iArchitecture for improved adoption of eLearning in India

Dr. Ashok Bhansali  
Associate Professor  
Dept. of computer science and engineering  
O P Jindal Institute of Technology  
Raigarh, India  
ashok.bhansali@opjit.edu.in

Nilesh Jain  
Assistant Professor  
Dept. of Computer Application  
Mandsaur University, Mandsaur  
Mandsaur(M.P.) India  
Nilesh.jain@mitmandsaur.info

Abstract—eLearning is fast becoming part of the life and has huge potential in India. eLearning technologies have great possibilities to spread learning and have the potential to redefine the education delivery mechanism in schools and colleges. However adoption has been slow and driving an eLearning implementation campaign in a diverse country like India is a tough job and requires coordinated efforts not just from the government side but from all the corners of the society. Moreover many of the concept of eLearning and many such courses emanated from western countries and may not be suitable for the typical socio-economic-geographic condition of India. This paper concentrates on the eLearning in Indian education scenario, various eLearning models and makes significant observations which could be critical to embrace eLearning into the existing education system. We also propose an iArchitecture which aims at bridging the gap between the basic building blocks of typical Indian Engineering Education system namely government, school, teachers, students and parents to connect them in a loose but effective and efficient manner. It has the potential to become the defacto standard for the implementation and enhanced adoption of any eLearning system in India. It is intended to support closed loop feedback and monitoring system to support the open learning, supplement blended learning and extends the reach of education to all corners of the society.

Key words—eLearning, Education in India, ICT

I. INTRODUCTION

This is an era of competitive, knowledge-based economies and education has the biggest role to play in India to transform itself from a developing country to a developed Nation. The Government of India is spending huge amount of money on various projects like – Right to Education (RTE), National Mission of Education through Information and Communication Technology (NMEICT), Sarv Shiksha Abhiyan, and many other educational initiatives. There is a huge demand for up gradation of education as India is expected to have a surplus of 47 million people in the working age group by 2020. As a result, both the formal education sector (including K-12 and higher education) as well as informal sector (including coaching institutions, pre-schools and vocational institutions) are witnessing rapid growth. Information and Communication Technology (ICT) can play a very important role to bring in the much desired revolution in the Education in India. Adequate ICT tools that support both traditional and emerging technology based education have been developed, however, their adoption is not up to the mark in developing countries primarily due to lack of sufficient infrastructural facilities and competent human resources besides socio-economical, socio-cultural, and linguistic challenges[1].

II. LITERATURE REVIEW

Though ICT has been accepted in India as a prospective tool for extending the reach of education and enhancement of the learning, the review of literature shows little research on various aspects of eLearning. Very few studies are available in the context of India regarding the attitude of teachers and students towards eLearning, teaching and learning styles, pedagogical aspects, and impact of eLearning on the performance of the learners and on similar research themes. Also the quality and implementation of eLearning programmes/systems is a concern and important driving factor. While educational institutions have been adopting a variety of ways to assure quality of eLearning and eContent, the Commonwealth Asia ELearning 2013 survey hinted the need for a more systematic approach to develop eLearning systems at the regional level [2]. Based on thorough literature review following factors have been identified and are considered to be important and critical for the development and successful adoption of an eLearning System:

a) Learner satisfaction and role of instructor: User’s perceived usefulness before joining a course and satisfaction at the end of a course plays a very critical role in eLearning. The study revealed that attitude of an individual teacher and a student is central to the acceptance of eLearning [4]. Umran-
Khan and Iyer (2009) devised an eLearning acceptance model identifying and explaining the factors of performance expectancy, effort expectancy, social influence and facilitating conditions [5, 6]. Lee et al (2009) also indicated that perceived usefulness of eLearning is influenced a great deal by instructor characteristics and teaching materials [7]. Webster and Hackley and Piccoli et al says as instructor is a major actor in learning activities so his attitudes toward e-Learning or IT positively influence results of e-Learning [8]. Soon et al point out that instructors’ failing to respond to students’ problems in time has a negative impact on students’ learning. If an instructor is capable of handling e-Learning activities and responding to students’ needs and problems promptly, learning satisfaction will improve [9, 10, 11, 12].

b) Contents, assessment and feedback: Many researchers agree that interactive instructional design is a very important factor for learning satisfaction and success [13, 14]. According to Moore, there are three kinds of interactions in learning activities: students with teachers, students with materials, students with students [15]. Richard D. Johnson supports the need to create a learning environment that encourages peer to peer and peer to instructor interaction [16]. Proper feedback mechanisms are important to e-Learners. Some studies about giving students incentives to do homework and to improve their performance were also performed by Radhakrishnan et al [17].

c) Personalization: Personalization is described as adapting the learning experience to different learners by analyzing knowledge, skills and learning preferences of individuals [18]. Personalized learning removes time, location and other constraints of the teaching process and aims to tailor teaching to each learner’s constantly changing needs and skills [19]. By exploring the concept of personalization in e-learning, Chakula et al define three main directions of development - Student’s personality, knowledge level and course contents [20]. Research shows that every student consumes training material based on their unique learning style, needs and interests. There is a tendency to claim that personalization is an instinctive feature of e-learning [22]. Content placed within an e-learning platform, easily accessible from any place at any time, seems to fulfill individual needs of learners. However, easy access to learning content does not ensure better teaching and learning results [23].

d) Pedagogy and eLearning solution design: Umran-Pedagogy and eLearning solution design: Umran-Khan and Iyer (2009) highlight that the eLearning effectiveness is the function of student and teacher style of learning and teaching respectively. Viewing the rapid growth of technological advancements Bashar and Khan (2007) recommended that in order to enhance the effectiveness of eLearning technological innovations should be balanced with pedagogical innovations [25]. As per Gunawardana (2010) integrated study material is also an important factor for success of eLearning [26]. According to Kathy Caprino, on Forbes.com, the best way to approach Millenials is to allow them to learn at their own pace and schedule rather than go through lectures and overly structured training. She suggests making contents succinct, entertaining, mobile and self-directed [28]. Motivating aims, cognitive modes, and interpersonal behaviors are equally important [4].

e) Technology and Internet: Several researchers indicate that technology quality and Internet quality significantly affect satisfaction in e-Learning [13] [14]. Commonwealth 2013 eLearning report says that lack of competition among faculty, and insufficient bandwidth compounded with heavy traffic during day time, erratic power supply, server problems and introduction of intelligent tutoring techniques to accommodate the heterogeneous learning styles of the students are major challenges [32]. Meritnation CEO, Mr Pavan Chauhan says (Jan 2014) tablets in the education space will be the game changer in the months to come [30]. Leidner’s framework argues that information technology and course design affect learning processes and outcomes, with the assumption that the most effective outcomes will occur when technology and pedagogy are integrated. Pei-Chen Sun et al developed an integrated model having six dimensions with thirteen factors and suggested that an eLearning solution should encompass all of these [31].

f) Societal Adoption: Connectivity (infrastructure and affordable access to the Internet), Capability (skills, confidence and recognition of value in using the Internet) and Content (relevant, useful and accessible information and services online) play a very critical role in the spread and adoption of eLearning in India [29]. Social implications of E-Learning are also very important to be understood for the success of e-learning in India. The social implications of e-learning may be categorized into the following types of issues: cultural, gender, lifestyle, geographical, religious/spiritual, literacy, disabilities, and digital divide [33]. All these matters need to be addressed properly.

Developing strategic capabilities for eLearning requires coordinated efforts by all concerned players to judiciously involve themselves to become an active part of the learning process.

III. OBSERVATION, GAPS AND RECOMMENDATIONS

On the basis of study we observed following points that could be critical for success and adoption of any eLearning System in India, and accordingly recommendations suggested:

There exist number of eLearning portals/websites targeted towards global market and having contents and delivery mechanisms not suitable for the typical Indian Education System. There is not much scope of customization of the course and contents for each school and individual teacher as per the need of socio-geography-demography etc. Moreover, very few quality resources are available in Hindi or regional languages. Govt is taking many initiatives towards free and open contents but unfortunately the status of these websites is not up to the mark.
We need to put efforts to make a paradigm shift from technology based eLearning systems to a pedagogy driven social process. The social context in which learning occurs plays a very important role but not much research is available on this, probably because many of the courses are emanating from west and so this factor does not play a very important role there. The experience and studies show that we cannot rely on the open ended systems to self educate the students especially in the socio economic context of India. Not just satisfaction of the learners but the satisfaction of the teachers and parents are equally important to drive e-learning campaign in the society. The Government of India launched many schemes/programs to push eLearning forward but to achieve the desired acceptability and effectiveness is still a great challenge and the system must support managing it as a parallel activity.

eLearning systems should be designed such that it is affordable, works well in a digitally divided society, works without major dependency on Internet connectivity, can be personalized for the end users, supports integration with existing education systems, can be used for many purposes and has the potential to transform the Education in India.

The mentioned systems have not been designed in a way that couple together all the stake holders of the typical Indian Education Systems, namely the Government, schools, teachers, parents and the students in a closed loop feedback and monitoring system. As we have got commendable education infrastructure and teachers which must be harnessed towards developing strategic capabilities for eLearning. This requires coordinated efforts by all concerned players to judiciously involve themselves to become an active part of the learning process.

IV. PROPOSED ARCHITECTURE

In view of the above we propose a paradigm shift in the basic eLearning architecture, as depicted in fig 1, which facilitates active involvement of all the stakeholders of the typical Indian education system and supports real time closed loop feedback monitoring. In iArchitecture – “i” stands for involve, interactive, and India for. It facilitates interactive involvement Indian education systems’ stakeholders. The iArchitecture aims to revamp various processes, policies, protocols, mechanisms and supports designing various algorithms to mine useful patterns from the databases to enhance the effectiveness and adaptiveness of the eLearning in Indian context. The proposed architecture empowers the students as well teachers to enhance the learning outcomes and could be the crux of any eLearning system in Indian context. It will definitely help improving the acceptance and adoption of eLearning in the society.

![Fig. 1. Block Diagram of iArchitecture](image)

The proposed helps to design and develop an ICT driven Learning System to redefine the traditional education delivery mechanisms, especially in the socio-economic-cultural context of the India. We also propose to design a framework using the said architecture which provides various APIs and functions to facilitate the inter tier communication and application level abstraction. The framework will provide an intelligent Content Generation and Management System [CGMS] which will structure the contents generated by the moderators and experts using the Learning Object Model [LOM]. The LOM will be built using the content aggregation technique which intends to bring the scattered contents together and structure them with the help of sequencing and organization methodologies and metadata and manifest file concepts to create modifiable and reusable Learning Objects. These Learning objects will then be tallied against the course structure provided by the Govt. authority to prepare the course materials for each school. It could be very helpful in creating personalized and adaptive course contents for individuals.

Framework also supports community building over time, using a well-defined reputation score mechanisms and non-repudiation scheme, which would then help the experts and moderators to continuously modify the existing Learning Object Instances for better localization and customization & evolve the course materials at the same time

V. CONCLUSION

There are currently thousands of projects in the world developing e-learning products and solutions. India seems to lag behind in the process. There is an urgent need to design and develop eLearning systems which could deal with the social-economical-cultural-geographical diversity of this country so that we can make use of technology and a true knowledge based society can emerge in this country.
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