ABSTRACT

The Objective of this research was to study and analyze and examine various e-learning models for effective teaching and learning, as how various Learning Management Systems are developed and provide effective e-Learning model in the form of a generalized model which help in effective learning using the current technologies.

All modern nations are built on sound knowledge base and continuous education is central to knowledge acquisition and knowledge spread. India with more than billion population is knowledge conscious nation but it lacks excellent educational opportunities. E-learning with efficient tools is the most effective way to address this issue. E-learning provides self paced learning and may be instructor assisted. The most important challenge is developing tools and techniques and creating an invigorating learning environment with associated testing methodology to meet goals. Tremendous advances in computer technology and the evolution of the Internet have led to new approaches in learning and training which are summarized under the term e-Learning. The penetration and deployment of Information and Communication Technology (ICT) has impacted teaching-learning process. There are many dimensions of e-learning viz. socio-cultural aspects, integration of e-knowledge with traditional knowledge, role of instructor and effects of WWW. This thesis will explain what can be expected from e-Learning and although especially focused on the model for learning based on technological issues. The thesis also focus on different kinds of requirements for e-Learning environments like pedagogical requirements, functional requirements and non functional requirements. E-Learning due to its own importance over c-learning had become more popular for increasing interoperability, cutting costs and gaining acceptance in both learners and instructors community.

In this thesis, firstly the concept of e-learning is explained, with different objectives in the initial chapters. The first objective is use of technology in learning. The second objective is to explain e-learning as systematic learning over c-learning. The third objective is in terms of describing exiting models of learning and developing the new model of e-learning. At last, the fourth objective is in terms of aiming the advantages of implementing the new model of e-learning over the existing models. The general
objective means to assess the significance of e-learning. Chapter 1 starts with an objective and research and research methodology in field of e-Learning and e-Learning environments and focuses on need and importance of e-learning and then discuss about the plan and road map of the proposed research. Planning of an ideal e-learning systems need through examination of the pedagogical, functional and non-functional requirements of an ideal e-Learning system. The chapter also discuss about the quality requirements, usability and accessibility requirements. In effective learning, for evaluations of models we need to understand the e-learning. The various approaches to perform the evaluations of models are discussed. The existing methods for analysis of e-learning models are described. The research methodology is designed for the objective of evaluations considering the validity of internal and externals constraints and also the reliability.

The learning management systems are important for implementing a generalized model after studying the different e-learning models. Structured planning and execution of the activities is required for model development and simulations. This process is called model development and execution of the process.

Chapter 2 is the through study of e-learning styles & systems. Starting with styles and history of e-learning systems the chapter also discusses about the social impacts of e-learning and the current status of e-learning in india and abroad. We reviewed the literature and presented various requirements related to e-learning. The e-learning era started in early 1985 as Instructor-Led Training era, as Multimedia era (1985-1995), as Web Infancy era (1995-2000) and Current Generation WorldWideWeb era from 2001 onwards. In subsequent sections, various models of e-learning are described viz.

Chapter 3 is the deep analysis of e-learning systems with critical analysis of merits and demerits of e-learning. The chapter also discuss about the co-relation of e-governance and e-learning with significant discussion of current status of e-learning and e-governance and also the future scope of e-learning. The subsequent chapters discuss important models of e-learning used by various learning management systems viz Demand Driven learning, Community of Inquiry model, Modal e-learning, DIY (Do-IT-Yourself) Model, E-learning Maturity Model, Technology Content and Service Model, Demand and supply Model. It affirms that the need to obtain a general
model arises for e-learning and so Competency based model (problem, activation, demonstration, application and integration) is presented.

E-learning systems are characterized using various components. One of the most important components of an e-learning system is the learning material or the learning content. Popularity of various e-learning systems has led to the development of many learning object repositories that store learning materials specifically created for e-learning. Besides, the WWW (world wide web) contains many articles and good quality learning materials. High quality learning materials are expensive to create and the cost of e-learning will be subsequently more compared to traditional learning management systems. So it is very important to ensure reuse of learning content every time designing the contents of the new e-learning system. Reuse is made possible by annotating learning content with metadata. As Manual annotation is a time consuming and expensive process and there is more possibility as being liable to human errors.

The model works using the automatic annotation of learning materials. We have identified a set of metadata attributes that describe some important pedagogic characteristics of learning materials & using an automatic annotation tool, which annotates given learning materials, the model facilitates the creation of a learning object repository. To make the best use of the learning repository one needs to be able to retrieve learning materials that are most relevant to the learner's requirements. The metadata associated with a learning object are chosen so as to make this possible. We use as metadata pedagogic attributes like document type, topic, difficulty level, coverage of concepts, concepts map and competency map tools and for each concept the significance and the role. A number of methods like standard classification algorithms, parsing and analysis of documents have been used for automatic extraction of the above metadata attributes. The automatic extraction of some of the metadata makes use of the domain ontology. The domain knowledge of the subject is captured using a structural ontology of the domain and this ontology has been manually developed for a few domains using the flow charts. Also test items are designed to check the domain knowledge of the subject after learning through LMS. Chapters 4 and 5 form the body of the thesis and largely describe the proposed work. First, it discusses the readily available e-learning standards. After that, various e-learning models are described using which e-learning system can be
implemented. During the initial implementation phase, I was the part of approximately 18 weeks program at Indian Institute of Information Technology, Bangalore and spent 18 weeks in face to face and remote sessions to design and develop effective course material for various engineering courses using Moodle software. This chapter gives a good overview of the flexibility and successful implementation of the different courses using the system. The courses were designed after writing their competencies and drawing the competency map using C-MAP Tools software and then identifying the Problem, Activation, Demonstration, Application and Integration for each of the module of the course. The same was then implemented in the Moodle software. Testing and validation of the model was then followed by taking the same courses into live implementation in the present working environment of an engineering college for the students using e-learning methodology in contrast to traditional c-learning lectures and then a questionnaire consisting of more than 50 questions had been conducted for 300 students of the college and test results were in favour of e-learning methodology. This implementation was the testing part of the proposed model for pilot run of 30 days and only for one department.

Further in test run need for personalized learning analyzed, because a learning system should be able to deliver personalized learning materials to a learner. To deliver personalized learning materials to a learner, we also integrated a search tool as a part of the model. The personalized retrieval is based on the user profile. The user profile includes what the learner already knows (the learner's knowledge state) and what the learner is required to know (the learner's curriculum requirements).

Next important component of e-learning systems is role and reliability for higher education institutes. Over the last two decades, many higher education institutions have adopted a wide range of e-Learning tools into their educational delivery and support processes. Lessons so far demonstrate that a wide range of e-Learning projects have stimulated an agenda of bottom-up innovation rather than one of institutionally-led changes in educational delivery processes. Furthermore the implementation of e-Learning has primarily been evolutionary and not revolutionary. It has mainly been a process of bottom-up, incremental change from within through which the use of e-Learning is integrated in old and existing practices. In order to respond to new student markets and
changing needs and expectations, higher education institutions have to define clear and comprehensive strategies for the integration of e-Learning in their educational delivery processes.

The general model of e-learning focus on higher education institutions to define a vision for teaching and learning, and define where technology fits within that vision, to identify new target groups that could be reached through the use of technology, to define priority target groups and appropriate programs for the use of technology-based delivery to identify areas of already-existing technology support and encourage people in those areas to provide support for "novice" technology users.

The case study performed on the e-learning implementation using learning management system MOODLE (Modular Object-Oriented Dynamic Learning Environment) as a project carried out Institute of Knowledge – College of Engineering, Pune affiliated to Pune University. The model is fully implemented in the real environment of an engineering college (higher education institute) for the first year and second year undergraduate students of engineering of five different branches. The model simulated the various courses of odd and even semester in comparison to the traditional c-learning of the courses. Thereby depicting the effectiveness and usefulness of the proposed model of e-learning.

Finally survey and results were obtained of the real time implementation of the model using comprehensive questionnaire from the users of the model at both the levels – Learners and Trainers and the feedback of both the categories were recorded in the form of objective based questions. The sample data for performing the testing model was more than 800 students of various streams and more than 50 professors. The testing of model based on the parameters like effective learning and teaching considering parameters like performance checking of learners, time taken, effort applied by the trainers and learners in all were considered for proving the efficiency and effectiveness of the model. Also, the chapter 6 summarizes and concludes the work in terms of survey, results and conclusions so far, and presents a visionary outlook into the future of e-learning.