ABSTRACT

1. INTRODUCTION

Times are changing. Today, it is the age of e-learning. The shift from instructor-centered to student-centered e-learning was the immediate effect of the radical increase in student numbers and the struggle to find a sufficient number of experienced instructors with suitable skills. In e-learning environment, the instructor inevitably became a facilitator of the overall learning process (Lin & Hsieh 2001). e-Learning system is a tool for empirically exploring how learners and instructors use learning objects in a variety of subject areas and across diverse age groups. In the past few years, there's been a rapidly growing interest in e-Learning, learning that is accomplished over the Internet, a computer network, via CD-ROM, interactive TV or satellite broadcast. Self-paced, interactive training programs produced on CD or the Web contain multimedia elements (i.e., sound, video, animations) and automated test questions that provide instant feedback to the trainee. e-Learning most often means an approach to facilitate and enhance learning by means of personal computers, CD-ROMs, and the Internet. Advantages that accrue are that just-in-time learning is possible, courses can be tailored to specific needs and asynchronous learning is possible. e-
Learning may also be used to support distance learning through the use of WANs (Wide area networks). e-learning is becoming an influential force in higher education today; a force, which has some kind of presence on almost every campus and in an ever-increasing number of college and university courses. A learning object (LO) is an independent content component that can function as the learning content of a course module. It can be defined as any digital content resource that supports learning, that can be re-used and that can be delivered on demand. Learning Objects (LOs) are elements of a new type of computer-based instruction grounded in the object-oriented paradigm of computer science. The LOs may provide instructional benefits by potentially increasing the speed and efficiency of e- teaching and instructional development.

2. NEED

e-Learning is becoming a major component in the academic world today. There is a need for formalized guidelines in e-Learning so as to enable the designer to design, maintain, and manage a course. Some research has been done on the subject, but so far none has proposed formalized guidelines, and none has draws conclusions from the users’ perspectives. The users, students in this case, should be at the heart of the design and their thoughts, wishes, and needs should be implemented in the user-centered design.
There are so many e-Learning systems available in the market. Content available for learning on the Web is variable. The content developers, educators and students needs can’t be addressed simultaneously. To bridge the gap, a modified ADDIE model of e-learning system was proposed by us to build fragmented lesson plans.

The most widely used methodology for developing new training programs is called Instructional Systems Design (ISD). It is also known as Instructional Systems Design & Development (ISDD), the Systems Approach to Training (SAT), or just Instructional Design (ID). This approach provides a step-by-step method for the evaluation of students' needs. For best results, we used a modified ADDIE model. It is based on the most valuable aspects of the systems approach. Specifically, a rapid prototype phase is inserted after, or as an extension of the design phase. A rapid prototype is simply a quickly assembled module that can be tested with the student audience early in the ISD process. It assures quality of learning in this new environment.

The main objectives of the model are:

- Object Oriented Analysis and Design of Learning Objects
- The ADDIE model based Instructional Development of e-Learning Systems
- To give an overview of the learning object approach to create learning content and converting e-content to Learning Objects
- To bridge the gap between the needs of students and learning content by making use of Agent Based Learning Objects
- To propose an Agent Based Reusable Learning Object Model for personalizing the learning content and fixing the granularity of learning objects for different levels of students like undergraduate and post graduate based on the three dimensional aspects of breadth, depth and the degree of autonomy.
- The agent based learning object architecture is designed by encapsulating the agents with learning objects.

This thesis investigates Object Oriented Analysis and Design of Learning Objects and Applications of Agent Based Reusable Learning Objects in e-Learning system design. The traditional and e-Learning architecture and Instructional System Design models are discussed. The problem of reusability and personalizing the Learning Objects to fulfill the needs of students are discussed.

Thesis chapter three describes conversion of learning contents to reusable learning objects and the need for blended approach to make e-learning work. The evaluation techniques, usability evaluation, design prescription and the results of the case study conducted using School e_Learn System are presented. Agent based learning object technique is identified as a mechanism to dynamically organize and deliver learning materials to satisfy individual learning requirements. The agent
technology gives personalization, adaptivity and dynamic support. This thesis tries to give a solution to agent based learning object design for personalized e-Learning system design and learning content reuse.

This thesis also discusses about the usability of learning objects as an independent and self-standing unit of learning content. That can be reused in multiple instructional contexts. A learning object is a digital learning resource that can be reused for different levels of students and for different courses. Since learning objects are essentially static resources, reuse of learning objects is a difficult task that should be done by the faculty manually for different levels of (undergraduate and post graduate) students. This problem can be solved by making learning objects smarter, more active and capable of reusing. This can be achieved by using agents. The agent based learning objects present a personalized model that responds to requests from other agents in an intelligent manner, allowing more sophisticated kinds of learning object reuse than what is currently available. We propose an Agent Based Reusable Learning Object (ABRLO) model for personalizing the learning content and fixing the granularity of learning objects for different levels of students like B.Sc., B.E., and M.E., based on three dimensional aspects of breadth, depth and the degree of autonomy. Depth, for example, is not really one dimension; it breaks down into the complexity of concepts and the way in which the student is able to use concepts.
The ABLO is a practical solution to the problem because of the compatibility between the fields of learning and artificial intelligence. Agent technology is appropriate for creating intelligent learning objects since they can be employed to facilitate the reuse of learning content (McCalla 2004) and the communication between other ABLOs would not be limited to single method invocation as in the object-oriented paradigm for learning objects (Azambuja, 2004). The task of repurposing learning material can be greatly eased by ABLOs because the intelligence of a content specialist can be built into the ABLO. The thesis tries to give a solution for personalized student centered e-learning system design and reusability of learning Objects in different programs according to student levels and implementation of the reusability of learning objects in analysis and design stage itself using agent based learning object technique.