

# Hybrid Approach for Modeling Units of Learning, Using a Prototype Learning Design Model and IMS Learning Design Standard

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**ABSTRACT:** *Open and distance learning opportunities have created new challenges in the design and delivery stages. The development of e-learning standards proposes new perspectives for educational actors to overpass those challenges, however they still been not adopted by design teams. We propose in this paper a conceptual model and an approach for modeling open and distance learning situations by using one of the e-learning standards.*

**Keywords:** Component, Educational Modeling Languages, Open and Distance Learning, IMS Learning Design

**Received:** 1 August 2012, Revised 30 September 2012, Accepted 3 October 2012

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## 1. Introduction

Recently, several educational modeling languages have emerged aiming the formal description of a wide range of learning situations with different granularity, in this direction the IMS consortium has developed one of the most important e learning standards: IMS-learning design (IMS-LD) [1]. This specification is built on a powerful expressive conceptual model that allows describing *in fine* learning / instruction processes, in the aim of assisting instructional designers to produce formal and interoperable learning designs, and thus facilitating the delivery of courses on learning management systems.

However, while analyzing the specification performance on the educational practices, it is revealed difficult to be accessible by instructors and instructional designers, since the design method is too complex based on a theater metaphor far from educational practices and neglecting the practitioners' perceptions, usages and design needs [6] [7] [8].

Regarding this problematic many researchers have introduced novel approaches, methods and tools to design or model units of study according to the end-users design needs, those different approaches consider the compliance to the IMS-LD standard, hence they aim to facilitate the adoption of the specification into the educational actors' practices.

In this direction, lies our work targeting the design of distance learning situations, and aiming the development of a new learning scenario model, compliant to the IMS-LD standard and taking advantage of the organizational and accessible aspects of an existent learning design method. Therefore we are interested in this paper about the application of a hybrid formalization of learning scenarios, between the conceptual model of IMS-LD and a learning design model described as a prototype model. From this type of formalization we succeed in the development of a new learning scenario model.

We firstly present a general view of the two models used in our work, and more specifically we analyze their important parts used in our approach, then present our research methodology and objectives, after that we step forward presenting our hybrid approach for modeling units of learning, and finally set out the proposed conceptual model (ODLDM: Open and Distance Learning Design Metamodel).

## 2. IMS-LD and the prototype model for learning design

### 2.1 IMS-LD

IMS-LD provides a formal description of the learning/instruction process allowing a consistent association between pedagogical content and the information related to its usage, control and contextualization. It offers three levels of modeling; [2]

Level A: allow the general description of the learning components such as: roles, activities, environment, and resources. Rather than describing the way in which those components are related to each other.

Level B and C, are however more detailing and control offering regarding the unit of learning, especially when running on a runtime systems, this is due to the integration of “*condition*”, “*properties*” and “*notification*” concepts in the conceptual model.

The model is considered in the literature as complex and not easy to be used by practitioners, beside its complexity the model lacks the pedagogical expressiveness of a unit of learning, such as learning strategies and pedagogical context.

### 2.2 The prototype model for learning design

The model [3] is based on research conducted in the field of educational technology; it is based on two complementary theories, the theory of transactional distance of Moore [4] following the research in distance learning environment, and which aims to reduce the distance in educational transactions between teachers and learners, focusing on two main components: the course structure and dialogue.

The second theory or principle is congruency [5] which allows the practical application of the theory of Moore on the practices of teachers. The principle is described by the author as an overlap degree between the functions of planning, teaching and assessment.

The prototype model for learning design is applied as a conceptual and theoretical framework supporting the development of our proposed model. It was created to bridge the gap between theories of instructional design and planning practices of pedagogical materials. It represents a structural and organizational framework for the planning process allowing accessibility to practitioners by describing the connection between the pedagogical and technical aspect of a learning unit (expressivity).

## 3. Methodology and objectives

Our main objective is to develop a model that allows the instructional designers to overpass the complexity of the specification, and to express the major important pedagogical aspects of the learning process. In other words, we aim to express the technical and pedagogical aspects of the learning process in a formal and accessible way.

Therefore and to achieve this objective, we have analyzed the prototype model for learning design, and use it in conjunction with the IMS-LD method to model units of learning, the result is presented in a conceptual model (ODLDM)

## 4. Hybrid approach and proposed model

To model units of study according to the hybrid approach that combines both of conceptual models of IMS-LD and the design steps, concepts and principles of the prototype model. The modeling process includes two principle stages:

### 4.1 Before running the unit of learning

This stage corresponds to the module-building phase of the prototype model, in which, the targeted knowledge in the unit of learning is defined by the instructor, to formulate the **general objectives**, during this phase the roles and activities planned for the achievement of objectives are described, rather than didactical **resources**, **services** and **environment** necessary to enable instructor-learner dialogue, the next step is related to the identification of **pedagogical strategies** that includes: **teaching**

**strategy** enclosing the teaching methods designed to reach the predefined pedagogical objectives; **support strategy** including technological tools and activities conceived to support learners and the **evaluation strategy** that represents the definition of methods, activities and tools considered for assessment.

The result of this stage is represented by the generation of two instances of learning scenario: a formal scenario expressed in XML, compliant to IMS-LD, and a graphical scenario intended for design teams.

#### 4.2 After the running of the unit of learning

This stage corresponds to the ongoing development phase of the prototype model, that enables design teams to manage, control and regulate the unit of learning after its delivery, to improve it, while verifying congruency between general **objectives**, used **content** and **activities** and finally the **outcome** of the learning activities

Both stages are described in the ODLDM model proposed to illustrate the modeling approach (figure 1).

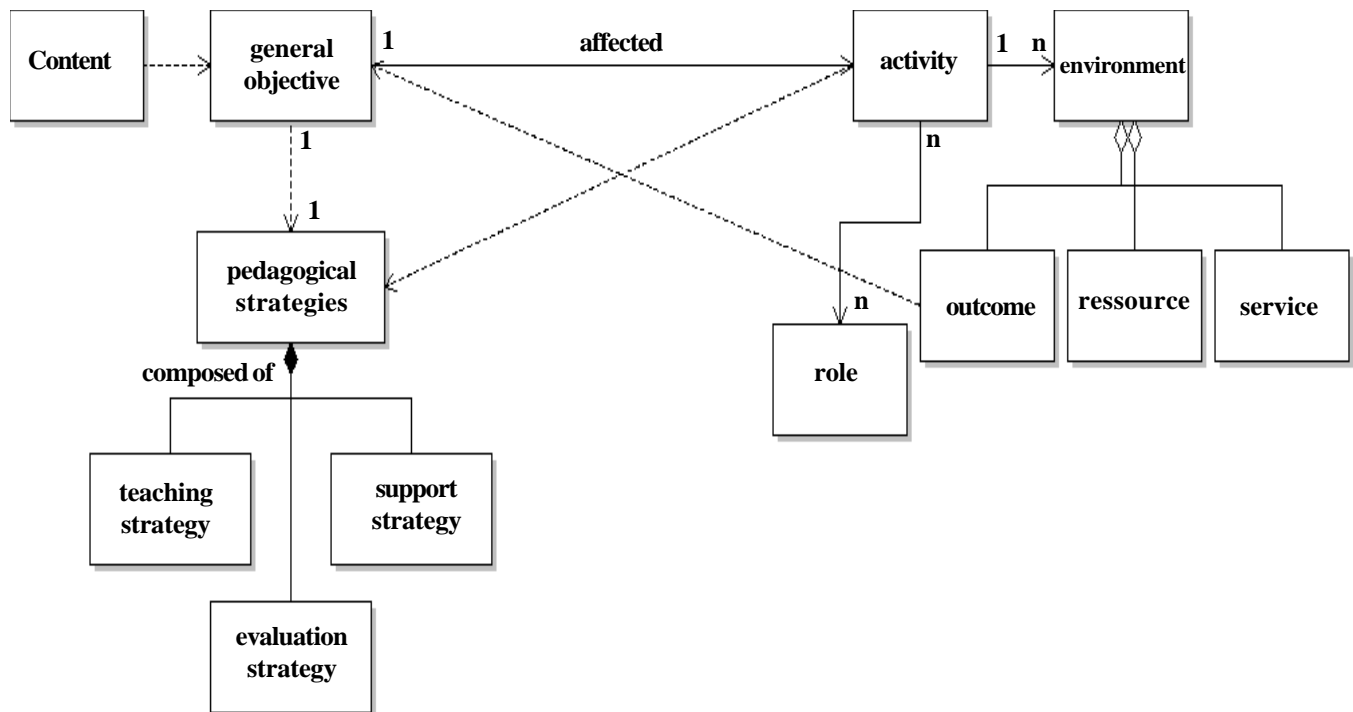


Figure 1. An overview of the ODLDM

The proposed model is characterized by:

**Expressivity:** the learning unit is designed as a combination of two types of descriptions: pedagogical (objectives, context, prerequisites and pedagogical strategies) and technical (activity, environment, outcome, resources and services)

**Accessibility:** the model can generate scenarios accessible (graphics, text) in a process appropriate to practices of teachers.

**Supportability:** instructional design method (prototype model of instructional design) describes and supports the different steps doable by teachers or instructional designers.

**Controllability and Flexibility:** the model allows design actors to design and control unit of learning before, during and after its release on the learning management system.

**Compatibility:** The model is compliant to the IMS-LD standard.

**Congruency:** the proposed model provides the correspondence between the organization of the learning unit and the needs of learners. This is achieved by defining the link between the technical and educational components of a learning unit.

## 5. Conclusion

We have presented in this paper our first version of the open and distance learning design metamodel (ODLDM), and the modeling approach, inspired both from design practices and theories. We aim at this stage to develop the proposed model using a model driven engineering (MDE) approach, to support the learning design approach, by implementing an authoring tool. Thus allowing design teams to adopt learning design standard and use instructional design principles and theories.

## References

- [1] IMS Learning Design. <http://www.imsglobal.org/learningdesign/>
- [2] Koper, R., Tattersall, C. (2005). Learning Design: A handbook on modeling and delivering networked education and training. Berlin: Springer-Verlag.
- [3] Power, M. (2005). le design pédagogique dans un contexte de bimodalisation de l'enseignement supérieur: une étude multicas,. Thesis, faculté des sciences de l'éducation, Laval, Québec, déc.
- [4] Moore, M. G. (1993). Theory of transactional distance. In: D. Keegan (ed.), *Theoretical principles of distance education*. London & New York: Routledge.
- [5] Power, M. (2002). Générations d'enseignement à distance, technologies éducatives et médiatisation de l'enseignement supérieur, *Journal de l'enseignement à distance.*, 17 (2) 57-69.
- [6] Pernin, J. P., Emin, V. (2006). Evaluation des pratiques de scénarisation de situations d'apprentissage : une première étude, in proc. *colloque TICE Méditerranée*, Genova.
- [7] Villiot-Leclercq, E. (2007). Modèle de soutien pour l'élaboration et la réutilisation de scénarios pédagogiques. Thesis Dept. Didact, Université Joseph Fourier/Université de Montréal.
- [8] Emin, V. (2009). Modèle et environnement métier pour la création, le partage et la réutilisation de scénarios pédagogiques, . In: Proceedings of . *EIAH'09*.