWW. Greater interaction --- on a more timely basis --- is possible between student and instructor with email, making this potentially a more intimate form of education. However, the degree of interactivity ---and the degree of synchronousness --- is up to the instructor and the educational institution.

Traditional correspondence courses are designed to be fairly self-contained, highly structured packages, usually not featuring much interaction between student and instructor. This snail-mail model can be followed for email correspondence courses, or, if the instructor prefers, a more interactive model can be adapted. Although there may be more than one student, this approach features students working independently, in contrast to the virtual class model described above, which features a community of students interacting with each other as well as with the instructor.

One important advantage of the correspondence course approach is that students can work at their own pace. And they can start the class at any time. This approach may be particularly useful for just-in-time training. It can be tailored to individual schedules and educational needs.

3. CHALLENGES OF WEB BASED EDUCATION

The classical model of institutional education is as old as history itself. There must be a teacher; there must be students, classrooms, libraries, laboratories and a curriculum. The model is at least five thousand years old. The Harappan ruins of the indo-gangetic plains are dated to around 2500 BC and show schools using this model. So does archaeological data from the civilization of Egypt, Greece and Mexico. It is interesting to notice that while our concepts and models about almost everything else changed in the last two thousand years, our views on education have changed a little.

Millions of people around the world still do not have access to the Internet and do not understand how to use it to harness the global web of knowledge. They do not know how to deal in information, the basic currency of the knowledge

economy. They do not know how to find information, how to handle it, how to invest for their futures. These individuals, already at risk, will become increasingly marginal in the emerging knowledge economy---unless we provide them greater to the broadband connectivity, change current law, regulations and the practices.

On the other hand, those have the Internet access new design in learning is needed to create the knowledge workers who will define the Information Age. Although, Internet offers one of the most promising opportunities in education ever, people are troubled by their inability to harness its potential advantages. We identify the following as the main barriers for effective implementation of Internet based education:

- Broadband Access
- Professional Development
- Research and Development
- Quality of Content
- Regulations and e-Learning
- Protection and Privacy
- Funding

3.1 BROADBAND ACCESS

Access is fundamental. For students as well as teachers have to learn with the tools and content of the Internet, they must have ready access to its supporting technology. But even the term access must be more sharply defined. Access is more than getting one's hands on a computer, or simply connecting to the Internet. Access must be convenient and affordable. It must offer a user the opportunity to find and download complex, content-rich resources. The technology that supports access must be where the learner is located and be available whenever he or she needs it.

Those who work with the technology that supports access must have the skill and understanding to apply it well. If the user---whether teacher or learner, parent or administrator--- does not know how to work with technology or where to go on the Internet to find material of value, that learner does not have real access to what the Internet offers. Access also implies that once a user has the connection and is able to use it, he or she can find content and applications that have meaning and value for his or her learning needs.

Without broadband access, there will be little demand for the innovative content and applications that can bring new teaching techniques and new assessment models. Without access, teachers cannot

benefit from the just-in-time training and support the Internet has made possible in other professions. Without access, schools and universities will not have the links that could move research into practice and practice into research.

3.2 PROFESSIONAL DEVELOPMENT

Training helps teachers transform lifeless equipment into useful tools. Creating high tech educational tools without training teachers to use them would be as useless as creating a new generation of planes, without training pilots to fly them.

Professional development is often called training, but the term implies much more than just building basic technology skills. It means developing a vision built on the understanding that technology is a tool that can offer solutions to longstanding teaching and learning problems. It is more than knowing how to automate past practices. It is the growing understanding that comes with confidence to *think with technology* in order to approach old problems in new ways.

3.3 RESEARCH AND DEVELOPMENT

It need to establish a pedagogical base for the effective use of Internet learning. There is a need for a vastly expanded, revitalized, and reconfigured educational research, development, and innovation program, one built on a deeper understanding of how people learn, and how new tools support and assess learning gains.

Educational research, focused on using long-term, longitudinal studies as well as aggregated short-term trials supported by technology, should be directed at enhancing performance in learning. Technology offers both the impetus and the opportunity to vastly improve learning performance. Without a vigorous, dynamic research base, however, we will miss the opportunity to advance the state of the art and science of education. Educational research suffers from three major problems:

- Not enough money is spent on educational research
- Educational research often does not support enhanced learning performance
- Educational research often is not accessible to teachers or easily translated into practice

3.4 QUALITY OF CONTENT

The real revolution now taking place is not the hardware of technology, but the intellectual technology of information, communication, and the augmentation of human intelligence. All too often, discussions about web-based learning tend to fall back on a simplistic faith in the power of technology. Of course interactivity is a powerful mechanism for teachers and students alike. But dazzling technology has no meaning unless it supports content that meets the needs of learners. Some of the content currently available on the Internet is excellent, but much of it is mediocre.

Challenges await content developers and educators in producing, distributing, cataloguing, indexing, and evaluating good online content. They must address gaps in this market, find ways to build fragmented lesson plans into full courses, fully develop the promise of educational opportunities on the Web, and assure quality in this new environment.

3.4 REGULATIONS AND E-LEARNING

The regulations that govern much of education today, from primary to higher education, are focused on supporting the welfare of the educational institution, not the individual learner. They were written for an earlier model, the factory model of education in which the teacher is the center of all instruction and all learners must advance at the same rate, despite their varying needs or abilities [6]. What is needed, in short, is a wholesale rethinking of the regulatory foundations governing our educational institutions. The Internet cannot be ignored in any such effort of regulatory reform.

3.5 PROTECTION AND PRIVACY

The Internet carries with it danger as well as promise. Advertising can interfere with the learning process and take advantage of a captive audience of learners —of all types and ages. Privacy can be endangered when data is collected on users of online materials. Students, especially young children, need protections from harmful or inappropriate intrusions in their learning environments. We all have a responsibility to assure that they do not find themselves in the *dark places* of the World Wide Web.

Online profiling is the collection of information from and about an individual as he or she uses the

Internet. This can be accomplished either through the collection of personal data a user provides or through the use of screen name or identifier *cookies* placed on a hard drive by the Web site or third-party delivering ads to a Web site. Many consumers are unaware when they are being profiled or that profiling is in fact a sophisticated form of personalized marketing.

3.6 FUNDING

Technology is expensive and web-based learning is no exception. Technology expenditures do not end with the wiring of a school or campus, the purchase of computers, or the establishment of a local area network. They represent just the beginning. We must therefore respond to these realities by addressing head-on how best to finance technology-based, student-centered learning environments that will enable success in the digital era.

Technology investments can lead to economies of scale and real productivity gains. In this new environment, two things are clear: funding must be sustained and new approaches must be considered. Old models do not meet new realities. It makes little sense to use 30-year bonds to purchase equipment that should be replaced in 3 years.

4. RECOMMENDATIONS

The Internet is changing the very structure of society. The Internet is breaking all barriers of time, distance, language and boundaries. Its popularity can be attributed to its simplicity and accessibility. It is evident that there are lot of Internet based education avenues and it is just the beginning. Still there are many things to be addressed to reap the full potential of it and to make it available for all. To make Internet based education successful we call for action to:

- Powerful Internet resources, especially broadband access that should be widely and equitably available and affordable for all learners.
- Relevant training and support for educators and administrators at all levels.
- New research on how people learn in the Internet age.
- High quality online educational content that should be widely available and meets the highest standards of educational excellence.
- Revise outdated regulations that impede instructional innovation in favour of

approaches that embrace anytime, anywhere, any pace of learning.

- Safeguards to protect online learners and ensure their privacy.
- Sustained funding—via traditional and new sources — that is adequate to the challenges at hand. Technology is expensive, and web-based learning is no exception.

5. CONCLUSIONS

The question is no longer if the Internet can be used to transform learning in new and powerful ways. Nor is the question should we invest the time, the energy, and the money necessary to fulfil its promise in defining and shaping new learning opportunity. The very idea of the WWW is one of connections. Our ability to use the Internet to reshape education and learning requires actions that are also interrelated and interconnected. We need to tap into this potential energy and use it to shape future education policy for the Internet age. The issue before us now is how to make good on the Internet's promise for learning. It is time to move forward collectively from promise to practice.

6. REFERENCES

- [1] Hilary McLellan, "Internet Based Education: Some Guidelines", McLellan Wytte Digital (<http://tech-head.com>).
- [2] Aggarwal, A.K. , Bento R., (2000), "Web-Based Education , " Web based Learning and Teaching, Technologies: Opportunities and Challenges, Idea Group Pub.
- [3] Sugata Mitra, "Research and Development Issues in Internet Based Education", Centre for Research in Cognitive Systems, Synergy Building, IIT Delhi-110016
- [4] K. J. Garland et al, "The Internet as a learning tool: a Preliminary Study", Information Research, Vol.4, No. 1, July 1998.
- [5] . Qiul Sun, Kurt Gramoll, "Internet-Based Simulation and Virtual City for Engineering Education", 200 ASEE Annual Conference Proceedings, 2000.
- [6] Herberger et al, "Collaborative Learning via WWW in Legal Education", The Journal of Information, Law and Technology (JILT), 1998(2).
- [7] [http:// www.emoderators.com/index.shtml](http://www.emoderators.com/index.shtml)
- [8] [http:// www.sofweb.vic.edu.au/discuss/](http://www.sofweb.vic.edu.au/discuss/)
- [9] <http://www.gsn.org/project/>