TOWARDS A LEARNING PATH SPECIFICATION

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Abstract: Flexible lifelong learning requires comparability and exchangeability of courses, programmes and other types of learning actions both in a national and international context. A uniform and meaningful way to describe learning paths is needed to enable lifelong learners to choose suitable ways to build their portfolio. This paper identifies the requirements for a learning path specification drawing on a study of literature in the field of curriculum design and lifelong learning, and on recent initiatives aimed to enhance comparability and exchangeability of learning actions. Mapping these requirements on two existing specifications designed to describe learning programmes, XCRI and IMS-LD, leads to the conclusion that IMS-LD more broadly fulfils the requirements because it has a generic way to define completion of learning paths as well as an expression language to describe all kinds of conditions. A learning path model is presented identifying the main elements of a learning path specification.

Keywords: lifelong learning; learning path specification.

1   Introduction

Easy exchange of courses and programs across national and institutional borders is an important goal in creating a "European area of lifelong learning" (CEC, 2001, 2004; González & Wagenaar, 2003; PLOTEUS, 2006; Pöyry, Pelto-Aho, & Puustjärvi, 2002; TENCompetence, 2005). In order to foster mobility of employees across Europe and to enhance flexible lifelong learning, it is necessary to remove barriers to the exchange of programs, courses, and other educational offerings (hereafter *learning actions*). Exchangeability is an attribute of the relation between learning actions indicating that one action can be substituted or replaced by another, simply because they result in similar learning outcomes (e.g. competences) or because they result in learning outcomes which are formally recognised (certified) as a valid alternative within a wider programme. To establish whether or not learning actions are exchangeable they have to be described in a way that they can be compared.

An additional challenge lies in the fact that in lifelong learning the learner might perform formal, non-formal and informal learning actions in parallel: take a job-related training course at work, retrieve information from the Internet and study for a master's degree at a university in the evening. Instead of addressing the problem of exchangeability by agreeing on structures and formats for exchange beforehand, we would like to facilitate exchange of learning actions which are not necessarily developed within agreed upon curricular contexts.

Given the broad variety of learning actions in lifelong learning, the need arises to facilitate the selection and decision processes regarding adequate learning paths. Some automated filtering could be applied, offering learners the possibility to indicate for instance cost ranges, start and end dates, weekly study load etc. To support such filtering learning actions and learning paths must be described in a uniform and meaningful way. This paper will investigate the requirements for a learning path specification: what aspects of learning, learning actions and learning paths should be incorporated so that they can be compared and learners are provided with the information they need to make informed decisions?

In order to support learners in choosing a learning path from all available ones, the learning path specification must facilitate identification of learning paths leading to the same learning outcomes. In this sense learning outcomes are the primary base for screening. Facilitation of further screening and final choice for an option requires that the learning path specification describes most relevant characteristics to support learner's decision making. Besides these characteristics, the learning path specification must be able to describe the structure of a learning path and all possible rules that apply to it, like sequential structuring of learning actions due to prerequisite knowledge.

2   Method

In order to derive more precise requirements for a learning path specification we've pursued two lines of investigation.

Firstly, a review of literature on curriculum design was carried out to further investigate the structure and rules connected to a learning path. Two existing specifications in the field of curriculum design have been analysed to see to what extent they fulfil these requirements: IMS Learning Design (IMS-LD, 2003) and the eXchanging Course-Related Information (XCRI) curriculum specification (XCRI, 2006). The IMS Learning Design

specification allows defining which roles should carry out which activities, using which supportive materials and services, in order to achieve certain learning objectives. It is this 'workflow-based' approach that makes it appear a suitable candidate to model flexible learning pathways (Marjanovic, 2006). The XCRI project's main focus, namely exchanging course-related information, prioritises an interest in fragments of curriculum, but the schema enables the description of linkages between curriculum fragments as well (Stubbs & Wilson, 2006).

Secondly, a number of recent and current initiatives aiming to enhance comparability and exchangeability of learning actions were analysed to see what characteristics they provide or propose to provide to learners to facilitate their decision-making. We strive for parsimony in this respect and aim to select the most important characteristics rather than strive for completeness. We compared three different types of initiatives: portals, general guidelines and metadata applications. Table 1 lists the examples of each type we investigated.

Table 1: Examples of approaches aiming towards comparability and exchangeability

Approaches	Examples
1. Portals	- UCAS http://www.ucas.com/ (UK) - PLOTEUS http://europa.eu.int/ploteus/portal/home.jsp (EU) - Curriki http://www.curriki.com/ (Global)
2. General guidelines	- Two cycles in HE: undergraduate and graduate (EU) - Quality Assurance Agency Guidelines (UK) - European Credit Transfer and Accumulation System (EU)
3. Metadata applications	- CUBER (EU) - CDM (N)

3   Results

3.1   *Curriculum design literature*

Building on a study of literature in the field of curriculum design and lifelong learning (Bligh, 1999; Colardyn & Bjornavold, 2004; Harden, 2000; Livingstone, 1999; Marsick & Watkins, 2001; NOCN, 2004; Ramos, Kautonen, & Keller, 2001; Tattersall, Janssen, Van den Berg, & Koper, 2006) we conclude that the learning path specification must enable the description of the following characteristics:

- *Modular composition*: learning paths must be able to be built from units;
- *Nested composition*: learning paths must be able to be composed of other learning paths;
- *Learning outcomes*: learning paths are defined in terms of learning outcomes;
- *Entry requirements*: it must be possible to specify entry requirements for a learning path;
- *Selection*: it must be possible to specify which elements of a learning path are mandatory and which are optional;
- *Sequencing*: it must be possible to specify a fixed order in which elements of a curriculum are to be completed;
- *Temporal coordination*: a learning path specification must enable to express parallel programming of two or more learning actions;
- *Completion*: the requirements for completion of a learning path must be able to be specified;
- *Conditional composition*: it must be possible to specify conditions under which learning path elements are to be included or excluded;
- *Substitution*: learning path specification must enable description of substitution rules. These rules describe which units in the learning path might be replaced and the criteria that exist regarding the substitute.

Besides the learning path specification must meet the general requirements of *formality*, so that automatic processing is possible, and *interoperability*, so that different support systems can share and exchange the information.

IMS-LD more broadly meets these requirements than the XCRI specification. It enables to describe completion of curriculum elements in a generic way and has an expression language to describe all kinds of conditional compositions.

3.2 Initiatives to enhance comparability and exchangeability of learning actions

Different initiatives place different accents in describing educational offerings. PLOTEUS and CUBER for instance seem more focused on the wish to compare and exchange educational offerings, whereas CDM pays considerable attention to information pertaining to the provider, and QAA and ECTS wish to accurately cover information concerning awarding and accrediting institutions and quality procedures.

Facilitating lifelong learning however requires that the focus of attention is on the learner and his/her learning needs. To enable learners' choices it will be more important to indicate whether or not a learning path leads to formal recognition, than to describe which institution it is awarded by. We believe that quite a lot of this more detailed information could be suitably offered by linking to a provider website. Moreover learners will need to have planning information and information on all kinds of possible prerequisites, in order to decide whether a learning path is suitable to their needs. Some of the initiatives investigated describe quite a number of planning aspects in parallel (study load in weeks as well as typical learning time for instance). We propose to use a minimum set of start date, end date and total workload. Together with information on contact hours we believe this to suffice for learners to decide whether the learning path complies with their personal schedule.

Besides we propose to use proficiency levels related to competences rather than the more general level descriptors like 'bachelor' 'graduate', because they seem more suitable in the realm of lifelong learning which clearly exceeds these 'school career' level indicators.

4 Conclusions

Figure 1 represents a model of the learning path specification we propose. The figure maps the learning paths terminology on IMS-LD elements (between brackets) and describes further characteristics to be covered by the specification.
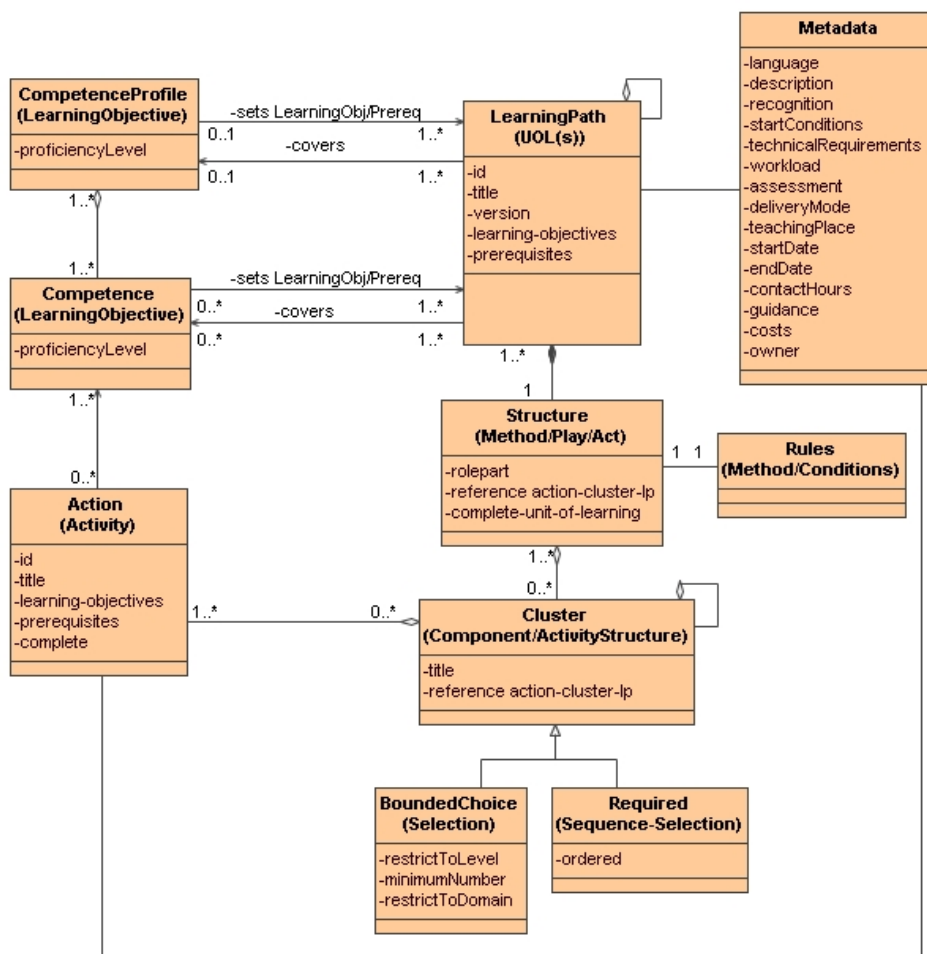

Figure 1: Learning Path model

A learning path leads to the acquirement of one or more competences or to a competence profile. The learning path consists of one or more actions, clusters of actions or learning paths. These actions, and/or clusters, and/or learning paths are presented in a certain structure, describing the overall work/learning flow. The learning flow may depend on certain circumstances as expressed in 'if-then' rules pertaining for instance to learner preferences or the way the learning process evolves.

In other words a learning path basically describes a structure of one or more actions, clusters of actions or learning paths, in a way that explicates restrictions and degrees of freedom for the learner. Restrictions and degrees of freedom are not only defined through structuring principles describing optional and required elements or through rules, but can also be reflected in metadata describing the learning path or its constituting parts, e.g. delivery mode, teaching place, contact hours etc.

Based on this model the learning path specification will be elaborated in more detail and tested on a variety of actual formal, non-formal, and informal learning paths (e.g. can it describe the training programme of company X, can it describe the masters programme of university Y, the learning path of Z). Besides the specification will be tested in a pilot setting where it will become clear whether the specification has reached a balance in that it parsimoniously enhances informed decisions.

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