Reusing Learning Objects and the Impact of Web 3.0 on e-Learning Platforms

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ABSTRACT
E-Learning promotes the exchange of experiences and knowledge that facilitate the learning of students without the time and space restrictions imposed by traditional models. The potential for reusability is a primary attraction for educators when discussing about learning objects. Reusing learning objects is as old as retelling a story or making use of libraries and textbooks. In electronic form has received an enormous new impetus because of the WWW technologies. The goal of this paper is to define a concept of reusing learning objects, the platforms and the impact of Web 3.0 technologies while designing an e-learning system solutions, where course contents, teaching methods, learning activities and learning styles are included. To facilitate the process of finding and reusing learning objects stored in global and local repositories, very important is the development of appropriate technologies and platforms.

KEYWORDS
Reusable learning object; learning objects repositories; e-learning platforms; Web 3.0.
INTRODUCTION

The main challenge of E-learning developers is to design effective e-systems which should include sophisticated and advanced functions, yet to be easy and flexible to catch students’ interest. An e-learning platform is an environment integrating tools and services. The core of e-Learning is a Learning Object- LO whose destination is to change the form and shape of learning. Their most significant aim is to increase and improve the effectiveness of human performance by enhancing the learning. IT offers its ability to capture knowledge by reusing and sharing with others.

Reusable Learning Objects (RLOs) is a new way of thinking about learning, providing thus a digital educational resource that can be reused, scaled and shared from a central online repository in the support of instruction and learning. RLO supports a single learning objective and vary in size, scope and level of granularity ranging from small chunks of instruction to a series of combined resources to provide a more complex learning experience[1]. Cisco[2] defines a learning object as “educational object, content object, training component and chunk.”

Digital repositories of LOs support education efforts that benefit instructors, undergraduate/graduate students, support course and curricula development, and extension activities. An important issue in reusing learning objects is the development of appropriate technology to facilitate the discovery and reuse of learning objects stored in global and local repositories which are increasingly becoming available on the Internet.

One of the hottest topics in education is the opportunities that Web 3.0 offers by handling the WWW as the largest information database humans have ever invented. People can access large amounts of information (e.g. news, research etc.) just with few mouse clicks by using automated search engines.

The paper is structured as following: section 1 gives an introduction to the subject, section 2 gives and overview of learning objects and their reuse, section 3 presents the available platforms and section 4 present the Web 3.0 in the context of e-learning system.

REUSABLE LEARNING OBJECTS

The importance of technology in the development of e-learning systems is often overstated by technology providers. In many cases the e-learning projects’ development has devolved into a purely technical process resulting thus on expensive software implementations. To avoid this, designers should seek to define the basic components of an e-learning system. These components are called Learning Objects (LOs) or Learning Components that interoperate and co-operate. LOs can be electronic texts, a Web site, a .gif graphic image, a QuickTime movie, a Java applet or other digital resources used in learning.

In order to standardize the learning process a dozen of well designed multimedia LOs could be used in thousands of courses, due to large numbers of similar online being adapted by many institutions which develop modules, and courses on common topics. The easiest way to search and find LOs, the descriptions of their characteristics is necessary. To describe their content several analogies or metaphors are used.

The Lego blocks analogy[3], where blocks are assembled/combined in an infinite number of ways, frequently used in object-oriented programming [4], is a metaphor used for LOs. A LO should be autonomous, yet possess the necessary plasticity to combine with other LOs to create something greater than a collection of parts. Reusable Learning Object are independent and self standing unit of learning content used in multiple instructional context (e.g. courses or extension).

Reusability is governed by certain principles and applying them directly to LOs, means that they must meet the following conditions [5]

- The objects are abstracted towards pedagogy, context and media.
- According to [6] when teachers plan and design a course, usually they employ an implicit design idea based on ‘knowledge transmission’. They think about the content, the potential resources (texts, figures, tools), the sequence of topics and how to assess the learners. The order in which a teacher designs a course usually depends on his/her pedagogical standpoint.
- The objects must be small in order to be aggregated into larger meaningful chunks.
- Usually teachers view their course as one large integrated chunk like when writing a textbook they refer to other chapters in the book, making it difficult to use in another context
- The objects should be encapsulated: have no side effects to learners.

When creating LOs they should be closed-totally ignorant of the outside ‘world’ in which the object functions. However, in educational process there are additional factors to be considering, such as student administration, dossiers/portfolios. In practice, when building units of learning, the reuse framework can be implemented in two ways:

- Bottom up – building a course by starting with the available reusable learning objects and services and ordering them within the context of the learning design.
- Top down - starting with the learning design, then searching for objects and services which fit within the framework. In this case, the learning design can automatically guide the search process. The different entities can act as place holders for queries [7].

The framework also works in reverse, decomposing existing courses to identify reusable parts contained within them.

Once a learning object has been defined, measuring its “goodness” must take into account its essential properties. However, if we want learning objects to become the central component of a more efficient industry of educational content,
existing definitions that focus on reusability must become the key property of learning objects. Therefore, assessment techniques for learning objects must approach the concept of reusability in their evaluation criteria.

A newly approved IEEE standard[8], is making important progress, so LO can be managed, searched and reused. LOs repositories are growing rapidly. LO repositories stores both LO’s and their metadata, either by storing them physically together or by presenting a combined repository to the outside world, while the metadata or LO’s actually stored separately. LO repositories allows registered or unregistered users to search and retrieve LOs from the repository supports simple and advanced queries, as well as browsing through the material by subject or discipline.

E-LEARNING PLATFORMS

E-learning is defined as all forms of electronic supported learning and teaching, which are procedural in character and aim to effect the construction of knowledge with reference to individual experience, practice and knowledge of the learner [9]. Information and communication technologies have changed the approach of how learning materials are delivered to students at education institutions. ICT offers continuous educational improvements through offering online learning services, greater information access, greater communication and cost efficiency.

E-learning platforms (sometimes called learning management systems (LMS)) are applications used for delivery of learning content and facilitation of learning process. They are developed for administration and teaching in education. This software enables the administrators and lecturers to treat enrolment data electronically, offer electronic access to course materials and carry out assessments (OECD, 2005). A learning management system is a server-based or cloud based software program. It contains information about users, courses and content. A learning management system provides a place to learn and teach without depending on the time and space boundaries. Learning management systems are also known as Course Management Systems (CMS), Personal learning Environment (PLE), e-learning courseware and Virtual learning Environments (VLE) [10].

THE IMPACT OF WEB 3.0 ON E-LEARNING PLATFORMS

Taking in consideration that the rapid growth using online services last few years and on the other side since the internet revolution, the web development had important changes in every area especially in education. Integrating the web 1.0 and web 2.0 e-learning tools, coming to the new paradigm such as semantic web 3.0 which according to [11] will bring structure to the meaningful content of Web pages, creating an environment where software agents roaming from page to page can readily carry out sophisticated tasks for users.

The information and communication systems, whether networked learning or not, serve as specific media to implement the learning process. This often involves both out-of-classroom and in-classroom educational experiences via technology, even as advances continue about devices and curriculum. Abbreviations like CBT (Computer-Based Training), IBT (Internet-Based Training), or WBT (Web-Based Training) have been used as synonyms to e-learning. [12]

Introducing great opportunities in a open and distance learning Web 1.0 and 2.0 changed the way of e-learning solutions by transferring educational data in a easy access and decentralized manner, but these systems requires and should be supported with new a contemporary techniques, such the semantic web or the Software as a Service.[12]

But, the key problem is that current e-learning systems are not scalable and do not lead to the efficient utilization of the resources. As a response to this increase in pressure and to increase the efficiency and availability of their current e-learning system, the educational institutes may adopt a service-oriented approach.

Using Web 3.0 into e-learning platforms will provide the university staff, students, and IT managements with many high points (efficiency, reliability, portability, flexibility, and security) to enhance their knowledge and education.

According [13] several content models can be used for Web 3.0. The Service Model involves the generation of content by a human user, followed by the transformation of the content in order to make it understandable to another, the addition of meta-data, the organization of operations on sets of content, involving the generation of content, the analysis, the alteration and the localization:

- **GeneratedContent**: content produced by a person.
- **AnalysedContent**: content analyzed before adapting it.
- **PreparedContent**: content modified.
- **LocalisedContent**: content subject to the localization processes.

Using Web 3.0 it would be a completely new story providing better: Mobile, decentralized and just in time learning; cost effective; speed of implementation and updating; virtualization; easy to monitor data access; latest dependency on IT department, in the meantime there are several impacts, starting by:

- Services and support to a wide range of users.
- A wide-range of course materials and academic support tools to instructors, teachers, professors, and other educators and university staff.
- Research level computational systems and services in support of the research mission of the university.
With these requirements, the major challenges of planning a cloud computing solution in a higher educational, research-oriented institute involves following factors:
- Excellent resource utilization depending on different user demands
- Variety of diverse service environments
- Operating cloud infrastructure as an economically viable model

Decentralized learning

Implementing e-Learning Models with Web 3.0 shows benefits starting by the fact that many education institutions do not have the resources and infrastructure needed to run top e-learning solution.

Figure 1 shows the proposed Ontology based e-Learning model for Learning Management System.

![Figure 1: Proposed Ontology based e-Learning Model](image)

This architecture of a distributed e-learning system includes software components, like the client application, an application server and a database server the necessary hardware components (client computer, communication infrastructure and servers), by which there are several benefits, such as:
- Increased quality and value of learning achieved through greater student access
- Combination of appropriate supporting content, learner collaboration and interaction, and on-line support
- Increased reach and flexibility enabling learners to engage in the learning process anytime, anyplace and on a just-in-time basis
- Decreased cost of learning delivery, travel, subsistence costs and time away from the job
- Increased ability to respond to evolving business requirements with rapid roll-out of new and organizational-specific learning to a distributed audience.

CONCLUSION

Reusing learning objects and the implementation of web 3.0 into e-learning solutions will soon become reality, enabling the system to achieve personalized interactivity with each user. The main goal of this suggested prototype is; managing effectively the technological needs of universities such as delivery of software, providing of development platform, storage of data, and computing, and the most important increasing the quality and value of the University and gaining a deeper understanding for the development of e-learning platforms.

REFERENCES


