Virtual university and e - learning: future perspectives in technical education of India

S. B. THORAT
Institute of Technology and Management (ITM)
Nanded, India
suryakant_thorat@yahoo.com

N. V. KALYANKAR
Yeshwant Mahavidyalaya
Nanded, India
drkalyankarnv@yahoo.com.

S. B. JAGTAP
Swami Vivekanand Institute of Technology & Management
Udgir, India
sudhir.jagtap7@gmail.com

Ashwini KULKARNI
ICMR
Pune, India
ashwini2@yahoo.com

M. M. BOKARE
Institute of Technology and Management (ITM)
Nanded, India
bokaremadhav@yahoo.com

ABSTRACT

Technical Education plays a vital role in human resource development of the country by creating skilled manpower, enhancing industrial productivity and improving the quality of life. Technical Education in India covers courses and programmes in engineering, technology, management, architecture, town planning, pharmacy and applied arts & crafts, hotel management and catering technology. In order to have Quality Technical Education concern to Future Perspectives in Technical Education, this paper presents a concept of 'Virtual University and e Learning', which will certainly help the students to acquire knowledge in parallel to the regular education with ease, sophistication and effectiveness, with online interaction. A virtual learning environment represents a space available on-line where both students and teachers are brought together to interact similarly to the way they do in reality. Although efforts towards the

materialization of this concept are currently on track, the domain has yet a long way to go before reaching a mature state.

Interactive Learning Systems: Book metaphors are widespread across the cultures. "Book" and "Writing" are endowed with a high degree of authority and in these knowledge is organized. With interactive learning systems, like Multi-book, we can develop a new organization of knowledge in nets and links and, perhaps we will have to change the paradigm of understanding. There is a significant impact of interactive learning systems on the way we have to think on education in the future.

Keywords: *e Learning, Interactive Learning, Multi-book, Structured Learning, Unstructured Learning*

INTROUCTION

It is becoming increasingly clear that the future is "*e*-prefixed", making it only a matter of time before most traditional domains will be doubled by their "e"-equivalent. Since the academic environment could not be the exception, it is only natural that technological support is required for aligning it to this tendency. The first thing that comes to mind when talking about universities on the Web is e-learning. An e-learning environment is supposed to provide both teachers and students with a way of carrying out common educational activities within virtual premises.

One of the things we were interested in, as far as e-learning is concerned, was to create an application by means of which we could allow teaching to take place through the Internet. We are presenting herewith such an instrument as "virtual university". In short, the virtual university intends to closely replicate a real academic environment, with its main purpose being to offer the possibility of remote education to those interested. Our objectives with interactive learning systems are to:

a. Promote understanding of the implications for education.
b. Ensure that pedagogical considerations are given proper weight in multimedia based educational systems and services.
c. Promote access to improved methods and best practices.

A-Philosophy

The mission of the Virtual University is to evolve into the e learning center for a better tomorrow. My philosophy is that no one type or style of learning is appropriate for all individuals or all situations. I believe that a comprehensive approach to e learning involves more than just taking some seminars or self-study materials, throwing them on the internet, and calling them a virtual university.

B-Why Indian Technical Education is chosen for the e-Learning?

The history of imparting formal technical education in India can be traced back to mid 19th century, although it got momentum in 20th century with the set up of Constitution of Technical Education Committee of the Central University Board of Education (CABE) in 1943; Preparation of Sergeant Report in 1944 and Formation of All India Council of technical Education (AICTE) in 1945. With the country gaining independence in 1947, the development of technical education had become a major concern for the government of India to face the new challenges and move the country forward.

The set up of Indian Institutes of Technology, Indian Institutes of Management and Indian Institutes of Science was a major step in the development of technical education in the country. The quality of education of these institutes have managed to change the outlook of India so much that this ancient country which was earlier known for yoga and mediation is now known for computer engineers. However, it does not mean that the challenge of making technical education accessible to the rural populace and other under developed sections of the society has been overcome.

Technical Education plays a vital role in human resource development of the country by creating skilled manpower, enhancing industrial productivity and improving the quality of life. The technical education system in the country can be broadly classified into three categories – Central Government funded institutions, State Government/State-funded institutions & Self-financed institutions. The Table I show the 65 centrally funded institution of technical and science education in India.

Table 1: Centrally funded institution of technical and science education in India.

IITs	15
IIMs	7
IISc., Bangalore	1
IISERs	5
NITs	20
IIITs	4
NITTTRs	4
Others (SPA, ISMU, NERIST, SLIET, NITIE & NIFFT, CIT)	9
TOTAL	65

Besides the above, there are four Boards of Apprenticeship Training (BOATs). The Central Government is also implementing the following schemes/programmes:

(i) Technical Education Quality Improvement Programme (TEQIP) assisted by the World Bank.
(ii) Indian National Digital Library for Science & Technology (INDEST).

There is one Public Sector Undertaking, namely, Educational Consultants India Ltd. (Ed.CIL) under the Ministry. There are also Apex Councils, namely the All India Council for Technical Education (AICTE) and Council of Architecture (COA). The Table II shows the Statistic of Colleges, Students & Teachers involve in Indian Technical Education.

Table 2: Statistic of colleges, students & teachers involve in Indian technical education.

Colleges : 16,885	Students:99.54 Lakhs	Teachers :4.57 Lakhs

In order to maintain the standard of technical education, a statutory authority- The All India Council for Technical Education (AICTE) - was set up in 1945. AICTE is responsible for planning, formulation and maintenance of norms and standards, quality assurance through accreditation, funding in priority areas, monitoring and evaluation, maintaining parity of certification and awards and ensuring coordinated and integrated development and management of technical education in the country.

Technical Education Courses in India: The courses, which are known as 'technical' in India and therefore come under the purview of All India Council of Technical Education are - degree and diploma courses in Engineering, Master degree Courses in Engineering, Master of Computer Application (MCA), Master of Business Administration (MBA), Pharmacy Courses, Courses in Architecture and Applied Arts and Hotel Management and Catering Technology Courses.

Institutes offering Technical Education in India: As the technical education courses in India are quite diverse, the number of institutes providing technical courses in India is also huge. The number of AICTE approved institutes that offer engineering degree courses in India is - 4,39,689. There are around 1244 institutes in India that offer diploma courses in engineering, 415 institutes offer diploma courses in Pharmacy, 63 institutes offer diploma courses in Hotel Management and Catering Technology Courses and 25 AICTE approved institutes that offer diploma courses in Architecture. The number of AICTE approved institutes that offer master of Computer Application courses in India is 1012. (These figure are tentative & subject to change as new colleges are sanctioned every year by AICTE)

Likewise the AICTE also approves institutes from time to time institutes that offer MBA courses, M.E. /M. Tech, Architecture and Applied Arts Courses, Hotel Management and Catering Technology Courses.

OBJECTIVE

The main objectives are the development and evaluation of new paradigms for teaching over the Internet, the provision of all important features of a university at the students' PC, and the development of an integrated platform. In order to get a high level of functionality and a wide acceptance, many different requirements must be considered which arise from different needs of different users. To be independent of time and place, students want to have permanent access to all relevant information and central facilities, several communication options, an individual workspace and the option to learn offline. In the context of teaching and tutoring over the Internet there is a requirement of the teaching staff as well. Some of these are decentralized access and revision of content, easy handling of all relevant data, support for assignments and laboratories and a flexible platform in order to follow new trends and new fields of application in online teaching.

VIRTUAL CLASSROOM

The power of real-time, interactive Virtual Classrooms has now become an integral part of our e-Learning environment. Virtual Classrooms can enhance the fast, easy sharing of information on the Internet using our data integration, audio, and video capabilities through a standard web browser resulting in more comprehensive, flexible, and dynamic communications.

Virtual Classrooms can transform your website into an interactive virtual classroom. This not only reduces the need for "bricks and mortar" classrooms, but eliminates costly travel time as well. And the Virtual Classroom web interface can be customized to meet your company's e-Learning goals, branding, and visual identity standards.

Features

- Holds live ad-hoc learning discussions and study sessions;
- Collaborates on the implementation of e-Learning content;
- Saves voice discussions and Microsoft® PowerPoint® presentations so that participants can refer back to them on demand;
- Reviews what has been accomplished in an Virtual Classroom and reuse it to your advantage from anywhere in the world;
- Scales your Virtual Classrooms to include any number of participants in multiple locations;
- Shares the advantages of e-Learning with your suppliers and strategic partners;

Virtual Classrooms are delivered to your web- site via the WebEx Interactive Network (WIN). WIN is a globally distributed, fully meshed and fault-tolerant, carrier-grade network that's highly scalable, reliable, and secure. System Requirements are: Pentium with Windows 9x/NT/2000 (all **Instructor** features) MAC OS and UNIX (limited features) Netscape Communicator 4.x or Microsoft Internet Explorer 4.x, JavaScript and cookies enabled 56 Kbps Internet connection.

Conventional Classrooms vs. Virtual Classroom

A website is developed as information "container" to supplement classroom education with text (course notes, assignments, pointers to external websites), and other types of media (graphics, video clips etc.).

A website is created to supplement classroom education and a newsgroup and e-mail discussion list is established for the instructor to communicate asynchronously (not in real time) with students to help guide their understanding of content and exercises. The instructor can also develop an online student assessment application which allows students to take some tests online and submit them electronically.

Importance of Virtual Classroom / e-Learning

e-Learning initiatives are on the rise as all the organizations are looking forward for "online tools and content" for staff skills development while seeking to reduce travel cost since with e-learning we are not restricted by time and place. E.g. International Telecommunication Union (Website-http://www.itu.int/ITU-D/hrd/events/elearning/) deals with Telecommunication.

Advantages of e-Learning are:

- Reduce your training costs;
- Improve your results and measure your training;
- Provide flexible access to training for telecom staff worldwide;
- Cut down on your training time;
- Access latest curricula on the Internet.

ARCHITECTURE OF VIRTUAL UNIVERSITY

The architecture, functionality and implemented tools of the Virtual University must be designed to fulfill all the different requirements of diversified hardware and software since students and staff all across its premises are suppose to interact with it. Hence the architecture of Virtual University is characterized by a differentiated decentralized structure and a flexible technical platform.

To comply with the listed requirements and to optimize e learning, several tools and functionalities were developed and implemented. The central element of the Virtual University is the database with interfaces for lecturers and students. The student's HTML-front-end to the database is called 'Online-Assistant'. It offers an individual learner space with diverse support functions for the students. The 'Offline-Navigator' is a Java-based tool for automatic downloads and structured storage of course material in order to save the students Internet access costs.

Three Tier Architecture of Virtual University

The analysis of the functional requirements of this application (web clients, large amount of data to work with, the need for an attractive, yet simple, interface) led us to the conclusion that what would best suit us is a 3-tier architecture. Such architecture would allow us to achieve a high level of independence in implementing the design; the use of a wide range of resources would thus become possible. The following figure (Fig. 2) best illustrates this concept.

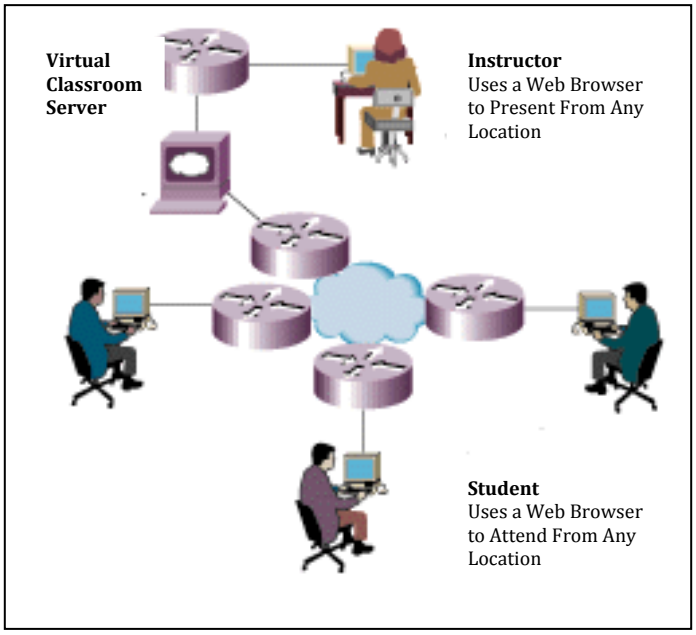

Figure 1: Virtual classroom.

Need of JAVA Technology

Java technology is the best choice for developing Virtual University since Java allows portability to this application being platform independent SQL. Java

platform benefits from powerful enterprise support and it is free technology–an important advantage in the academic environment. Further, it helps to have compatibility with all "Web Browser's" through its APPLET feature which is most recognized, appreciated and most useful for internet applications.

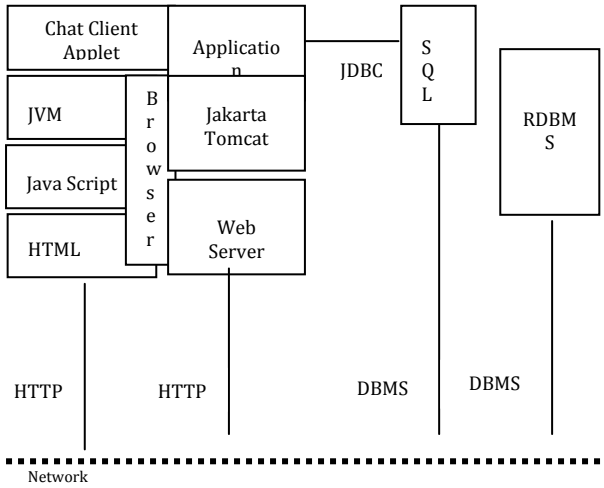

Figure 2: Three tier architecture of virtual university.

First Tier

The entire first tier (encapsulating the presentation level), represented by the client desktop on which a Web browser is running, is based on html. Additionally, it provides support for JavaScript as well as Java applets.

Middle-Tier

As far as the middle-tier (encapsulating the business logic) is concerned, our choice was to rely on Java Server Pages and Servlet technology and to use Jakarta Tomcat server as support. It was decided on using JSP and Servlet technology in order to bring the power of Java into our application. The choice of using Jakarta Tomcat, [5,10] on the other hand, was determined both by its close relation to the widely used multi-platform Apache web server (thus assuring maximum efficiency) and by the fact that the former code base is included by Sun in the J2EE reference implementation. [3, 4].

Back-End Tier

Finally, the back-end tier (comprising of the data layer) is ensured by one or more database engines. Our choice for relational database management system (RDBMS) was Microsoft SQL Server 2000. The Java Database Connectivity Data Access API provides us with a means of connecting the middle to the back-end-tier in a very flexible manner, thus making the replacement of the RDBMS very easy [3].

We are sure that using the following concept of "Digital Library" and "Multi-book" with "Technical Virtual University" the student's life will be most easy and they will be encouraged to read more and more because of the interesting presentation of knowledge at their door step. Further, it is reported that Indians are less prone to reading (it is being reported through one CSR magazine that, in India out of 1000 Indian only 14 uses to read, compare to approximately 900 Russian per 1000). Hence, use of "Digital Library" and "Multi-book" will serve the strong basis to improve the reading ratio in India by making the reading materials available on PC's [1, 2].

Nowadays, PC has reached to most of the Indian houses, which could access internet via "Dial-up" connections and "cable net". Even the internet could be accessed though the Mobile using GPRS. Hence, the "Technical Virtual university" equally supported with "Digital Library" and "Multi-book" now could reach to the maximum users, with every chance of further increase in the users of this system, which is self motivating, easy to use being user friendly and menu driven, most effective being imbibing (since lots of animation used makes it more appealing), interesting being interactive [6].

DIGITAL LIBRARY

The Virtual Library System is a free Web-based system to build, manage and maintain efficiently medium to large collections of links and their Meta information. It provides advanced full-text search capabilities as well as uniform access via categories to information on the Internet, reducing long paths leading to a few clicks.

Features

- Easy to use: Information access via browsing categories and full-text search.
- All administration with a standard Web-browser. Scalable: Supports unlimited number of independent libraries on one server.
- Uses glimpse, a indexing tool that is successfully used with thousands of entries.
- Automatic services like link-checking, execution of scripts, automate most of the time consuming tasks to keep the collection up-to-date.

MULTIBOOK

A strong tendency towards online multimedia courses can be observed in many disciplines. Such courses promise a much better learning efficiency because of the many possible forms of knowledge presentation and their potential for active learner involvement through interactive learning materials, virtual laboratories, and learner-controlled animations and visualizations for example, in Fern University at Hagen, the concept of the Virtual University was developed and realized. At the start of the Virtual University in 1996 there were about 6000 online-students registered and using the online offers from all departments with more than 100 courses. Currently world's largest e learning community is serving for 500000 students and having alumni in 128 countries: The multimedia book, 'Multi-book ', is Web-based multimedia learning system. It is supposed to be a supplement to traditional teaching models and may possibly substitute traditional text books. Multi-book is characterized by three aspects:

i) Multimedia elements: Video sequences, interactive animations, interactive tests etc.
ii) Adaptability: Different learning aims, media preferences etc. lead to individually generated lessons.
iii) Maintenance: Due to the modular and Web-based architecture of the Multi-book knowledge base, it is easy to keep the media bricks up to date.

Teaching in the near future will be different from today in terms of how learning material is being presented and how it is created [1, 9].

IMPACT OF VIRTUAL UNIVERSITY AND E LEARNIG ON TECHNICAL MANPOWER DEVELOPMENT

From researchers and policy maker's point of view

As we know India follows the planning through "planning commession". Unfortunately this planning is on the basis of information collected by traditional, tedious and manual methods which are too slow to sustain and moreever when this so collected information reaches to the concerned policy-maker, this information becomes absolute and so made policies could only yields nothing out of the most valuable efforts in terms of time, energy and money that is being invested. Hence, eventhough we are leading towards liberalize Market oriented economy, the importance of current, accurate, reliable and high speed data/information collection is very much identified and realized.

Researchers could be asked to survey the employees at various industrial and service establishments of the country to determine the nature of, and demand for, manpower skills. These surveys could then yield reports/models that could be devised to predict future manpower needs. These researchers could then recommend to the Indian government to develop scientific and technological manpower based on their findings. Further, it is suggested that the Indian

government must re-examine any institutional and organizational restraints on technology diffusion, and the use of scientific and technological manpower within its own economy. So obtained research results could then be discussed at senior policy-making levels in the government and eventually could lead to better policies for rapid development of science and technology [8, 11].

Now imagine that, all the policymakers are interacting with the researchers online instead of offline for every important aspect of TECHNICAL EDUCATION DEVELOPMENT through any of the specially devised Virtual University and e Learning equally supported by organizations like our own NTMIS (through its various lead centers and nodal centers), how fast, how effective, how economical and efficient would be the decision making. These so made policies could be then better used and will certainly prevents the policies from becoming obsolete with the age of technology of the time.

With the expansion of universities, technical and vocational schools and skill training centers in the country, the supply of scientific, technical, and skilled manpower has been growing fairly rapidly in India. However, we feel that there are no coherent national plans for the development of skilled manpower in different fields and at different levels. In an attempt to correct this situation, the Indian government has to under take a major policy study to evaluate the nature of supply and demand for skilled manpower in India to identify qualitative and quantitative gaps between supply and demand and devise improved manpower development policies.

From teaching and learning point of view

It is well understood that there is a need for new, methodically efficient and motivating ways of teaching Technical subjects. Nowadays this requirement can be ideally met by self-driven, computer-based and Web-supported multimedia learning systems. Modern educational software offers a unique opportunity to considerably improve the quality and efficiency of teaching and even the image of a science and technology in society.

.

CONCLUSION

Given the importance of technical education in the further development of the nation, the Government of India is keen on developing some more institutes in the line of IITs, IIMs and IISCs. The Prime Minister of India has unleashed a plan to establish 8 IITs, 7 IIMs and 5 IISCs to improve the spread and quality of technical education in the country. These institutes along with various private institutes and foreign technical colleges have the potential of making technical education accessible to all sections of society in India without compromising on the quality of education.

This paper presents a system to comply with the ever increasing demands of web based education, the services it provides and the architectural model. The "virtual university" application could be developed to meet the goals set. In addition to

this, it also proved itself to be a viable system, ready for deployment in technical education as well. The architectural model, specifically conceived to anticipate constantly changing requirements, backed by Java technology, forms the basis of straightforward development.

The "Technical Virtual University" offers the environment for easy implementation of different educational technologies using Web oriented technologies.

Hence, a "Technical Virtual University" could be designed to run various courses aimed for "Technical Education Development" through "E learning," so as to have full utilization of the current Technical Manpower. E Learning initiatives are on the rise as all the organizations are looking forward for "online tools and content" for staff skills development while seeking to reduce travel cost since with E learning we are not restricted by time and place. [2]

The overwhelming advantages of "e-Learning" vise reduce your training costs; improve your results and measure your training; provide flexible access to training for technical staff; cut down on your training time; access latest curricula on the Internet are too strong to resist, hence carefully designed curriculum of this "Technical Virtual University" confirming the norms and standards of UGC and AICTE could then be strong enough to form launching pad for technical education development and its utilization.

ACKNOWLEDGMENT

We are thankful to Hon. Ashok Chavan, Chief Minister, Maharashtra State, India and the Chairman of Shri Sharda Bhavan Education Society, Nanded and Hon. D.P. Savant, the MLA North Nanded, Maharashtra State and Secretary of Shri Sharda Bhavan Education Society, Nanded and all the office bearers of Shri Sharda Bhavan Education Society, Nanded. We are also thankful to Vice Chancellor & Director, B.C.U.D. of S.R.T.M. University, Nanded for encouraging our work and giving us the whole hearted support. We would like to extend our sincere thanks to Ex. President MAMI & all office bearers of MAMI. We are grateful to our family members, staff and our most obedient and enthusiastic students.

REFERENCES

1. Cornnlia S. Multibook: The multimedia multimedia book, http:// www. kom. etecnik. tu fernuni hagen. de, Fern University, P1.
2. Kaderali, F. Architecture and Functionality of a Virtual University Infrastructure, http:// www. informatik. fernuni-hagen.de, Fern University, P1.
3. Java Server Pages. (2010). Retrieved from: http:// java.sun .com/ products/ jsp/

4. Java Servlet Technology. (2010). Retrieved from: htt p://java. sun. com/ products servlet
5. The Jakarta Tomcat Project. (2010). Retrieved from: http:// jakarta. apache.org/ tomcat/index.html
6. Hahsler, M. (2001). The Virtual Library, Department for Applied Computer Science, Vienna University of Economics and Business Administration, 6-Apr-2001 P1.
7. Sangster, A. (1996). Experience and best practice in the use of learning technology: A personal view. LTDI, Implementing Learning Technology, Henriot-Watt University, Edinburgh, 1996
8. Ioan Salomie, Horatiu Goller, Bogdan Sintoma, Anca Rarau. (2000). Student Evaluation in Virtual Universities using Mobile Agents. Accepted for *ISTEP 2000* Symposium, Kosice, 2000.
9. Lazenby, K. (1998). The creation of a virtual campus in higher education: two case studies. *Proceedings* of *ASCILITE '98.*
10. Gangmeng, J.I. (1998). Keep the server COOL: a proposal for server-side object development for on line courses, *Proceedings of ASCILITE* '98.
11. Arnold, M. (1997). Using the Web to Augment Teaching and Learning, *Proceedings of ASCILITE '97.*