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DESIGN OF VIRTUAL LEARNING ENVIRONMENT USING SCORM STANDARDS

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ABSTRACT

E-learners can experience the best learning when the web based material provides interactive communication; and information presented in a different ways with the control over learning. This expectation shifted the E-Learning course delivery from simple presentation of learning content to learning objects with the power of E-Learning standards. The feasibility study is made on the derived Instructional Design Template for further incorporation with the SCORM model. In this research, the usage of SCORM standards which improve the quality of eLearning content is analysed.

Keywords: *SCORM, Learning Objects, Aggregation, Sequencing*

1. INTRODUCTION

Learning is a cognitive activity that differs from student to student. It has necessitated the design of effective Instructional Template on Learning Content Management System (LCMS). The revolution in the field of Information technology and evolving E-learning standards like SCORM has motivated further study on creating platform independent learning content. In this paper we address the scope of SCORM in designing Learning Content Management System. SCORM is used to unify the different groups that work in the E-Learning area.

2. SCORM

SCORM [1] is the Shareable Content Object Reference Model; it's an inititative of the ADL (Advanced Distributed Learning Network) to modernize education and training and to promote cooperation between government, academia and business. It is aimed to provide high quality instruction anytime, anywhere, tailored to individual learners' needs with the underlying specifications and standards such as

- IEEE Data Model For Content Object Communication
- IEEE ECMAScript Application Programming Interface for Content to Runtime Services Communication
- IEEE Learning Object Metadata (LOM)
- IEEE Extensible Markup Language (XML) Schema Binding for Learning Object Metadata Data Model
- IMS Content Packaging and Simple Sequencing.

The SCORM standard is an XML-based industry formalization and the high level requirements defined for learning contents in SCORM are content reusability, accessibility, durability, and interoperability. SCORM enables the reuse of web based learning content across multiple environments and products. Clearly, it is not a model for learning content; but it is a model for content delivery. SCORM is a set of specifications that describes:

- How to create web-based learning content that can be delivered and tracked by learning management systems
- What a learning management system must do the proper delivery and track SCORM compliant learning content.

The SCORM model is focused on distribution of packaged learning objects and not on the detailed models of instructional system design that have been adopted by specific organizations but it focus is on the distribution of packaged learning objects for reuse. Fig. 1 shows the different SCORM

components. The specifications that make part of SCORM are organized in tow major groups: the Content Aggregation Model, Run-time Environment and Sequencing and Navigation.

3. DESIGN OF LMS

The Learning Management System (LMS) of SCORM can be applied to simple course management systems or highly complex enterprise-wide distributed environments (Fig. 2). It refers to a suite of functionalities designed to deliver, track, report on and manage learning content progress and learner interactions.

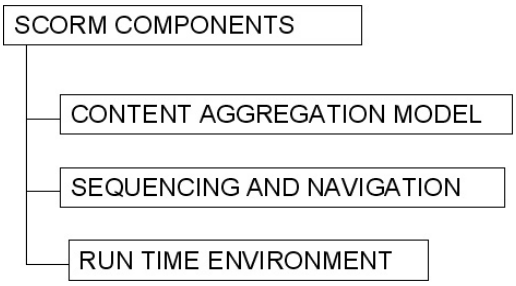

Fig. 1. The Components of SCORM

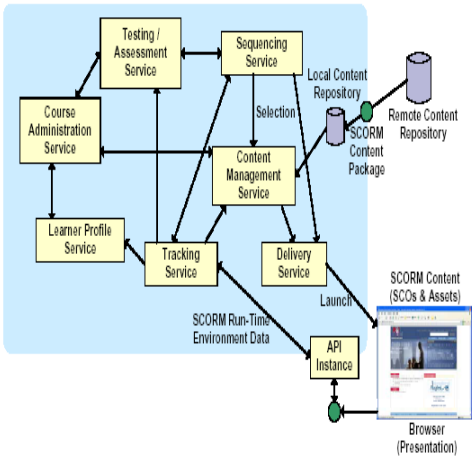

Fig. 2. A generalized model of LMS defined by SCORM

SCORM focuses on interface points between content and LMS environments and is silent about the specific features and capabilities provided within a particular LMS and its components. The initial study is carried out to derive the model of LMS and the learning content model. Referring the Fig. 2, the detailed LMS is defined for the proposed Virtual Learning Environment (VLE). It is described in the Fig. 3. The required components of the LMS are Learning Content Management System (LCMS) for course delivery, Student Information System (SIS), which provides the interface to the individual users, Test Builder System (TBS) for building assignment and online examination, and Feedback analyzer system (FAS) for identifying the usability of interface and the course delivery.

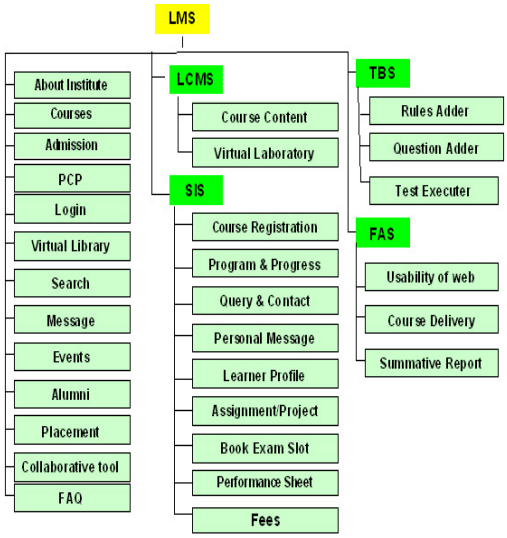

Fig. 3. The LMS for the proposed VLE

4. DESIGN OF LCMS

The Learning content model is derived by applying the Instructional Design on Educational and Information Technologies (Fig. 4). The main objective of such mapping is to identify the best interactive environment on web based education [9,10] and the factors' which has direct or indirect influence on learning outcome.

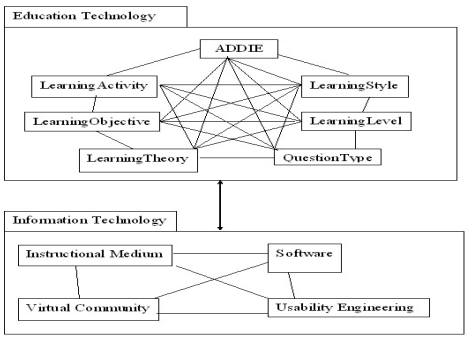

Fig. 4. Concept Class Mapping of ID

Fig. 5 is derived carefully to describe the generalized structure of "item" in the Learning

Content Management System. The applicability of the identified components defined in LCMS is based on the course and learners' preferences.

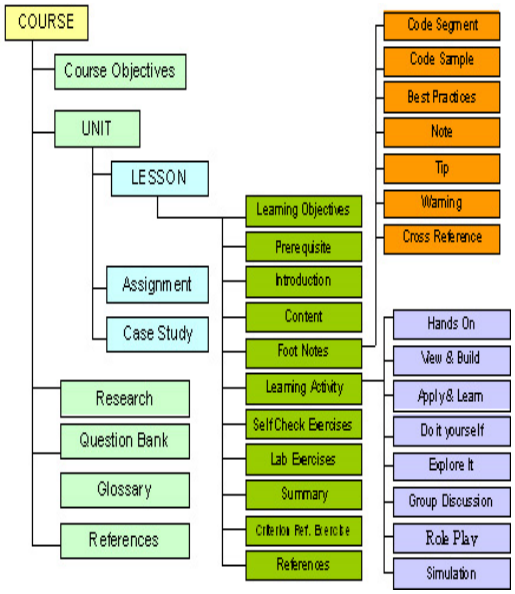

Fig. 5. The proposed structure of LCMS

The three standards defined in SCORM are Content Aggregation model (CAM), the Run-time Environment (RTE) and the Sequencing and Navigation (SN). The CAM [2] contains guidance for identifying components used in a learning experience, and promotes consistent storage, labeling, packaging, exchange and discovery of content. The model is based on the IMS Content Packaging Information Model [5]. A SCORM Content Package may represent a course, lesson, module, or may simply be a collection of related content objects. It is based on three components Assets; Sharable Content Objects (SCOs) and Content Organizations that are enabled by means of the Run-Time Environment.

Assets are an electronic representation of media, such as text, images, sound, assessment objects or other piece of data that can be rendered by a web client and presented to a learner. A SCO is a collection of one or more Assets that represent a singly launching learning resource [6]. A Content Organization is a map that represents the intended use of the content through structured units of Activities. The relationship of CAM components are described in the Fig. 6.

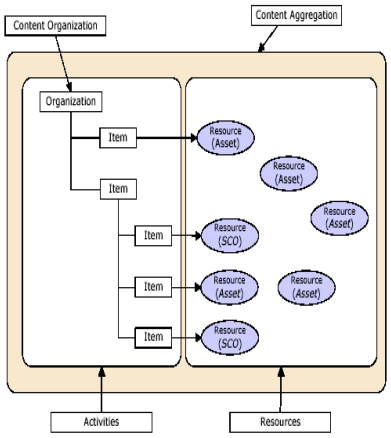

Fig. 6. Content Organization with Assets and SCOs

The IMS Content Packaging specification describes the interoperability between systems that wish to import, export, and aggregate and disaggregate content packages. The Conceptual diagram of Content Package is shown in the Fig. 7.

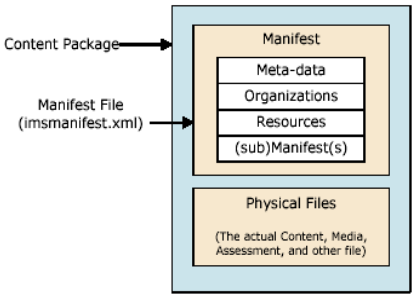

Fig. 7. Content Package Conceptual Diagram

The sample lesson page (Fig. 8) of the "Stress Management" Course is taken for describing the content package concept. The page has defined as html file with two images and JavaScript to wrap the components.

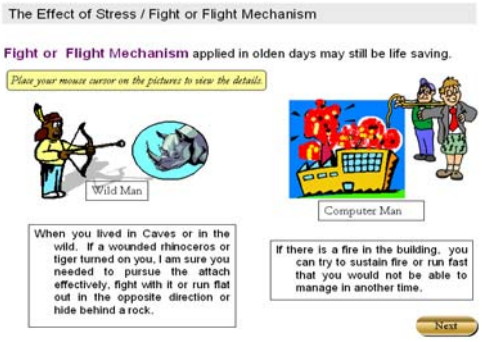

Fig. 8. The sample page of the Course Stress Management

The imanifest.xml file to describe the content packaging is shown in Fig. 9. In addition to the Content Organization, the SCO and Asset components of CAM (Kassahun, 2006) are represented as a <resource> element in imanifest.xml file.

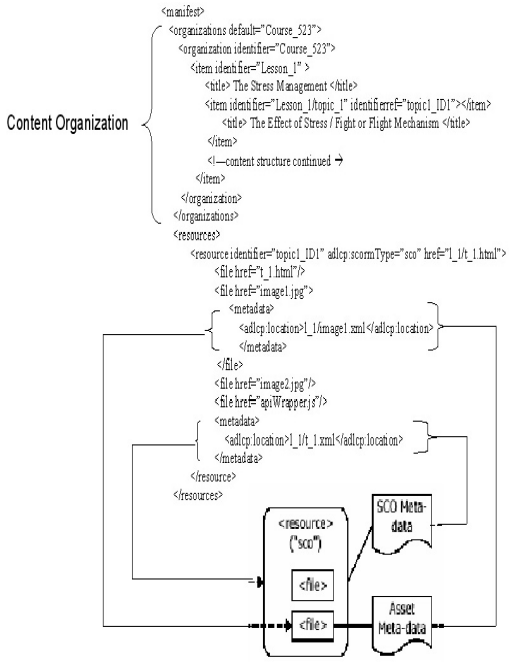

Fig 9. Content Packaging mapped with CAM components

The RTE [3] describes a content object launch mechanism, a communication mechanism between content objects and the SCORM engine on the server, as well as a data model for tracking learners' experience with content objects. SCORM conceptual RTE is defined in Fig. 10.

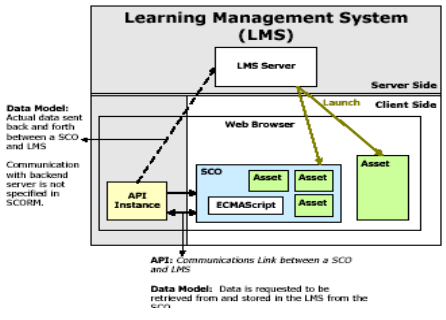

Fig. 10. Conceptual Run Time Environment

The LMS will launch the collection of content objects [8] and present it to the learner. Fig. 11 depicts how the content structure can be interpreted in an activity tree.

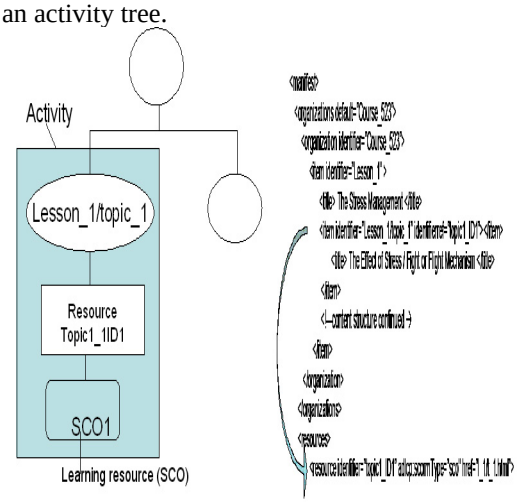

Fig. 11 Launch the Content Object

The SN [4] describes how SCORM conformant contents may be sequenced through a set of learner-initiated or system-initiated navigation events. The SN is based on the IMS Simple Sequencing standard [5]. It introduces new structures to aggregate Activities. The SN defines a method for representing an activity tree of learning activities managed by the LMS for each learner as shown in Fig. 12.

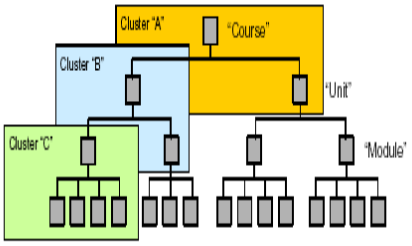

Fig. 12. Conceptual Activity Tree and Clusters of SCORM

5 . CONCLUSION AND FUTURE WORK

The SCORM standard is applied to the learning objects which is created and maintained at static location. However, the personalized or dynamic aggregation of learning object is not carried out. The Shareable Content Object (SCO) promised by SCORM must support pedagogical model that provides functionalities such as adaptive learning, collaborative learning and retrieval of state and shared data across the network. The migration of large learning objects produced the scalability problem and there is a lack-of-support of

personalized learning. The identified issues are taken for future implementation.

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