The construct of a Learning Situation Application Profile

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Abstract: The new program developed for Quebec secondary schools proposes a competency based approach to replace the simple acquisition of knowledge. Developed with contextualized, open and integrated Learning Situations (LSs), its assorted activities are likely to spark students' interest. To increase accessibility, facilitate localization and, ultimately, the sharing and re-use of LS, this paper initiates a reflection and proposes an LS-specific application profile that is compliant with recent work intended to standardize Learning Objects (LOs).

Introduction

The new pedagogical program for Quebec schools proposes a competency-based approach rather than the simple acquisition of knowledge. For the "Ministere de l'education" (2003), competency consists of know-how that is based on mobilizing and using a set of resources. Such competency-based training requires the use of learning situations (LSs) for pedagogical activities whose main role is to render learning significant. An LS must be created for the various school subject areas. It must address subject-specific content yet, also make it possible for learners to develop cross-curricular and subject-specific competencies. An LS is a complex set of activities which must be described in a precise manner in order to permit localization, use and sharing. Although our work is based on the Quebec Secondary School Reform, it spans a much broader realm, extending to components generally called Learning Objects (LOs).

Over the last few years, significant efforts have been undertaken to establish norms that would solve problems pertaining to the interoperability, description, indexing and classification of information, processes and services. The field of education was not spared from this trend as the stupendous increase of pedagogical material (texts, images, audio or video files, etc.) available on the Web made it possible to develop standards such as the IEEE LOM or application profiles such as CanCore in Canada and Normetic in the province of Quebec. A method to efficiently localize and share LSs, must consider existing standards and profiles (LOM, Normetic, etc.). A more precise LS description also requires the use of supplementary metadata to reflect not only the LS vocabulary, but also their specific structure. Setting up search engines, interoperability protocols, planning and follow-up functionalities without a concerted effort from all actors involved would make such a task difficult.

The LS that are presently available are not always composed of the same elements, nor are they always organized in the same manner. Currently, there is no consensus amongst the various LS authors to classify generic and specific competencies and concepts. The only operational solution resides in the setup of an LS-specific application profile that will provide custom referencing in a transparent manner to allow automatic vocabulary updates for future program revisions.

Learning Situations and the New Quebec Education Program

Fig. 1 illustrates the new Quebec education program which put students at the center of the learning process. Learning is now contextualized in five broad areas of learning and their associated educational aims. The new program seeks to develop cross-curricular and subject-specific competencies. For every one of the five subject areas, the new program identifies general and compulsory concepts. Subject areas and general concepts may point to possible cultural references. In a day-to-day perspective, the new program is implemented through learning situations which are rich, open and complex structures. An LS is associated to one or several subject areas, to one or several broad areas of learning or educational aims. An LS brings cross-curricular and subject-specific competencies, uses compulsory concepts, resources, strategies, processes, techniques and attitudes. An LS is decomposed in three phases (opening, productive and separation phases) which contain themselves activities. LSs are very similar to learning scenarios but emphasize quite explicitly their links to the new program. This very structured approach to LS calls for the development of a specific application profile along the lines of the norms and standards being used in the learning object literature.

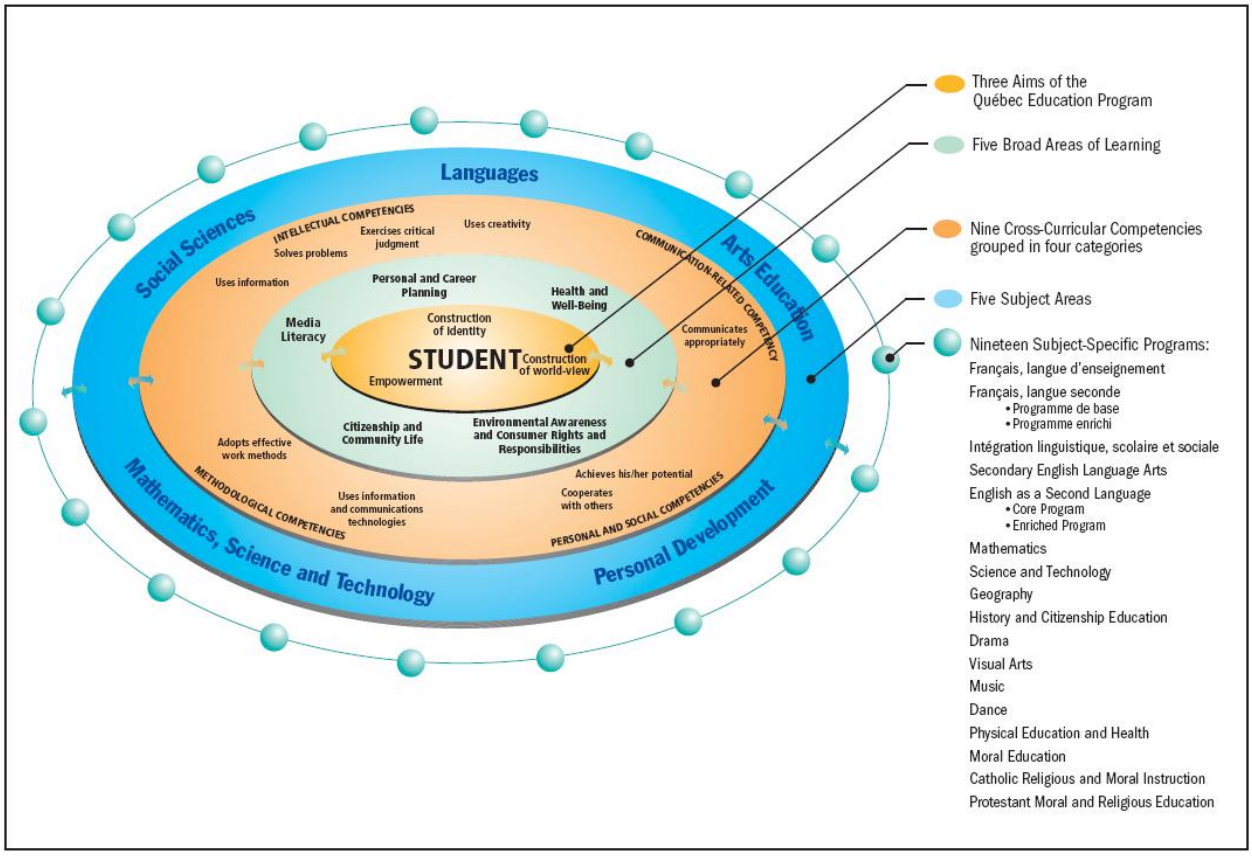

Figure 1: Quebec education program (Ministere de l'education, 2003, chap. 1, p.2)

Norms and Standards

XML: A language for Sharing

XML is a marking language that makes it possible to describe the content of certain elements. XML stands for ''eXtensible Markup Language''. A subset of SGML (Standard Generalized Markup Language), it is designed especially for file sharing on the Web.

Standards and Specifications

The following sections briefly present the normalization of LS standards and specifications which are used in our approach. The IEEE LTSC was derived from the IEEE LOM (Learning Object Metadata) (Computer Society/Learning Technology Standards Committee, 2002) to allow universal descriptions of LOs. This standard has been widely disseminated and selected, amongst others, by GTN-Quebec to create the Normetic application profile. IMS Content Packaging (IMS-CP) (IMS Global Learning Consortium, 2003) proposes an information model to describe the sharing of instructional resources on the Internet. It suggests a set of structures to describe the various components of a resource, as well as interoperability between pedagogical resource design tools, instructional resource management systems and pedagogical resource execution systems. IMS Learning Design (IMS-LD) (IMS Global Learning Consortium, 2003) proposes an information model to describe, reference and share learning process specifications. More particularly, IMS-LD makes it possible to specify the competencies or objectives targeted by the process or its associated activities. In the context of our study, IMS-LD permits more refined LS descriptions by indicating the targeted competencies for each activity.

Application Profiles

An application profile consists of a subset of a norm, or a standard that proposes the use of a certain number of descriptors. Guidelines complete the application profile by formulating usage rules and recommendations and offering input examples. SCORM (Advanced Distributed Learning, 2004) is described as an agglomeration of standards and specifications which are adapted to multiple sources in order to create a complete suite of functionalities to support online learning and favor the interoperability, accessibility and reuse of pedagogical material in electronic format. Most of these standards and specifications originate from organizations outside of SCORM and they are integrated and recorded in ‘’technical documents’’ to enhance user-friendly usage. Cancore (Cancore, 2003) is an application profile designed to facilitate the search and localization of online instructional resources. It consists of a structured method to create and share high quality standardized metadata records that describe LOs. Cancore consists of a set of guidelines for the usage of the IEEE LOM 1484.12.1-2002 Standard. To facilitate a standardized description of French LOs, GTN-Quebec has proposed the implementation of its Normetic application profile, version 1.111 (Groupe quebecois de travail sur les normes, 2006). This innovation is based on the EEE LOM 2002 Standard.

The LS LOM/Normetic Application Profile

The proposed LS application profile is based on the application profile of Normetic v1.0, the IMS Content Packaging and IMS Learning Design specifications. The LS profile specifies the elements of the LO information model. This paper proposes two different versions of the LS profile that are congruent with LS descriptions and sharing requirements.

Firstly, the LOM/Normetic version is suited for contexts devoid of activities or situations for which details of activities are not desired. Secondly, the IMS-CP version is well-adapted to situations where structural descriptions are needed. The first version aims to document and index LSs within repositories. The second option targets the sharing of LS between LS development environments. Both versions are complementary and the IMS-CP model integrates the LOM/Normetic version. The LOM/Normetic approach is presented in this section.

LS Attributes

Here are the characteristics of LS attributes:

- identifier;
- title;
- author;
- abstract;
- level and cycle;
- duration;
- type;

– localization.

The table shown on Fig. 2 presents LOM/Normetic tags used to code LS attributes.

Characteristics	Tags
identifier	1-General: identifier / catalog / entry
title	1-General: title
author	2-LifeCycle: contribute
abstract	1-General: description
level and cycle	5-Pedagogy: context
duration	5-Pedagogy: typicalLearningTime
type	5-Pedagogy: learningResourceType
URL	4-Technical: location
format	4-Technical: format

Figure 2: Attribute codes

Subjects

We propose using Category 9 of the LOM/Normetic classification to join an LS and the subject(s) to which it is associated. Moreover, when an LS refers to more than one subject, a taxonpath is required for each subject. The taxon/id identifier is linked to an entry in the LS ontology.

Concepts

The concepts pertaining to an LS belong to either one of two levels: the LS Global Level or, the Activity Level if an LS description includes activities. We propose using Classification 9.

Generic and Specific Competencies

Generic or specific competencies targeted by an LS belong to one of two levels: the LS Global Level or, the Activity Level if an LS description includes activities. We propose using Classification 9 with the value competency to link these competencies.

Assessment Criteria

Assessment criteria vary according to the competencies being evaluated. Thus, we propose adding this component to the hierarchical structure where competencies are coded.

Techniques or Processes

Same as other components, techniques can be located at the Global Level of the LS or, if activities are detailed, at the Activity Level. We propose using Classification 9 with the value idea to link techniques and processes.

The IMS-CP LS Profile

As suggested in the IMS Learning Information Model (IMS Global Learning Consortium, 2003, p.12), the main function of the IMS Learning Design is to model learning units (see Fig. 3) by integrating them into a ‘’content

package'', preferably in an IMS Content Package. Therefore, we propose using IMS-CP and IMS-LS to describe complex LSs.

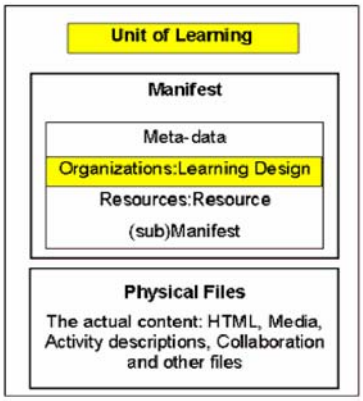

Figure 3: Structure of a learning unit - (IMS Global Learning Consortium, 2003, figure 2.4 p. 13).

The following section presents the global structure of a file for describing complex LSs and adress the representation of activities and their breakdown into various steps and activities.

The Global Structure

The global structure consists of an IMS-CP manifest that contains a global description of the situation in the metadata section of the manifest as well as the description of the activities, including their subsections, in the section learning-design under organization.

Activities Associated with a Situation

The activity structure is represented using IMS-LD. In the activities tag, learning-activity allows details each LS activity, including its targeted competencies and their criteria, the concepts to be exploited and the techniques to be used.

Breaking down Activity Components

The learning-structure tag makes it possible to represent the various steps required to organize the activities of the breakdown structure.

The Situation-Structure Link

The link between the situation and its structure occurs in the component method. For the sake of simplification, we create roles for an instructor and a learner who interact together in a situation. It is thus possible to detail roles for both these actors as this is permitted by IMS-LD.

Conclusion

The new educational program designed for schools located in the province of Quebec brought about numerous Learning Scenarios (LS). In this period of transition, finding, using and sharing LSs become increasingly important and will benefit significantly from a concerted standardization effort. Recent investigations in the province of Quebec, relative to the normalization of Learning Objects (LOs), generated the Normetic profile, a very promising avenue.

This paper launches this normalization effort by suggesting an LS application profile that combines various standards and specifications, more specifically LOM, Normetic and IMS-LD. This approach can become a framework to simplify metadata input and transfer. The LS application profile proposes various solutions, such as a description that is sufficiently precise while still respecting the current competency and activity norms, two essential components of the reform.

However, implementing an operational application profile requires further work. Aside from modifying and detailing the LS model, numerous mandatory steps will need to be addressed. More specifically, the new program vocabulary must be studied closely (area-specific competencies, compulsory concepts, etc.) and online catalogues must be set up to inventory the areas of learning, the subjects, the concepts, the processes and techniques. This normalization process generated by all interested parties in secondary schools can lead to LS design environments adapted to local practices, yet be freely available through search engines adapted to the LS application profile, for the purposes of sharing and collaboration.

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