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An application of creating and packaging learning objects

Beril CEYLAN^{a*}, Birim BALCI^b, Mustafa Murat INCEOĞLU^a^a*Faculty of education, Department of Computer Education and Instructional Technology, Ege University, 35040, İzmir, Turkey*^b*Faculty of engineering, Department of Computer Engineering, Maltepe University, 3485,7 İstanbul, Turkey*

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Abstract

Finding learning content is one of the problems that most learners face while developing their knowledge on the Internet. Should learning objects have special descriptive data along themselves; they could easily be found by learners. In such a case, it is necessary to package learning content in to a learning object. In this paper, materializing learning objects using Adobe Captivate and application of these learning objects in an experimental setting is discussed.

© 2009 Elsevier Ltd. Open access under [CC BY-NC-ND license](http://creativecommons.org/licenses/by-nc-nd/3.0/).*Keywords:* content package; ReLOAD; Learning content desing manager, learning object; instructional technology

1. Introduction

Learners use internet as a learning source. However, they find tremendous information on the Internet, but they have problems while choosing which are useful. It is hard to decide on the suitable information. In that case indexing becomes a necessary process to aid learners in finding suitable information. If all the learning contents had definitive information along with them, they would easily be searched and found. Some tools called content package are used to put these definitive information into the object. Some definitions about the standards of content packages provide the communication between learning materials and Learning Management Systems (LMS). LMS makes it easy to observe how many times the learning object was used, which materials was used, how long was the learners online and reports about evaluations (Greenberg, 2008; Ceylan, 2008)

In this study, learning contents are packaged using a content packager Learning Content Design Manager (LCDM) and these objects are put into an LMS. 40 students took part in the experiment and they were divided into 2 groups, namely experiment and control groups. A pretest – posttest model was conducted for assessment purposes.

Paper line-up is as follow; characteristics and importance of packaging process is discussed in second section. Third section covers a literature about learning content packagers and comparison of two content packaging systems

* Beril CEYLAN. Tel.: +90-232-388-4000/1628; fax: +90-232-373-4713.

E-mail address: beril.ceylan@ege.edu.tr.

named ReLOAD and LCDM. Details about experimentation reside on the fourth section and conclusions will be discussed in the fifth section.

2. Learning Objects

The first definition of the term learning object was done by Wagne Hodgins in 1992. He captured learning object idea while watching his child playing with LEGOsTM. He thought that learning must has a block strategy conducted with plug in/out mechanism. Like LEGO blocks, learning contents can be divided into small chunks for the better understanding (Hodgins, 2002 ;Ceylan and Inceoğlu,2008).

According to Willey learning objects are assets used for supporting people's learning. He claims that learning objects must be designed like smaller chunks with an open standard system. Content and courseware must be reusable, easily manageable and interoperable throughout the online learning (Willey, 2000a; 2000b; Ceylan and Inceoğlu, 2008).

Another definition about learning objects was done by English. He defined the learning objects as, the combination of learning that stored in an independent way also they are accessible subjects (Cebeci, 2003; Ceylan and Inceoğlu, 2008).

All these definitions seem that learning objects are digital assets including content and metadata. In the content main part there are three sub parts. These are instructional strategy and theories, goals and assessment. In the metadata part there is information about object's keywords, identity, cataloging, rules, techniques and educational definitions (Ceylan, 2008).

2.1. *The characteristics of learning objects*

Learning objects has six characteristics. They must be reusable, interoperable, adaptable, flexible, updateable and manageable.

Reusability is the most important characteristic of learning objects. It's the main purpose of an object. Because people desire using them many times. Successive usage is increases value of learning contents.

Interoperability means that independence from a system. Take into different platforms and being accessible where the learner want is the main idea of this characteristic.(Karaman 2005; Ceylan 2008).

Manageability is another characteristic means that learning objects must be easily found, added, changed and updated (McGreal ve Roberts, 2003; Karaman, 2005).

3. Content Packages

Packaging is an important issue for learning object interoperability. In this section two of content package is explained and their similarities and differences are discussed.

3.1. *Creating content packages on LCDM*

Content Package (CP) creation can be done in Project Management module. And the created CPs can be reached from the Packet Manager Module. On LCDM platform, projects are not hold in a directory structure. Project information and the different versions of a project are hold in database. In this module, publisher can see the projects related to the lessons he gives and the versions of that projects. To create a new project for a selected lesson, publisher has to define a name, description and a version number. The content organization of a project is done by using the resource files and the URL definitions in the File Management module. And the information about these files is taken from the database.

The user interface for content organization creation for a project includes 2 tree-view structures. The first one includes the files/URLs uploaded/defined by the publisher and the files uploaded by the other publishers and marked as "shared". The other one is for the content organization of the project. By dragging and dropping the files from the resource files tree to the content organization tree, it is formed. On the content organization tree, right-click function works for each organization, each object of an organization, and each file related to each object. It is possible to add and delete an organization, to add new item under it, to open metadata editing interface and sequencing rules

interface by right clicking on an item. Also “TimeLimitAction”, “DataFromLMS”, “CompletionThreshold”, “Presentation” information can be entered by right-clicking on items. If publisher wants, it is possible to enter the properties of the packet and resource files. After these steps, publisher has to save the organization as a CP. While saving, the organization is placed the related areas of the “imsmanifest.xml” file, all the resource files and the “schema” files are collected in a directory and zipped with the name of the CP.

A project can have more than one version. To do this, a publisher can create a new version by entering a new version number before starting the content organization, or can open an existing version, make changes on the content organization and save with a new version number. Because everything related to the project are hold in database, directories do not created for the versions and the system capacity do not wasted.

A publisher can see the name, version number, addition date and the information about the organization of each version of a project. And he can make updates on this information. The prepared CP is zipped and saved under the related lesson with the name format “projectname_versionname_versionnumber”.

3.2. Comparison of ReLOAD and LCDM

ReLOAD is an editor for editing metadata definitions and creating content objects. It can create, import, edit and export LO metadata and content packages. It is written with Java and it is not a web-based application (Balcı and Inceoğlu, 2006).

LCDM, Learning Content Design Manager, is the first application in Turkey combining several functions together and it is for university level use. It is a platform for metadata editing and content packaging, too (Balcı, 2007).

The similarities of these two tools can be given like this. They both support SCORM2004 standard. They support IMS content packaging. ReLOAD supports IMS and SCORM metadata specifications. LCDM supports IEEE LOM rules for metadata editing. LCDM also supports IMS Simple Sequencing rules. Both ReLOAD and LCDM makes possible to packet the contents, to reorganize the content package (CP), to preview the resource files and CPs without a need of an LMS. Also they provide metadata editing to the independent files, the files used in a CP and the CP itself. Both of them support a tree-view graphical user interface for metadata editing. And both of them have preview functions for resource files and for the CPs without a need of an LMS. On the other hand, there are many differences between these tools. These are:

- ReLOAD is an open source tool written with java. LCDM is not open source, it is written by using IIS, ASP.NET, XML, C#, javascript languages and SQL database.
- LCDM is an online platform and it is not a part of an LMS, but the created contents can be used in different LMSs which supports SCORM2004.
- Three user groups, publisher, learner and administrator, are defined in LCDM platform. But it is possible to create new user groups. A publisher can upload the resources and add links to the system. By using the resources from the resources pool, he can create content organizations related to the lessons he gives. He can edit metadata definitions, create LO CPs. A learner can see the list of the completed CPs related to the lessons that he/she takes. It is possible to download a CP and see a preview. An administrator can define new languages in the platform; perform all the functions related with the modules and the functions what the other users can do.
- LCDM has 12 modules: Group, User, Lesson, File, Project, Packet Manager Modules, Preview, Search, Metadata, Sequencing, Upload Completed Packets, and Language Manager Modules.
- On LCDM, group manager module is used to create a new group, add users and make related updates. Course Manager Module is used to add, define, delete lessons, and choose the users related to that lesson. User manager module is used to update the users' information, add users to groups, select the lessons of that user, etc.
- File Manager Module is used to upload the resource files and the references of them to the repository. It is possible to hold the previous versions of a file in the database. Shared files are marked and can be used by the publishers in their contents. It is possible to download a file and to delete a file from the repository if it is not a part of a project. This module provides to organize the files under directories. These properties are not included in ReLOAD. Because it is an online and sharable platform, LCDM has two repositories (Balcı and Inceoğlu, 2007). One for learning resources and one for CPs. By search module, according to the metadata elements, it is possible to search resource files within the resource files repository and the CPs with in the CPs repository. ReLOAD does not have any repositories.

- Metadata module is reachable only by the publishers (Balcı and Inceoğlu, 2008). Different from ReLOAD, the resource files metadata is saved as standalone files in the resource files repository. So if a file which has a metadata definition, is wanted to be used in a different content package or organization, it is taken with its' metadata. But the metadata of each component (asset, SCO, item, organization and CPs' itself) of a CP, is embedded to the related parts in the CPs' manifest file.
- LCDM has a Multilanguage support, but ReLOAD does not. On LCDM, Turkish and English are defined but it is possible to define new languages. When a user selects a language the user interfaces changes according to that language.
- Different from the ReLOAD, LCDM platform provides you to download the files and CPs. The CPs that designed according to the SCORM and can work on an LMS, can be downloaded. Also the preview format of the CPs can be downloaded too. LCDM provides you to upload the prepared CPs according to Scorm 2004. After uploading the compressed CP files, they are marked, unzipped and recorded under the related tables in the database. The packets prepared by Reload Editor are uploaded and tested. Uploaded packets can be processed as the other packets on the platform.

4. The Experiment

In this study the learning objects created for the lecture named Instructional Technology in Education I. This is a lecture given in Computer Education and Instructional Technology department of Faculty of Education. 40 students took part in the study. 40 students divided into two groups names experimental and control groups. All the students took pre, post and follow up tests. Results of these tests statistically evaluated.

Experimental group used the learning objects on an LMS named MOODLE. MOODLE has reporting, event, course and user management tools that are easily used by learners, teachers and content managers (MOODLE, 2008). Meanwhile the control group continued traditional learning activities.

By the results of pretest, statistical equality of two groups is accommodated. Table 1 shows the total number of students, mean, standard devaluation and p meaningfulness.

Table 1 Equality of groups

Group	N	X	S	Sd	T	p
Control	20	24,325	14,310	38	0,036	,972
Experiment	20	24,175	12,032			

*p>0,05

As Table 1 shows, the control and experiment groups are equally balanced. With this result the experiment has begun. At the end of the experiment repeated measures statistical evaluation was used for measure the experiment's value. The result of this measure is given in Table 2.

Table 2 The significance value between the experiment and control groups

Source of Variance	Squares Sum	Sd	Squares Mean	F	p
Between groups	12869,691	39			
Group (person/group)	340,033	1	340,033	1,076	,306
Missing	12529,658	38	315,995		
Into groups	19078,667	80			
Measure	14934,617	2	7467,308	143,565	,000
Group*measure	191,017	2	95,508	1,836	,166
Missing	3953,033	76	52,014		
Total	31948,358	119			

Table 2 shows that there is no significant difference in meaning for the 0,005 of devaluation. This result refers to the experimental setting that was conducted using learning objects and LMS is as effective as the traditional learning activities. Students can be successful with learning objects. This is clearly shown in fig 1. Fig 1 shows pre, post and follow up test results of control and experiment groups.

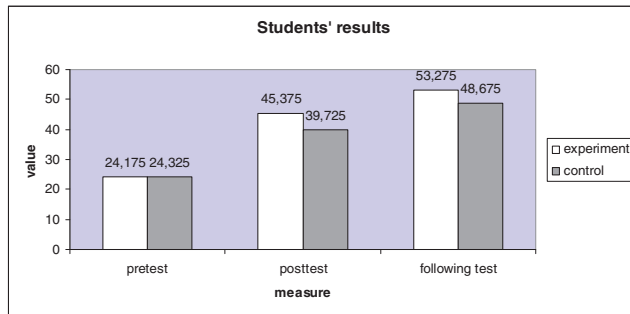


Fig 1 Students' success values on the exams

While both groups' test results increase by the time, it is obvious that experimental group's results are slightly higher than the control group's results.

5. Conclusion

It is clear that learning activities must be more flexible in the future. People wonder ubiquity of their learning. Learning objects could be a good match for this problem. Learning packages give learners chance to test their learning by themselves.

Should learning objects match ubiquitous learning desire of people, they have to be prepared and packaged carefully with appropriate standards. Packaging is an important and time consuming process therefore people are searching for effective and easy to use tools to get the job done. It becomes an important issue to choose the just right learning content packager.

This paper presented and compared two of the content packagers. Learning content creation process is explained using the LCDM tool. What gives advantage LCDM over ReLOAD packager is its ability to use online repositories and learning object download support.

The experimental study showed that online content usage is as effective as traditional classroom activities. It would be more appropriate to use them to support learning activities and increase learners knowledge and abilities about computers.

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