Evaluating a Learning Object Repository: A Pilot Study

Catherine Caws
University of Victoria

Abstract

This article describes a pilot study performed in the Fall of 2004 in order to evaluate the functional aspect of FLORE, a new learning object repository for French teaching and learning. The study seeks to elaborate a standard and iterative evaluation process in order to better analyse the educational value of learning object repositories. Developped as a prototype, FLORE is a web portal similar to MERLOT or CAREO that aggregates a collection of objects and sites for the community of educators and learners of the French language. The author here describes its specificities and draws initial conclusions based on the participants' evaluations and contributions towards the further development of the repository.

Introduction

Definitions of Learning Objects (LO) abound and no consensus has yet been established. For the purpose of this study we will describe LO as digital files that: a. facilitate the creation of e-learning experiences, and b. are stored within repositories. These repositories, similar to library catalogues, represent the mechanisms that allow the exchange, reuse and retrieval of these digital pieces of learning. For many educators, designers and technicians, learning objects constitute a major break-through in the complex world of education and as such, "represent a major paradigm shift away from the traditional unit of learning that has dominated formal education for the last two centuries-the course" (Millar 2002). Yet, despite, some resounding successes in the world of learning objects, difficulties still loom. Friesen (2003) states that the problems associated with learning objects and the technologies relating to them is directly linked to the very definition of learning objects which currently remains unclear. Another critical issue in the development of efficient learning object repositories (LOR) as explained by Wiley (2003) lies in the fact that in order to facilitate the reuse and exchange of learning objects, designers sometimes attempt to remove as much as the learning context as possible. The question of teaching or learning practices supported and/or promoted by learning objects has hence

become an important, and potentially controversial, issue by claims of their "pedagogical neutrality". If the design of learning object repositories is moving towards decontextualization, it is therefore going against current research in educational practice that emphasizes the pre-eminence of "learning in context" in situated learning, socio-constructivist or socio-cognitivist theories. As noted by Richards "although learning object repositories may provide a better mans of discovering and distributing learning objects, repositories do not themselves address issues of pedagogy" (Richards et al. 2002, 76).

Current research in learning objects focus primarily on promoting and developing technically-enhanced systems to distribute learning objects (Friesen 2004). These projects, although necessary, are neglecting one key element in the learning paradigm: the user. Indeed, knowing how educators and learners navigate through these virtual learning environments is crucial to the development of efficient tools for learning electronically.

In the present article, we will focus on a new learning object repository, which we design specifically for learning and teaching French. This repository is a prototype web portal created with the premise that peer review and evaluation will contribute to its development and its promotion. In addition, this repository has recently provided an opportunity to develop a program of research to understand the impact that a learning object repository may have on instructors, learners and consequently designers.

With this in mind, the objective of this article is twofold. First of all we intend to describe our learning object repository and explain the research methodology used to set up a preliminary method of evaluation by users. Secondly we will present the initial results of our evaluation in order to draw conclusions as to some features that need to be implemented in our learning object repository for French.

FLORE: a prototype

FLORE (French Learning Object Repository for Education: *http://www.digitalfrench.ca/flore*) is an experimental prototype that was developed to initiate our research and to gather preliminary data. The project is a collaborative endeavour initiated by Dr. Martin Beaudoin at the Faculté St Jean, University of Alberta. Dr. Beaudoin's expertise in interactive

database management and web design has already been established in previous projects. Soon after FLORE's initial development, three other researchers involved in computer-assisted language learning joined the project. Dr. Norm Friesen, currently a post-doctoral fellow at Simon Fraser University, is the director of the CanCore initiative and he represents Canada in a number of standards development forums, including the IMS and the IEEE LTSC, and is a member of the official Canadian delegation to ISO/IEC JTC1 SC36 which develops technical standards for "Information Technologies for Learning, Education and Training." Dr. Christian Guilbault works in the area of French linguistics at Simon Fraser University; his role in the project is to contribute primarily to the improvement of the content of the site and to conduct research on the pedagogical significance of some of its applications. As for the author, her role in the project is to define the research criteria, and set up strategic plans for the proposed research program, and contribute to the enhancement of intellectual exchange across academic disciplines and among researchers, communities and knowledge users.

The repository is currently composed of over 1000 learning objects corresponding to major components of the French language and grammar. The interface provides various ways to extract the information: by subject through the general index, by popularity or frequency of use, by keywords. Furthermore, the interface includes site evaluation and book-marking capabilities. The current repository is operational and can be used productively by learners and instructors. However, the metadata and interface of the repository have not yet been tailored to the competencies and requirements important in French language learning contexts.

FLORE differs from other online repositories such as MERLOT (Multimedia Educational Resource for Learning and Online Teaching: www.merlot.org) because it contains links to very specific objects such as tables extracted from a larger web site for instance, in addition to links to full web sites. By using the advanced search function, users can find sites or learning objects that answer specifically their own learning or teaching needs.

Research methodology

In order to explore how learning objects can mediate learning and what kind of practices adapt best to this new learning technology, we initiated an evaluation process based on the design experiments used in educational research. The design

experiment methodology was originally developed by Brown (1992) and Collins (1992) and is best described as a process by which an iterative process of experiments is used to refine an educational tool. Cobb et al. explain clearly a key feature of design experiments by stating:

Design experiments ideally result in greater understanding of a learning ecology- a complex iterating system involving multiple elements of different types and levels- by designing its elements and by anticipating how these elements function together to support learning (Cobb et al. 2003, 9).

The present pilot study reports on the first set of evaluations that occurred during the fall semester of 2004. We used both qualitative and quantitative inquiry approaches involving surveys, journal writing and focus group sessions in order to test and evaluate the first prototype of FLORE.

A total of nine participants (students in first and second year in the Department of French at the University of Victoria, Canada) were invited to test and evaluate FLORE. In order to assure that these participants had enough background in using technologies, we first surveyed their abilities by way of a survey. Some questions required participants to either indicate their responses on a 5-point (Likert) scale and other questions were multiple choices.
All students reported being mostly used to email (4.57) and other form of internet communication (web mail and MSN); they were all familiar with search engines and web searching (4.29) but not very experienced with the concept of learning object repositories (2.29). Students stated that they spent between 5 and 6 days a week using the internet for personal activities and between 3 and 4 days for school related activities. Google was the most common search engine used by participants on a regular basis. These results align with current research on the social aspect of the computer and Warschauer's view that "people access digital information in a wide variety of ways and usually as part of social networks involving relatives, friends and co-workers" (Warschauer 2003, 47). In addition, we can assume that the easiness towards the computer technology expressed by our participants influenced their attitude towards our learning object repository prototype.

Although the number of participants is low, the amount of data collected represents a good basis for the continuation of our program of research. All participants were given specific

instructions for their evaluation of the learning object repository. They had to spend 6 hours each, within a 3 to 4 weeks period, exploring French learning resources on line. For each session on the internet, they had to record their findings, time and length of their session, and any remarks, suggestions or problems they had encountered while exploring the learning object repositories. At the end of the 6 hours, each student had to fill out a survey and participate in a focus group session where a discussion with the researcher and other participants was recorded. Each student had to perform one specific task and one general task in the search engines or learning objects repository. For each task they explored the same three internet web based platforms: FLORE, Google, and Clicnet (*http:// www.swarthmore.edu/Humanities/clicnet/*).

The specific task required students to find on-line exercises or sites explaining or illustrating the agreement of nouns and adjectives in French. The general task would have students look for any on-line materials on French vocabulary. By using the three environments noted above, students were to compare their findings and note any information or features that they believed should be included or changed in FLORE.

Data analysis and findings

A research assistant transcribed all recorded materials and written materials and recorded numerical information from the survey to obtain an average for each question. In our data analysis, we looked for major themes and number variances in the quantitative analysis. A summary of the quantitative analysis is included in annex. The questions included in the written survey provided an opportunity for students to offer their perspectives on the content of FLORE, its interface and functionality and to compare this repository to Google and Clicnet.

The quantitative results obtained from the survey are encouraging for our research. Students reported a general satisfaction regarding both the content of FLORE and the interface of FLORE. This visual aspect of learning object repositories is essential to motivating users to work. Further research is planned in this aspect in order to improve the functional aspect of FLORE and to offer greater research capabilities to the users. Specific comments were made by users with regard to the organisation of the information, design of the pages, mild lack of flexibility within the repository and limited variety in the results given by the engine. These remarks appeared both in the journal notes and during the focus group

discussions. To comply with our design experiment research methodology, these observations will be addressed in the forms of functional changes within the repository before we implement our next set of testing by users.

Most students agreed that FLORE was fast, easy to use and they appreciated the evaluation capabilities offered by the system. Although all students did not use it automatically, it is encouraging to see that they are ready to use metacognitive learning strategies. According to Oxford (1990), Duquette and Dionne (2000), Germain and Netten (2004) one key feature in improving learners' ability towards the L2 acquisition is to develop strategies such as problem-solving, evaluating, organizing, finding about language learning opportunities, where students become more self-reliable. Our hypothesis is that learning object repositories can contribute to this metacognitive expansion as long as their structure and functional capabilities are specifically targeted towards language learners and/or instructors. Furthermore, students expressed an interest in having every site and learning objects associated with a level assessment. This need for specific tagging of objects has been recognized as a promising avenue to better distribute learning objects (Richards et al. 2002). In addition, systems are being implemented to encourage consumer reviews of learning objects, such as the Learning Object Review Instrument (LORI) proposed by Nesbit, Belfer, and Vargo (2002). In their journal notes, participants reported that having objects described also in terms of the evaluation score they had received would faciliate or influence their choice. This, as explained by one participant, "would give people a better idea of whether or not they should look at the site". Participant also expressed an interest in contributing to the knowledge sharing by evaluating the sites or learning objects:

I like the descriptions given for each link. And the way the visitors are counted, that's neat. (Right now the "50 jeux de langue" has the most, and it's listed first, so I guess they're listed according to number of visitors? That's neat.) And we can rate them, that's cool!

Students' narrative description of their search pointed out other searching problems when users entered specific items such as "préposition" in the search window. In order to receive a better selection of learingn objects, participants had to be more generic by using words like "grammaire". As shown by previous research regarding repositories in general, a better

meta-tagging system appears to be a critical issue in improving the functionality of FLORE. Some students expressed their own ideas to improve the organisational aspect of the learning objects in the repositories:

FLORE gives me 24 matches for a recherche rapide of "accord nom" (without quotes). This page doesn't seem to list them in any particular order, neither for number of visitors nor for rating. If you could get them to go in order by rating it would definitely feel more organized. I wonder, why are the ratings shown on this page but not on the Top 10 page? Simply because no one has voted??

Participants also confirmed their interest in being able to select specific and appropriate learning objects quickly. In fact all students expressed frustration at Clicnet because they could never get results related to the specific aspect of the language they were looking for. In Google, participants' searches were usually fairly successful and they actually located excellent sites, which they were eager to see added to the FLORE database. The major concern regarding Google was the plethora of results with which they were confronted. To illustrate this concern, we selected the notes from one participant who described in details the various sequences of her search while performing the specific task (agreement of nouns in French). She reported the following:

"Accord Nom": FLORE 24 results
- "Accord des participes passés" : I don't think that the page that this link sends you to is still functioning, check that. The site was very informative, though I only touched the tip of it. I think there is a lot more to be explored on this site.
- "Au Secours" : Another good site, nothing remarkable
- "Pomme: Adjectif": A great site, related well to something that everyone can relate to...an Apple. If the browser explores further, there are exercises based on level. I found that this was an excellent tool. Also, the FLORE site might benefit by having a special page linking to exercises like these.

ClicNet 161 results
- Under the search "accord nom", the results with the highest relevance gave very little help. I could not find anything like the results offered by FLORE

- Under the search "Accord du nom + grammaire", ClicNet yielded 606 results, with the same outcome as the previous search
- NOTE: In both these searches, I didn't continue past the first page of results. The reason being that anyone using the search would probably look no further either. The best result was 84% and it reconnected me back to the main ClicNet site.
- The main ClicNet site was very full of resources. Although I would not recommend the ClicNet search for students or teachers, I would recommend the site to both. It has many links to useful resources.

Google.fr 2 770 000 results

- I didn't even start to sift through the results before narrowing the criteria
- "accord nom + grammaire"   46 600
- "accord du nom + grammaire"   46 300
- "accord du nom + grammaire + tutorial"   538
- Under the third search, I checked the first few pages of results, and found very little on my first pass. On deeper investigation however, I found a site that would be useful to some.
- The site is at *http://www.fhis.ubc.ca/french/frresources/main2.htm*. There are a number of links that send you to sub-pages of about.com. If you can get past the ads, it's not a big deal. Both sites are in English and cover a lot of the basic things that we are revising in Fren190.
- I continued to browse, but found very little else resulting from the Google search.

After giving details of her experience with the three search engines, the student expressed her conclusions as such:

Specific Task Conclusion:

For the purpose of finding aides to French verb usage, I found that FLORE, google.fr, and ClicNet all brought back good resources. The advantage that FLORE had was the shorter list of results. If the internet has done anything, it has reduced our patience. As a student looking for resources, I would be more inclined to use FLORE because it yields the results I'm looking for, without having to wade through all the excess crud. I imagine that FLORE only searches specific sites while the other two, especially Google searched the entire web. If I had the time or patience to sift through all of the hits on Google, it's likely that I would find a great number of resources. But I don't have time to check 46 000 pages.

The importance of properly tagging learning obejcts has been expressed in many recent studies (Millar 2002; Mortimer 2002; Richards et al. 2002) and described as a highly complex process. In analyzing our participants' reflections, it also appears to be of an utmost importance for the future of repositories. A precise descriptive system of learning objects will guarantee a proper interpretation and exploitation by users and will further extend and encourage the discovery of learning objects. In addition, proper descriptions will help address the issue of contextualization versus decontextualization, and ensure that users can put their findings back into their original context.

As shown by the following comments by participants, all students expressed a need to see the development of specific "education object commons" (Wiley 2003) where information, resources, and references are available at a fingertip.

The FLORE site is a good beginning and lacks only a wider range of subject matter. Google.fr on the opposite end has oodles of subject, but is difficult to filter well.

http://www.digitalfrench.ca/ is a well laid out website that is easy to find info on [...] I like that it gives descriptions of each website and what level it is

I think the URL www.digitalfrench.com/ will be really easy for students to remember, which is good because in French class this semester we often used sites with huge URLs and could never remember what they were!

I like that FLORE is available for all students and provides a range of sites and allows the users to decide which site will be most beneficial. I will definitely use the site in the future when looking for a specific French topic.

Discussion and further research

Millar (2002) formulated two specific needs with regard to the future of learning objects: firstly, that the development and multiplication of learning objects be further expanded, and secondly that educators become informed about their existence and their potential in order not only to use them but also to contribute to their expansion and hence to their creation. In an educational paradigm where problem-based, inquiry-based or project-based learning are emphasized, learning objects become simple elements of a bigger resource-based facility to support learning, inquiry, experimentation and discovery (Wiley 2003).

In North America, projects like MERLOT (www.merlot.org), the University of Wisconsin Milwaukee Centre for International Education(*http://www.uwm.edu/Dept/CIE/ AOP/LO_collections.html*), CAREO (Campus Alberta Repository of Educational Objects, www.careo.org) or CanCORE (Canadian Core Learning Resource Metadata Protocol, *http://www.cancore.ca*) have had a positive and definite impact on discovering, locating and exchanging learning object repositories. FLORE's mandate follows that of these projects but specialize in one area: French learning and teaching. To value the efforts already done by these projects, we must also keep working in collaboration with the education community, and evaluate the needs not only of educators but also, and mostly, of learners. The development of open access resources has already led the way in this direction. More evaluation like the one described in this pilot study will help us take longer strides in the right direction. The iterative process described here will contribute to monitoring the content as well as the pedagogical values of learning objects from the point of view of both practitioners and learners. Standards in meta-tagging system are the other areas where further development will ensure a good integration of these learning object repositories in the educational context. As a final word, it is imperative that all individuals involved in the expansion and enhancement of learning object repositories operate in concert with the education community so that efforts may be made to achieve one common objective: to enhance life-long learning. ◆

Dr. Catherine Caws is an assistant professor in the Department of French at the University of Victoria. Dr. Caws conducts research in language teaching, computer-assisted language learning, and computer networking. She is currently involved in a collaborative project, funded by the Research and Development Initiative program of the Canadian Social Science and Humanities Research Council, that seeks to study the Learning and Teaching Impact of a French Learning Object Repository

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ANNEX
(Appendix)

Questions	Result N=7
FLORE INTERFACE EVALUATION	
FLORE has an attractive interface compared to Google or ClicNet.	3.43
The navigation within FLORE is easy.	4.14
I like working/searching in FLORE better than in Clicnet.	5.00
I like working/searching in FLORE better than in Google.	3.43
FLORE interface made my search easy.	3.86
FLORE interface has all the functions I need.	3.43
I find it motivating to work in FLORE.	3.29
I believe that other students would like to use FLORE.	4.14
I believe FLORE can help me with my study of the French language.	4.71
It was faster to find the sites or learning objects in FLORE than in Clicnet.	4.86
It was faster to find the sites or learning objects in FLORE than in Google.	4.29
I like the fact that I can evaluate sites or learning objects in FLORE.	4.00
FLORE CONTENT EVALUATION	
The organisation of the content in FLORE is efficient.	3.43
The content of the learning objects in FLORE were useful.	3.71
The quality of the sites or learning objects in FLORE were high.	4.00
I found learning objects in FLORE that I did not find in Google.	4.57
I found learning objects in FLORE that I did not find in Clicnet.	5.00
There was a good selection/variety of sites or learning objects in FLORE.	3.43
I found exactly the learning objects that I was looking for in FLORE.	3.00
The evaluation on a scale of 1 to 5 for each site in FLORE is appropriate.	3.86
The description of the site or learning objects in FLORE is fair.	4.29
The description of the site or learning objects in FLORE is useful.	3.71
The level associated to each site or learning objects in FLORE is appropriate.	4.00