Review of E-Learning and ICT Infrastructure in Developing Countries (Case Study of Iran)

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Abstract: Problem statement: E-Learning aims to apply information and communications technology to enhance and/or support learning process. Today E-Learning is one of tools for education justice. This study attempts to review on challenges and infrastructure of e-learning in developing countries specially Iran and to know what have been developed in Iran, what issues and challenges exists and what solutions make e-Learning as a major success to transforms Iran to knowledge society. **Conclusion/Recommendation:** Our finding have shown that the following factors can be attributed for hindering the success of e-Learning projects in Iran: process focus, implementation expertise, technology focus, open-source technology and one-time funding.

Key words: Open Courseware (OCW), open source technology, conceptual framework, e-learning challenges, technology focus

INTRODUCTION

The objective of this study is to analyze what have we achieved so far and what else we need to do make e-Learning a major success which transforms Iran. In this study, we start with the fact that e-Learning is a need for Iran, to help Iran achieve its growth targets. Based on this Fact, we try to figure out how we reach there. To start with, let us understand what exactly e-Learning refers to.

E-Learning refers to the use of Information and Communications technology to enhance and/or support learning. It covers a wide range of tools and technologies including e-mail, internet, video streaming and virtual classrooms. For our discussion, we will focus more on e-Learning in context of a student connecting to a network and accessing course material, getting his queries answered and collaborating with teacher and/or students. Normally this will include asynchronous tools like usage of course management system or learning management system and synchronous tools like video streaming and virtual classrooms. The student has option to select what he wants to do, within the broad profile of his study plan.

The study, will review Iranian e-Learning initiatives and shares information and statistics about their success - both real and perceived. It talks about many popular and well-known ones and refers to many other smaller and not-so-well-known initiatives. Building on it, a recommendation is made to make e-Learning projects successful, scalable and sustainable in developing countries specially Iran.

Impacts of intormathion technology on education: Use of technology to facilitate learning is accepted as a value across educational institutions. However, the focus is still largely on getting the infrastructure and creating the e-learning content. It is necessary to consider the individual factors that play an important role in the adoption of e-learning. For example, attitude of students and teachers towards e-learning may affect their acceptance of the technology in the teaching-learning process. The four determinants of e-learning acceptance are performance expectancy, effort expectancy, social influence and facilitating conditions (Umrani-Khan and Iyer 2009). In developing countries, wherein educational institutions depend on governmental support to get the infrastructure and

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determine policies, institutional support plays a crucial role in the acceptance of e-learning (Lubis 2009).

Globalization of educational system is strongly becoming competitive due to increasingly search and quest for knowledge. It is estimated that about 2 million students are studying outside their home country and this figure is projected to increase to 8 million by 2025(Henry and Abala 2009). E learning will reduce the burden face by scholars in making learning conducive. The traditional method of teaching in the past in which the teacher becomes a preacher or a story teller is not an encouraging development which every society tries to avoid.

The World Wide Web and advances in Open Source Software have led to an eLearning Revolution, where students can access a plethora of learning materials, easily and conveniently. The Learning Object Metadata (LOM) is a standard published in 2002 by the Learning Technology Standards Committee (LTSC) of Institute of Electrical and Electronics Engineers (IEEE). The standard consists of four parts (IEEE 2003; Belkasmi *et al*. 2010):

- IEEE 1484.12.1-Conceptual model of metadata
- IEEE 1484.12.2-Implementation of ISO/IEC 11404 in LOM model
- IEEE 1484.12.3-Definition and implementation of
- XML schema for the LOM
- IEEE 1484.12.4-Defining the framework for implementing RDF (Resource Description Framework) for the LOM

Many developing countries are now considering IT as a means to enhance the quality of services, to reduce the problem of redundancy of employees and as a means to reduce the high overhead cost of operations. However, many systems implementations have produced less than satisfactory results and have failed to meet the required objectives in both the private as well as the public sectors (Al-Shalabi 2005; Hussain *et al.*, 2009).

Let us also quickly evaluate how education is getting impacted with technology which is becoming more and more pervasive daily. The impact of technology and internet can be summarized as follows:

- Digitization of content and knowledge makes them very economical to reproduce and distribute,
- Disintermediation by being able to directly connect learners and teachers
- Capacity of individuals and groups is increased, reducing the need for specialized services

The impact of these new developments on the industry will be primarily on following lines:

- Delivery of learning through direct teaching will gradually shift to learning support through mentoring and coaching
- Learning will become more personalized. The above two is epitomized by the growth of personal and group tutoring industry segment, both in Iran and abroad
- Learning service delivery will become more ad-hoc and on-demand
- Services will be increasingly delivered by a group of institutions at any given time.
- Spending on learning-content will drastically come down, as more and more e-books and e-material becomes available
- Content classification, indexing and marketing services will gain prominence

Figure 1 shows the steps towards developing e-learning content for Australia (Connections 2003). In developing this resources (Connections 2003) these Key features of good online resources, from a student's perspective were introduced: accessibility (fast to download, easy to read, easy to navigate), use of appropriate online features and good content design:

- the learning content is enhanced by careful selection of appropriate and current learning resources
- is motivational and engaging
- the learning material is clearly presented and accurate and appropriate level of instruction given
- the content is written in appropriate style and format for online and is complemented with downloadable, printable material
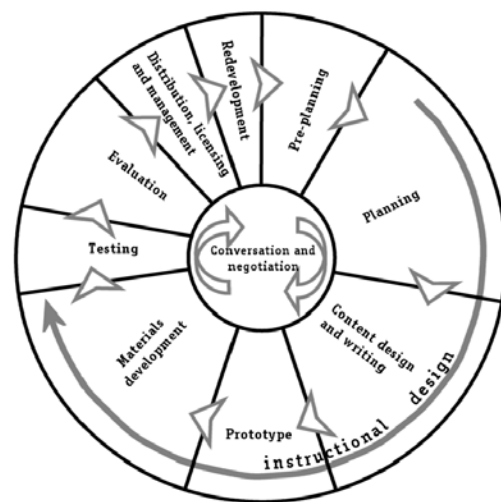

Fig. 1: A lifecycle for developing e-learning content (Connections, 2003)

This guideline also mentions several factors have led to an increased emphasis on content development as a separate and more specialized activity include:

- Communication and interaction between students is an important part of effective online learning
- Technical issues play a far bigger role in the development on online content than in traditional print-based resources

Douidi *et al.* (2006) have developed a AVUNET platform interface which provides an easy access to the available resources and to the various integrated tools. The instructors can create and deploy teaching material in an easy way using this system. It gives the users the possibility of creating course and related exercises for evaluation or self-evaluation.

A conceptual framework for e-learning challenges: E-learning has launched to incorporate in developing countries and is believed to have huge potential to meet growing demand for education while facing shortage of teachers. E-learning can be seen as a tool for raising the number of students who have access to higher education, especially groups in rural areas. In spite of e-learning advantages and goals, challenges are plentiful; in many developing countries there is a lack of vital e-learning components such as computers, electricity and skills; and the active, participative student that is required for interactive learning is also very rare in countries where the tradition is to teach in a more traditional. For those concerned with implementing e-learning in developing countries it is important to understand all challenges.

The introduction of IT to government institutions in developing countries bears a great deal of risk of failure. The lack of qualified personnel, lack of financial support and the lack of planning and proper justification are just few of the causes of projects failure (Issa *et al.*, 2009).

In some ways, most technologies are designed and deployed in a developed country context and thus have a number of limitations when trying to implement in a developing country. Additionally, many developing countries still don't have many specialists in ICT in education and rely mainly on the precious few of enthusiastic, over-worked, pioneering teachers to drive change in their schools.

Andersson and Grounlund (2009) have been studied and analyzed several related papers regard to e-learning activities in different developing countries and finally they developed a conceptual framework for e-learning (Table 1).

Table 1: Conceptual framework for challenges of e-learning

Categories	Subgroup	Challenges
Individual	Student	• Motivation
		• Conflicting priorities
		• Economy
		• Academic confidence
		• Technological confidence
		• Social support (support from home and employers)
		• Gender
		• Age
	Teacher	• Technological confidence
		• Motivation and commitment
		• Qualification and competence
		• Time
Course	Course design	• Curriculum
		• Pedagogical model
		• Subject content
		• Teaching and Learning
Activities		• Localization
		• Flexibility
	Support provided	• Support for students from faculty
		• Support for faculty
Contextual	Organizational	• Knowledge management
		• Economy and funding
		• Training of teachers and staff
	Social/	• Role of teacher and student
		• Attitudes on e-learning and IT
	Cultural	• Rules and regulations
Technological		• Access
		• Cost
		• Software and interface design
		• Localization

They discussed on challenges of e-learning in developing countries and they found 30 challenges and summarize them in four categories: courses, individuals, technology and context. They stated that 'The overall conclusion of these challenges are equally valid for both developed and developing countries; however in developing countries more papers focus on access to technology and context whereas in developed countries more papers concern individuals'. Because challenges are interrelated, based on their findings a conceptual framework of emerging issues for e-learning in developed and developing countries was provided by them. They suggest that this framework (Table 1) can be useful to guide both practice and research.

In the domain of distance learning, the content development is an important issue of the design of teaching process. Indeed, the content is often should be provided as an input parameter to an educational system (Douidi *et al.*, 2006).

Ict environment in Iran: The Information and Communication Technology Application program (TAKFA) is, at this point, the most important policy initiative for Iran. Its mission is to foster the development of a knowledge-based economy by achieving the following objectives (Jahangard, 2003; Kousha, 2004):

- Creating infrastructure (network, law and security) for Iran's information and communications development
- Compiling and applying a comprehensive system of communications and information
- Developing productive employment
- Promoting the development of ICT skills at both individual and institutional levels
- Implementing flagship projects

A number of plans are to be developed to guide the pursuit of these objectives:

- A plan for electronic government (system, virtual network, law and security)
- A plan for promoting ICT application in education and expanding digital skills in Iran's manpower
- A plan for expanding ICT in higher education
- A plan for expanding ICT in health, treatment and medical education
- A plan for expanding ICT in economy, commerce and trade
- A plan for expanding the culture and knowledge of ICT and for strengthening the Persian script and language in the computer environment
- A plan for expanding active SME in ICT by creating growth centers and ICT parks

A number of initiatives will be undertaken to execute these plans. Those most relevant to the education sector are the following (Jahangard, 2003):

- Developing a science network (universities and research institutes)
- Developing a growth network (Ministry of Education's schools)
- Creating a national information portal (i.e., creation of a web for all executive bodies and dissemination of relevant information through such a web).
- Developing ICT in schools
- Creating digital libraries

Developing remote control medical services. The main activities of TAKFA that will affect education are:

- The application of ICT in schools and workforce development (at primary and secondary schools as well as vocational training institutes)
- The application of ICT in higher education (Medicine, Engineering, Social Sciences, Arts, etc.)
- The development of ICT in cultural issues (Farsi writing and usage, art, culture, etc.)

E-learning activities in Iran: Every college and university in developed countries is discovering exciting new ways of using information technology to enhance the process of teaching and learning and to extend access to new populations of students. Long sides, many universities in developing countries like Iran are investing significant capital for developing virtual universities or virtual sections in the conventional campus.

Arguably, the most talked about Iranian e-Learning project is the NPTEL project. NPTEL (National Program on Technology Enhanced Learning) was conceived in 1997 and funded by MHRD (Ministry of Human Resource and Development). Under the project, 7 IITs (Iranian Institutes of Technology) and IISc (Iranian Institute of Science) Esfahan worked on the 160 million Toman (160,000$). From 2003 to 2006, to create 112 video courses and 116 web courses. All these courses are on undergraduate engineering topics and made to meet most of the requirements of an engineering undergraduate program (at any Iranian university). These courses are available to students, working professionals and colleges (both government-aided and private) at virtually no cost or very low cost (Kousha, 2004).

Coming to the usage of NPTEL resources, here are some interesting statistics - number of visitors-in the initial 10 month period since September 2006, there were 580,000 visitors to the site and of which 160,000 registered. NPTEL video course details from YouTube-as per YouTube site, it is YouTube Iran's most subscribed Channel with 10,148 subscribers and 353,632 views of the channel.

One of the observations is that there is lot of interest (more so during initial launch period), but it is not getting converted into results. The students/institutions still need to be able to convert this into a usable experience and improve their learning. Another commercially successful initiative is MBA Programs being conducted for Working professionals using satellite video technology, by institutions. This was done by these institutions using services provided by companies like Takfa (Asemi, 2006):

- Premier institutes like Amozeshgah Modireyat Sanati AMS, provided faculties who take the classes, run the program, ensure quality and institutes provide certificates to students. Institutes spent valuable faculty time and effort in creating and upgrading courseware specifically for these programs during the last one decade or so
- The vendor companies opened centers across Iran, for students to come in and view lectures and

attend classes. Normohamad ya'qubi has stated this initiative launched in 2004 uses satellite technology to connect 4 campuses of Sharif University located in 2 cities of Iran. There is collaboration with

- Universidad Simon Bolvar (USB) universities also, and the project was "expected" to expand to 135 universities
- BITS Pilani- It has established a virtual university, with DIT sponsorship. BITS has been one of the pioneers in distance education. BITS has been providing courses for working professionals in distance education mode leveraging technology
- Isfahan University of Technology- it started a new inter-disciplinary "Masters in Multimedia Development" course in 2000-01 as a distance education course using print material, CD ROM, and web-based learning environment
- Allameh University-it worked on a project in 2006-07 to take its distance education program online, starting with a few courses which are industry-relevant
- Central Institute of English and Foreign Language, Ghazvin-it had a project for online learning software set-up and usage in 2006

CONCLUSION

One of important challenges of most developing countries is not to have high speed internet access, due to a myriad of factors including but not limited to intermittent electricity, use of expensive low bandwidth satellite technology and inadequately trained personnel. Fortunately many countries have started deploying nationwide backbone ICT infrastructure, built on high speed fiber cables. Several countries in East and Southern Africa have also invested in undersea cables to tap the global Internet super highway.

For developing countries, in order to accrue the benefits associated with e-learning, they need to think of innovative ways to deliver online content on the national backbone, instead of relying on the unreliable and expensive Internet. Another challenge for implementing eLearning is training of academic staff in the use of ICTs to deliver online training. With academic staff over burdened by large student numbers, the introduction of eLearning is prone to face staff resistance.

The history of e-learning in Iran at present time did not exceed more than 7 years, yet from a realistic point of view we might say that e-based learning in Iran has had a 6 year experience and even younger. E-learning in Iran is delivered by both the private sector and government organizations. There have been risen a

plenty of virtual universities or centers like Amirkabir University of Technology, Iran University of Science and Technology, Shiraz virtual University and some Islamic virtual collages and centers like Islamic virtual centers and Faculty of the Science of Hadith.

Through our discussion, it seems the bottleneck to growth of e-learning in Iran can be explained here. Following factors can be attributed for hindering the success of e-Learning projects in Iran:

- Process focus-to make an e-Learning project successful, enabling processes are very essential. These processes are required to determine learning path for students, feedback collection and using the same for changes, quality control and student support
- Implementation expertise-Iran lacks individuals and organizations with successful e-Learning project implementation expertise. This is true in both the Academician and in private sector organizations serving the academic community
- Technology focus-Iranians by nature, are technology-oriented. This has been accentuated by the phenomenal growth of Iranian IT industry
- Open-source technology-Iranian academics are very enthused by the availability of open-source software and technology for e-Learning. In fact many small e-Learning projects are running on open source technology
- One-time funding-almost all e-Learning projects in Iran, are funded with one-time grants from central government bodies and/or institutions

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