

Library and Information Sciences: A Development of Learning Approach

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Abstract: The concept of learning object has changed the way teaching materials are created, developed and distributed. This approach can contribute to an improvement in the quality of teaching/learning and data dissemination without the stakeholders needing to be technology experts. This paper aims to describe and evaluate learning objects created by students of the Digital Content, Documentation and Archiving module of the postgraduate course in Library and Information Sciences offered by the Polytechnic Institute of Tomar in 2011/2012. The paper also presents students' feedback about the training provided, the use of eXeLearning, cataloguing of the learning object, its upload to a repository and its use in a professional context. The results show that students have welcomed this technology. They have considered the training provided as appropriate and found eXeLearning easy to use, as well as the cataloguing of the learning object with metadata and its upload to a repository. Most participants considered using learning objects in their own working contexts.

Key words: Learning objects; metadata; repository; learning; eXeLearning; library and information sciences

I. INTRODUCTION

Since the 90's of the last century, learning objects have aroused great enthusiasm among education providers [1]. According to Wiley et al. [2], the ethos of learning objects is consistent with the work developed by Ted Nelson who has foreseen that in the future the operating unit of hypermedia systems would be the version and not the document.

According to Hodgins [3], learning objects are destined to revolutionise the way teaching materials are created, developed and delivered. Its applications are varied [4] and its benefits are enormous, and therefore constitute an excellent option for teachers, particularly for librarian-teachers and for those who deal with documentation matters and need to transmit knowledge and skills to students and their peers as part of their professions.

II. LEARNING OBJECTS

According to Wiley [5], a learning object is any digital resource which may be reused to support learning. Its main characteristics are reusability, interoperability, durability and accessibility [6]. According to Shepherd [7], there are three types of learning objects: integrated, informational and practice. The development of learning objects must be based upon a model that describes the individual's or the institution's strategy in this matter [8]. In this work, we have explored the model proposed by [9] and the Multiple Perspectives Model to Structure Learning Objects [10]. Once created, learning objects are catalogued with metadata and deposited in repositories.

Metadata are used to help identify, describe, manage and locate learning objects. This is information that can be embedded in the code of the learning object (embedded metadata), stored in a file that accompanies the learning object (associated metadata) or in separate databases (third-party metadata) [11]. Currently, several metadata standards and specifications co-exist. The *Dublin Core Metadata Element Set* (DCMES) is one of the benchmarks of documentation sciences in the digital context having received the contribution from professionals in a wide range of areas from librarians to computer professionals [12].

Storage and management of learning objects make use of repositories that are either stand-alone or are included in other services such as a *Learning Content Management System* (LCMS) [13]. Lehman [14] class them into generalist, thematic and commercial. Among the most popular are *Agrega*, *ARIADNE*, the *International Database of Educational Objects*, *Connexions*, *HEAL*, *Illumina*, *MERLOT* and *SMETE Digital Library*. In Portugal, the e-Learning repository from *TecMinho* is the main reference.

The use of standards and specifications in the creation of learning objects facilitates its sharing and according to *ADL* [15] it can reduce related development costs between 50 and 80 percent which justifies the extensive work done in this field during recent years [16].

The *SCORM* model - the main reference in this field - includes a series of guidelines, specifications and rules developed by several organisations in order to establish a standardised way of sharing learning content between different systems and technologies (LMS, repositories, edition tools, etc). Creation of learning objects according to the *SCORM* model can be done through authoring and packaging tools such as *Adobe Captivate*, *eXeLearning*, *KnowledgePresenter*, *Lectora*, *Sculptoris*, *Trident* or *Xyleme Studio* [8].

This research made use of *eXeLearning* - a tool developed by the University of Auckland, the Auckland University of Technology and Tairāwhiti Polytechnic with the financial support of the New Zealand Government Tertiary Education Commission.

This tool enables us to easily and quickly create standard learning objects making use of text, audio, video, animation, Adobe Flash films, Java applications and PDF files among others, as well as Web 2.0 content. Files are stored in *ELP* format and can be exported in various formats: *SCORM 1.2*, *IMS Content Package*, website, single page, text file and *iPod* notes.

Although the content of learning objects may be free and open, copyright and intellectual property must be ensured and in this regard the *Creative Commons* licences are an excellent option. In Portugal, the current version is 2.5 and includes six user licences [17].

III. CREATING LEARNING OBJECTS WITH EXEARNING

Political and administrative developments have caused significant changes in the public administration paradigm in general and particularly in documentation and information sciences [18]. The need to provide libraries, archives and documentation centres with skilled staff who are prepared to deal with paper-based but mainly with digital documents, prompted the Polytechnic Institute of Tomar to initiate the 2011/2012 postgraduate course in Library and Information Sciences. The course is aimed mainly at:

1) "Delivering professionals in the library and information sciences sector who are capable of ensuring a quality work considering the civilisational changes in this new millennium and

2) "Meeting the demands of School Libraries as established by Decree No.756/2009 dated 14 July concerning the creation of the Librarian Teacher career"[18].

The curriculum of this postgraduate course includes an ICT module called "Digital Content, Documentation and Archiving" in which the students are expected to become familiar with the standards concerning the treatment and handling of digital documentation and to gain skills that will enable them to use digital content repositories on the Internet, implement systems for the electronic management of documentation, create and catalogue digital content and use Web 2.0 tools. In the context of the module, the students have been challenged to create learning objects in their area of activity, catalogue them and upload them to a repository.

A. Characterisation of Participants

Of the 39 students enrolled in the postgraduate course, only 6 did not attend the module Digital Content, Documentation and Archiving. Of the students who participated in the module activities, 84.8% are women and 15.2% are men. When it comes to age, we observed that the mode is 34 years. The minimum age is 32, the maximum is 50 and the mean is about 39.

The sample included 10 students were librarian teachers, 6 were librarians, 5 were teachers, 3 were library officers, 3 were library technicians, 3 were technical assistants, 1 was an archivist, 1 was a clerical worker and 1 was a freelance worker. When questioned about their familiarity with the creation of educational content with the support of computer tools, 48.5 per cent of the respondents reported having "little" familiarity, 39.4 percent "reasonable" familiarity while the remaining participants reported having "none".

B. The Learning Objects Created

The 33 students were divided into four working groups and each group developed a different learning object (Table 1). Most learning objects are informative. Stimulating the interest in reading and promoting reading and writing skills as well as creating a read/write repository are further goals of the learning objects.

TABLE 1. LEARNING OBJECTS CREATED WITHIN THE MODULE DIGITAL CONTENT, DOCUMENTATION AND ARCHIVING

Title	Objective
José Régio Repository	Disseminate José Régio's works.
Municipal Library of Vila Nova da Barquinha	Present and disseminate the Municipal Library of Vila Nova da Barquinha and its bibliographic collection.
On-line readings	Stimulate interest in reading and develop reading, writing and information literacy skills.
Integrated Risk Management	Show how the conservator-restorer profession articulates with documentation science and its significance in the safeguard of cultural property contained in libraries and public archives.
Next Stop is the Best Stop	Create a repository containing digital content related to reading.
A Tour through Regional Literature	Promote regional literature namely José Poças (father and son).
School Library of Atouguia	Promote interest in reading.
IPT Documentation Centre and Archives	Presentation and Dissemination of IPT's Documentation Centre and Archives.
Mubliando	Disseminate activities and events targeted at children in a non-school context.
Carlos de Almeida Museum House	Disseminate the Carlos de Almeida Museum House.

All learning objects have been created with the eXeLearning software, catalogued according to DCMES, are in compliance with the SCORM standard and copyright has been ensured through the Commons Creative Licence.

The evaluation of the objects' potential has been done by the lecturers in charge of the module using the evaluation grid proposed by Bennett and Metros [19]. The grid includes three dimensions: content quality, usability and potential effectiveness as a teaching tool (Table II). Every dimension includes a set of items that are evaluated based on a Likert scale where 5 corresponds to "strongly agree" and 1 corresponds to "strongly disagree".

TABLE 2. EVALUATION OF LEARNING OBJECTS (STRONGLY AGREE [5] – STRONGLY DISAGREE 1)

Quality of Content		Assessment
A	Is clear and concise	5
B	Demonstrates a core concept	4
C	Is relevant	5
D	Provides accurate information	5
E	Is flexible and reusable	4
F	Includes adequate amount of material	5
G	Summarizes the concept well	4
H	Quality of content very high	4
I	Overall rating	4
Usability		Assessment
A	Is easy to use	5
B	Has very clear instructions	5
C	Is engaging	5
D	Is visually appealing	5
E	Is interactive	4
F	Is of high design quality	4

G	Overall rating	5
<i>Potential effectiveness as a teaching tool</i>		<i>Assessment</i>
A	Identifies learning objectives	3
B	Identifies prerequisite knowledge	3
C	Reinforces concepts progressively	4
D	Builds on prior concepts	4
E	Demonstrates relationships between concepts	5
F	Is very efficient (one can learn a lot in a short period of time)	5
G	Overall rating	4

Some groups identified learning objectives and knowledge prerequisites only in the metadata, which has negatively influenced the average of these two items, in terms of the potential effectiveness of learning objects as teaching tools. In general, the evaluation results have been very satisfactory, both in terms of content and usability as well as in terms of effectiveness as a teaching tool.

IV. STUDENTS OPINIONS

On completion of the module, we questioned the students about the creation of learning objects and their potential use in their own working contexts. To collect the data a questionnaire was prepared in the SurveyMonkey tool. The questionnaire included mostly multiple-choice closed-ended questions and some open-ended questions. The tool was validated by an expert in the area.

As far as training with eXeLearning is concerned, 93.9% of the respondents consider it appropriate and only 6.1% reported that some questions remained unanswered. None of these respondents justified his/her answer. For 12.1% of the respondents eXelearning was very easy to use, 66.7% found it easy to use and 21.2% neither easy nor difficult.

Most respondents (57.6%) found it easy to catalogue learning objects with metadata, 9.1% answered "very easy" and 30.3% answered "neither easy nor difficult". One respondent however, found the cataloguing of learning objects difficult. Most respondents found it easy to deposit a learning object in a repository (15.2% found it very easy and 39.4% found it easy). 33.3% answered "neither easy nor difficult" and 12.1% found this task difficult.

When questioned about their prospects of using learning objects in their own working contexts, 84.8% answered that they intended to use them and the remaining respondents answered that perhaps they will use them.

Those who intend to use learning objects in their own working contexts justify this on the grounds that this tools

- are very interesting for promoting learning (21.3%);
- constitute an innovative way of presenting educational content (17.9%);
- constitute an attractive way of disseminating information (14.3%);
- allow a positive strategy to achieve learning objectives (10.7%);
- improve students' motivation (10.7%);
- stimulate research (7.1%);
- make learning more effective (3.6%);

- allow easy creation, edition and dissemination of educational content (3.6%);
- allow the use of information in multiple contexts (3.6%);

and that

- ICT technologies are crucial to create high-quality teaching content (3.6%);
- created content can be used in several "platforms": websites, repositories, LMS, etc. (3.6%).

Of the five respondents who answered "perhaps", only two justified their option. One of them said that the usage of learning objects in their working contexts is dependent upon the will of his/her employers and the other that it is dependent on future needs.

As to the purpose of the learning objects, the following was mentioned by the respondents:

- support for classes (21.2%);
- delivery of subject content (18.3%);
- information dissemination (18.3%);
- advertisement of institutional activities and resources (12.1%);
- educational/entertainment purposes (3%);
- provision of reading record sheets (3%);
- dissemination of undertaken research (3%);
- student interaction (3%);
- creation of exercises on taught subject matter (3%);
- dissemination of editorial news, reading records and tests (3%);
- creation of a digital repository to host a database of a document collection (3%);
- library promotion (3%).

V. CONCLUSIONS

Learning objects can be used in any field of study and at any educational level from primary to higher education [20]. Among other benefits, this approach enables lecturers to quickly prepare high-quality learning materials and activities [8]; makes full use of virtual learning contexts [8] and is an excellent medium to promote and disseminate on-line information [21].

The learning objects created by the participants have quality content and a good usability and potential effectiveness as teaching tools.

The vast majority of participants (84.8%) consider using learning objects in their own working contexts and the remaining participants perhaps will use them. The fact that the tools are an attractive, innovative way of promoting learning (21.3%), of presenting educational content (17.9%) and of disseminating information (14.3%) are the main reasons cited. The main purposes mentioned are support for classes (21.2%), delivery of subject content (18.3%), information dissemination (18.3%) and advertisement of institutional activities and resources (12.1%).

The results show that it is easy to create quality learning objects and reflect the participants' enthusiasm for the prospect of using them in their own working contexts. The maximisation of these teaching materials will depend on their use in multiple contexts and the validation of its development model will depend on the results of the evaluation of that use.

VI. REFERENCES

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