ABSTRACT

In this paper we present the process of learning object element extraction for enabling the reusing of Learning Object (LO) in e-Learning context. A prototype of learning objects repository that contain granular LO has been developed to show the process of granularizing LO. Each of existing LO will be extracted into granular element with the metadata and the system generated unique id for each LO based on its identifier (URL of LO) and save automatically the metadata contain in the LO. In future work these metadata will be used for searching and retrieval process of the granule LO.

Categories and Subject Descriptors

General Terms
Documentation

Keywords

1. INTRODUCTION

Electronic learning or E-Learning provides an environment where learners are able to access educational materials anywhere, anytime and at any place. Most of the educational materials located in the web environment or learning portals are in the form of digital objects. These digital objects are also known as Learning Object (LO) as they are used specifically for learning purposes in the educational environment.

One of the main motivations for having LO and Learning Object Repositories (LOR) is to allow educational resources to be reused by as many people as possible [1]. The reality now doesn’t show such repository of learning object allow of reuse learning object but more into shared LOs in coarse-grained form [2] [3] [4] [5]. In an empirical study of MERLOT repository [6], Heyer found that the majority of learning resources integrate several information objects and educational components in a fixed, immutable way, which implies that the degree of reusability is extremely low. Reusability requires the LO to be in a fine-grain form because raw media elements are often much easier to reuse then aggregate assemblies. In other words, as the LOs size decreases (lower granularity), its potential for reuse increases [7] [8].

This work looks into producing fine-grained form LO to enable LOs' reusability. The most obvious motivation in reusable learning object is the economic interest of reusing learning material instead of repeatedly authoring it and also enhances the quality of digital learning experiences [9] [8]. Other motivations can be found in the pedagogical area since learner-centric teaching theories invite instructors to use a wide variety of didactic material [10].

This paper will discuss the process of learning object element extraction for enabling the reusing of LO in e-Learning context. A prototype of learning objects repository that contain granular LO has been developed to show the process of granularizing LO. This system will produce a granular learning object from coarse-grained form learning object to ease reusable of LO.

2. METADATA STANDARD FOR EDUCATIONAL RESOURCES

One of promising approach for searching and retrieving LO is through the use of metadata – data that are used to describe other data. The purpose of metadata is to facilitate search, evaluation, acquisition and use of resources [11]. Metadata in e-learning allow learning materials to be well described and
easily searched, assembled in desired learning context, and delivered according to the learners’ preferences and needs of education [12]. As a result, users can retrieve to the learning content that most appropriate for them, and receive only the necessary and desired information.

According to Wiley [1], each LO must have a metadata consecutively for user to search and to reach related LO. IEEE-LOM (Institute of Electrical and Electronic Engineers/Learning Object Metadata) was a standard that have been used widely in e-learning context. IEEE LOM was released as IEEE 1484.12.1 in June 2002 [11].

The LOM specification contains almost 77 elements. These elements cover various aspects of the learning material including data about general content, life cycle, meta-metadata, technical characteristic, educational usage, rights, relations, annotation, and classification. Although IEEE LOM was a complete metadata specification that had been developed but organization or educational board may adapt apart of the element for their purpose based on requirement and rationale. As an example Barrit and Alderman[13] used several groups of metadata in IEEE LOM for their purpose. Another project in Sofia University Bulgaria, they selected metadata elements from IEEE LOM to describe their LO in order to generate the unique individualized learning path and match to specific learners’ preferences [12]. For our prototype we also selects metadata elements from IEEE LOM based on metadata extraction from the LO.

According to a study conducted by [14] on the metadata extraction based on content analysis, the finding shows that the most frequently used metadata elements are Title, Keyword, Type, Format and Identifier. Description, language, author and subject were also selected to support process of searching and also to maintain LO originality because we are using existing LO from LOR. These selected metadata aims to facilitate the retrieval and reuse of LO. They are presented in Table1.

<table>
<thead>
<tr>
<th>Table 1: IEEE LOM metadata groups selection</th>
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</thead>
<tbody>
<tr>
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</tbody>
</table>
3. WEB BASED LEARNING OBJECT EXTRACTION SYSTEM

We have developed a prototype of web based Learning Object extraction system to verify the process of LO extraction by generating a unique id for the LO. The Learning Object Extraction system workflow showed as following (see Figure 1):

i. When the URL of LO is inserted, the process of LO extraction element and metadata extraction starts. Metadata extraction is based on content analysis of the LO. These metadata will be used for searching and retrieval purposes.

ii. The filtering process will be carried out to select which element that had been extracted to be saved.

iii. 4 types of data that will be saved which are metadata, text fragment, images and video.

iv. Metadata of the LO will then be kept in XML format. XML is being approved as the standard for all future applications. The fundamental logic of XML that separate structure, content and presentation will allow the flexibility required for LO management.

Once the LO had been extracted automatically the system will generate a unique id for each of the identifier (URL of LO) and stored all metadata that contain in the identifier. The system wills also generating a unique id for text, images and video. Types of element that will be saved are text, title of the image and title of the video. A unique metadata id performs as a pointer (to link between tables) because one LO may comprise more than one element (text, image and video).

Table Metadata

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Id Metadata</td>
<td>2205147cc862c22535.06851773</td>
</tr>
<tr>
<td>Identifier</td>
<td><a href="http://www.smm.org/heart/heart/in-out.htm">http://www.smm.org/heart/heart/in-out.htm</a></td>
</tr>
<tr>
<td>description</td>
<td>Explore the heart and lungs through online science activities.</td>
</tr>
<tr>
<td>Subject category</td>
<td>Science and Technology</td>
</tr>
<tr>
<td>author</td>
<td><a href="mailto:joshuas@smm.org">joshuas@smm.org</a></td>
</tr>
<tr>
<td>keyword</td>
<td>Habits of the Heart, heart, lungs, heart and lungs, cardiovascular system, science, science activities, education, Science Museum of Minnesota</td>
</tr>
<tr>
<td>date</td>
<td>2008-03-03</td>
</tr>
<tr>
<td>language</td>
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</tr>
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</table>

Figure 1 : Learning Object Element Extraction Process
5. DISCUSSION & CONCLUSION

Process of learning object and metadata extraction has been discussed in this paper. The unique id that automatically generated for each LO is important to link between metadata and elements. At the moment we are using 9 of metadata elements which are Title, Language, Keyword, Description, Author, Format, Identifier (URL of LO), Learning Resource Type and Subject which are based on IEEE LOM standard. Metadata was an important element as it’s provides information about the object and its prospective educational usages. Learning object metadata is thus the key to reuse [15]. These metadata are beneficial for searching and retrieval purposes. Future work of this research will focus on possible technique for indexing the granular LO in order to retrieve and reuse the granular learning object for teaching and learning purposes.
6.0 REFERENCES


