Using and Enhancing a Normalized IMS-LD Description to Support Learners in their Appropriation of a Distance-Learning Curriculum

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Abstract

The general context of our work is the support that can be proposed to a distance learning student in order to appropriate a curriculum to himself. In this paper we explore how the IMS Learning Design (LD) norm can be used to address this issue. An LD model of a curriculum permits the construction of tools that allow a student to visualize different points of view on the curriculum items, annotate his progression in the activities or build individual projects. We present what can be done with an LD model and how this model can be enhanced to propose more helpful appropriation means.

1. Introduction

The general context of our work is the study of the support that can be proposed to a student in order to appropriate a distance learning curriculum to himself. Appropriating a curriculum to his needs and objectives requires a student to build a comprehensive understanding of the curriculum items (e.g. objectives or activities) and to explicit the way he intends to address the different issues. For this purpose, the curriculum must be modeled in detail. Different languages and norms for modeling a curriculum have been proposed by international consortiums and, in particular, IMS Learning Design (LD for short) [1]. In this paper we explore how LD can be used to model a curriculum for the sake of the appropriation issues: what can be done with an LD model and how this model can be enhanced to propose more accurate appropriation means.

This paper is organized as follows. First, we define the appropriation notion and issues. Second, we introduce IMS-LD. Third, we study how an LD model of a curriculum allows addressing some appropriation issues, the limits of an LD model and how it can be enhanced to address appropriation issues in a more accurate way.

We exemplify these different aspects by explaining how we operationalize these issues in the Saafir architecture. Saafir is a generic architecture that proposes different tools that allow a student to visualize the curriculum items from different points of view, annotate his progression within the curriculum or explicit the way he associates different issues and plans to tackle them in an integrated way ("project" notion) or. We explain how an LD model defines the data that is necessary for these tools, data that must be completed for some issues.

2. The appropriation notion

If the technological aspects of Web-based distance-learning (platforms, etc.) have been addressed by a huge amount of work and many technological platforms and tools are now available, the percentage of students that persevere until the end of the distance learning curricula remains very low, and many (often most) students abandon before the end of the session.

The literature that analyzes the causes that conduct students to persevere or abandon highlights the importance of individual features [2-6]: students' motivation, time managing and autonomy. These different issues must be taken into account in order to help students to appropriate the curriculum to themselves. "Appropriation" refers here to a situation where the student is not a simple passive consumer of services proposed by the curriculum but becomes an actor of his own learning [7], i.e.:

1. The student has an explicit understanding of his motivations [8]: he knows what the benefits of the curriculum are for him, i.e., knowledge and skills to be acquired, social issues, economical issues, etc.

2. The student is able to explicit his expectations and to plan an itinerary within the curriculum (i.e., a way of tackling the different curriculum activities) that corresponds to his motivations and expectations [9], [6].

3. The student is able to define the means that are necessary to address his objectives and to follow the curriculum according to his plan [10].

4. The student is able to examine and criticize his actions and the way he performs his plan and to adapt his plan and actions to unexpected difficulties or emergent events (evaluation and regulation issues) [3].

5. The student is able to identify the (human or documentary) resources that are required for the itinerary he has planned [10].

The appropriation issues therefore require the learner to build a comprehensive understanding of the curriculum, i.e., its different items (e.g., courses, activities, presentations to prepare or assessments), its organization (e.g., temporal aspects), etc. Proposing the student with the corresponding information requires a careful modeling of the curriculum.

3. The IMS – Learning Design norm

Different norms are at present being worked out by international consortiums (e.g., SCORM or LOM). IMS – LD (Learning Design) [1] is one of these, that focuses on the modeling of "elements and structure of any unit of learning". LD is based on work by the Open University of Netherlands on EML [11] and different other standards as the pedagogic resources meta-data standard LOM [12]. LD objective is to allow the description of different kinds of learning approaches in a formalized way that facilitates abstraction, reuse and interoperability.
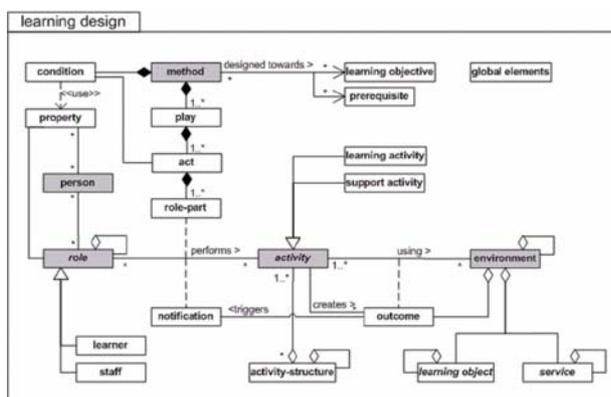

Figure 1. Learning Design conceptual model [1].

We will limit our description of LD to the elements that we will consider for the issues of appropriation and therefore to the A level (cf. *Figure 1*), further details can be found in [1]. The LD central notion is *activity*, which links the *roles* and the *environment* notions, the environment being composed of *learning objects* and *services*. Activities can be dissociated as *learning activities (*oriented by the learner's *learning objective*) and *support activities* (performed by staff members to support learners). Activities can be structured in an *activity-structure*, i.e., a structure corresponding to a group or a sequence of activities. An activity can be associated with a maximal duration. LD also allows describing the *learning objectives* to be addressed and *prerequisites*.

4. Using an LD model to support appropriation

4.1. Modeling the curriculum modules

Figure 2 presents an example[1] of a module LD modeling.

<div style="border:1px solid black; padding:8px;">

Informal description of the module

    Module « Journalism vs. Literature » addresses 1 pedagogical objective: Understanding the similarities and the differences between journalism and literature. The prerequisites are: (1) Ability to detect and explain a journalism work et (2) Ability to detect and explain a literary work. The activity « Journalism vs. Literature Activity » is composed of 2 sub-activities « Read URLs referring to the differences and similarities of literature and journalism writing » and « Given two different works decide which is a novel and which is journalism ».

LD modelisation:

```
<imsld:learning-design identifier="JvsL" level="A">
        <imsld:title>Journalism vs. Literature </imsld:title>
    <imsld:learning-objectives>
      <imsld:item>
        <imsld:item>
                <imsld:title>Understanding the similarities and the differences between journalism and literature
</imsld:title>
        </imsld:item>
    </imsld:learning-objectives>
    <imsld:prerequisites>
      <imsld:item>
        <imsld:item>
          <imsld:title>Ability to detect and explain a journalism work </imsld:title>
        </imsld:item>
        <imsld:item>
          <imsld:title> Ability to detect and explain a literary work</imsld:title>
        </imsld:item>
      </imsld:item>
    </imsld:prerequisites>
    <imsld:components>
      <imsld:roles>
        <imsld:learner identifier="learner"> </imsld:learner>
      </imsld:roles>
      <imsld:activities>
        <imsld:learning-activity identifier="Read">
          <imsld:activity-description>
                  <imsld:title>Read URLs referring to the differences and similarities of literature and journalism writing </imsld:title>
            <imsld:item identifier="I- Read "/>
          </imsld:activity-description>
        </imsld:learning-activity>
        <imsld:learning-activity identifier="GiveWork">
          <imsld:activity-description>
                  <imsld:title>Given two different works decide which is a novel and which is journalism </imsld:title>
            <imsld:item identifier="I- GiveWork"/>
          </imsld:activity-description>
        </imsld:learning-activity>
        <imsld:activity-structure identifier="JvsLActivity" number-to-select="2" structure-type="selection">
          <imsld:title>Journalism vs. Literature Activity</imsld:title>
          <imsld:learning-activity-ref ref="Read"/>
          <imsld:learning-activity-ref ref="GiveWork"/>
        </imsld:activity-structure>
      </imsld:activities>
    </imsld:components>
    <imsld:method>
      <imsld:play>
        <imsld:act>
          <imsld:role-part>
            <imsld:role-ref ref="learner"/>
            <imsld:activity-structure-ref ref=" JvsLActivity"/>
          </imsld:role-part>
        </imsld:act>
      </imsld:play>
    </imsld:method>
</imsld:learning-design>
```

</div>

Figure 2. An LD model of a module (simplified)

Although such a detailed model proposes a comprehensive view of a curriculum and its different activities, two aspects can be noticed:

- Objectives and prerequisites are not categorized very precisely. As an example, LD does not allow differentiating the competence and objectives notions.
- Activities are not associated with beginning and ending dates (which is information that differs from total duration).

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[1] This example is taken from the putting into practice of the presented approach and tools by teachers of a curriculum in Puerto-Rico; examples are however simplified for the sake of clarity and space restrictions.

We present here below how the information proposed by an LD detailed model of a curriculum can be used to enhance students' appropriation, also highlighting how the LD model could be enhanced to propose additional information useful for appropriation.

4.2. Supporting a comprehensive understanding of the curriculum

The way a curriculum is generally presented corresponds to the administrative structure, i.e., a module that is decomposed into sub-modules, etc. Information made accessible by an LD model allows presenting different complementary alternatives to the view by modules such as a view by pedagogical objectives or by prerequisites. This facilitates a comprehensive understanding by the learner of the curriculum contents and of the relations between its different items.

The fact that within a basic LD description objectives and prerequisites are not categorized very precisely however limits the accuracy of the information that can be proposed. In particular, it is interesting for a student to understand what type of issue an objective is about, e.g., dissociate theoretical and pragmatic issues or discovery-oriented and investigation-oriented activities. Second, the fact that activities are not associated with beginning and ending dates does not allow proposing the student with a comprehensive understanding of time-managing issues. This is an effective problem as (and our experimentation illustrated this aspect very clearly) this understanding is necessary for learners to evaluate their progression in respect to the session agenda, their own agenda and (when made explicit) the other learners' agendas.

Allowing learners to develop such a multi-point of view can be supported by a visualization tool that proposes these different views and means to shift from one to the other (cf. Figure 3). This allows a learner to follow a scenario such as: *browse the curriculum as a set of modules, focus on a given competence related to this module, select this competence, shift to the competence-view in order to understand if this competence is related to some other modules or activities or to some prerequisites, discover that it is related to different activities, shift to the activity-view to analyze these activities, etc.*

4.3. Supporting evaluation and regulation

The fact that the activity notion is central in LD helps learners that are presented with a detailed model of the curriculum to conceptualize what they have to do (*activity* or *roles* notions) and why they should (*objectives* or *prerequisites*). Shifting from an administrative conceptualization of the curriculum to such an activity-oriented conceptualization is a key issue for appropriation. This can be supported by providing, in addition to the basic description of the activities and their links (cf. §3.2.), evaluation and regulation tools.

- Evaluation is related to the fact that a student must be aware of the way he performs activities. This can be supported by proposing an editor that allows him to annotate the activities, e.g. stating to what extent he achieved the task (as a percentage for example) and/or typing free text as "meta-level" notes. This information can then be automatically summarized at a *structure* level or the entire curriculum level in order to offer the student a snapshot of his present itinerary. It is also possible to show learners their position in comparison to other students' progression (situating themselves towards the rest of the group is a central issue for distance-learning students).

- Regulation is related to the fact that a student manages (at a meta-level) the way he performs the activities. The first issue is to be aware of his progression (evaluation). Regulation can then be further supported by, for example, proposing a tool that allows a learner to explicit his planning as rules (e.g., "I plan that activity A1 should be over at date D1") and generates a warning according to these rules. Another way to support regulation is to connect students that encounter similar problems and allow them to create discussions Forums on these issues.

If a key advantage of LD is to allow such issues by defining the activity notion (and related notions) as first class objects, the generic description of objectives and prerequisites limits the precision of the information that can be proposed to learners. Here again this is a central issue as it can lead students to consider all the objectives in a similar manner when ordering objectives according to the objectives nature and the students' expectations and motivations are of key importance. From another point of view, the lack of precision for describing temporal aspects limits the capacity to support time-managing issues (e.g., being warned that time is running short for a given activity), which is central for learners not only to achieve the tasks they are supposed to, but also to construct and maintain a global control of their progression.

4.4. Expliciting and managing personal projects

We have in [13] proposed an approach of appropriation that goes a step forward from the simple visualization of information to students. The principle is that students can construct (and then manage) individual projects [13]. We call « individual project » (project for short) a set of features of a curriculum (e.g., a course, an activity, elements of a bibliography or competences to be addressed) that, given his motivations, a student perceives as linked and intends to tackle in an integrated way. Such a project can be seen as an *a priori* plan. The fact a student identifies such a project does not mean he will necessarily work out the corresponding features following this plan (a misunderstanding would be that we want the students to bury their activity in a predefined intangible plan; for a discussion of plans as resources, see [9]). Although not mandatory, such a project is a means for a student to organize his work and then a resource to carry it out. Helping students to construct such projects is therefore a key issue to help them to appropriate a curriculum to themselves. The LD model provides most of the data necessary to build such projects. This allows presenting students with an editor (cf. Figure 3) that displays the curriculum items and characteristics and allows the learner to create one or several projects by editing links on the different curriculum items (and, eventually, add items that are not proposed in the curriculum, e.g., additional documents found on the Web).

Such a project can be modelled in LD as an « activity structure » that would be created by the student himself. Such a *structure* can be described by a « title », a general description (« information »), a « structure-type » denoting the different items participating in this project and references to these items (using the « learning-activity-ref », « support-activity-ref », « unit-of-learning-ref » and « activity-structure-ref » items). Here again, the lack of precision in the description of the objectives and prerequisites and of the temporal aspects limits some aspects of the way projects can be described and articulated.
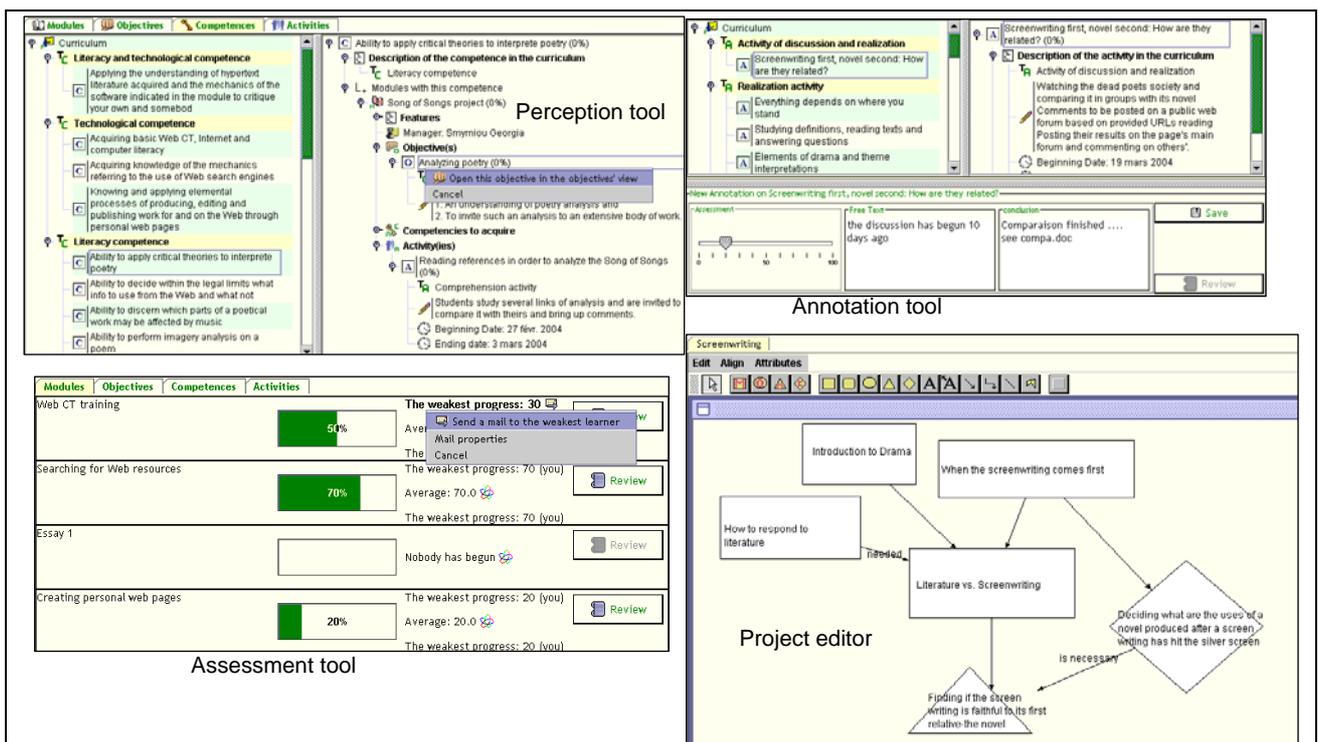
Figure 3. Saafir tools

5. Conclusions

Although IMS-LD is not defined according to the appropriation issue we consider in this paper, the notions it introduces can be used to support students in their appropriation of a curriculum by providing most of the data that is necessary to help them to construct a comprehensive understanding of the curriculum, to evaluate and regulate their activities and to explicit and manage personal projects.

We have however highlighted some drawbacks of the current norm for the concern of appropriation such as the lack of precision in the description of objectives and prerequisites or temporal aspects. Therefore, we propose, when addressing appropriation issues, to enhance the LD model. Figure 4 denotes the introduction of *types* and *dates* notions we have highlighted in this paper. We however believe that deepening our understanding of the appropriation issue and experimenting tools that support appropriation will bring us to some other improvements of LD models in respect to the appropriation concern.
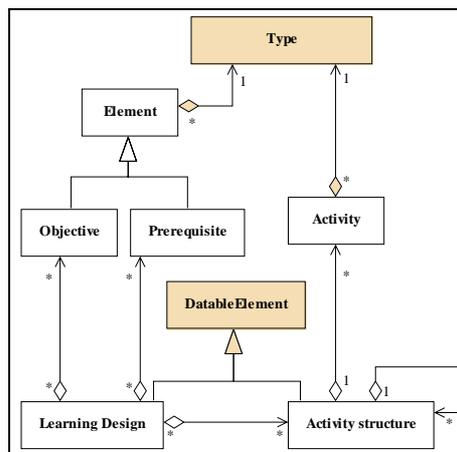

Figure 4. Enhancing an LD model

The Saafir architecture we propose takes as data a model of the curriculum and proposes different tools (multi point of view visualization, annotation of activities, edition and activation of automatic warnings, edition of projects) based on an analysis of this data. The interest of this LD + Saafir approach is that the architecture can be plugged onto a distance-learning Website without modifying this Website as the architecture uses the LD abstract model of the curriculum (by opposition of the analysis of the Website) [14]. We have already implemented and experimented Saafir on an already-existing distance-learning Website. This experiment allowed us to validate the principles of our approach and provided some feed-back about how learners appropriate the curriculum to themselves (and, in particular, the importance of time-managing issues). We are currently finishing such a "plugging" on a second curriculum (in collaboration with a team in Puerto-Rico).

Within the present implementation, providing Saafir with an LD model of a curriculum allows using Saafir tools but in a degraded mode. This can however be easily addressed by allowing a curriculum manager to complete the LD model with the information required by Saafir.

Another direction of work is related to the fact that Saafir can analyze the learner's data and actions and synthesize some interesting information (e.g., the learner progression). We are currently working on an LD modeling of this information, which could then be exported to other modules of the Learning Managing System, using LD as a means for interoperability.

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