Designing an IMS-LD Model for Collaborative Learning

Fauzi El Moudden/ Ph.D student
in computer sciences
Abdelmalek Essaâdi University
Faculty of Sciences, LIROSA
Tetouan, MOROCCO

Prof. Mohamed Khaldi
Abdelmalek Essaâdi University
Faculty of Sciences, LIROSA
Tetouan, MOROCCO

Prof. Aammou Souhaib
Abdelmalek Essaâdi University
Faculty of Sciences, LIROSA
Tetouan, MOROCCO

***Abstract*—The context of this work is that of designing an IMS-LD model for collaborative learning. Our work is specifically in the field or seeking to promote, by means of information technology from a distance, a collective knowledge construction. Our approach is to first think about the conditions for creating a real collective activities between learners, and designing the IT environment that supports these activities. We chose to use the pedagogy project as a basis for teaching these collective activities. This pedagogy has already proven itself, mostly in traditional learning situations in the classroom.**

***Keywords*—Collaborative Learning; Pedagogy Project; Socio-constructivist; IMS-LD**

I. Introduction

In this work, we try to present teachers with a tool for easy generation and management of collaborative educational content online. This tool allows the generation and editing of websites structures through a base educational models rich enough with a variety of choices ensures a better adaptation of the course to pedagogy and learning style. Otherwise, the social constructivism approach is to focus the activity on the learner to support synchronous and asynchronous collaboration, it is therefore necessary to find a method to model all types of activities. To model the activities we have based on IMS LD specification based on collaborative learning online.

First, we'll start the first section by defining some basic concepts such as collaborative learning, socio-constructivist approach, the project-based learning, collaborative learning, IMS-LD then we will address the modeling section in which we present our computer model design.

II. Concepts and Related Work

A. Collaborative Learning

According to Cuseo [1], cooperative learning is an educational method in which small groups of 3 to 5 learners, made intentionally, working inter-depending on a well-defined and structured task. Learners are responsible for their performance and the teacher is a facilitator, a consultant in the learning process of the group. The group is formed according to educational criteria (such as the heterogeneity of learners' levels); the roles of learners should be assigned so as to be interdependent. The intention to develop social skills is clearly explained in this approach.

The term "collaborative learning" seems to have an English origin, based on the work of teachers who explored how learners could take a more active role in their own learning. [2]. Learners are assumed to be responsible and have social skills. Panitz [2] see collaborative learning as a personal philosophy and not just as a class technique. Learners are responsible for their learning and that of others [3].

Overall, collaborative learning is an approach that gives a lot of freedom to the learner. The activities are not very directed and learners manage their workgroup largely. For example, learners roles are not assigned by the teacher in the case of collaborative learning, but learners negotiate these roles together.

B. Socio-constructivist approach

Although Piaget's theory [4] focuses primarily on the individual aspects in cognitive development, she strongly inspired a group of psychologists - named "Geneva School" - which began in the 1970s a research to know how social interactions affect individual cognitive development [6]. This new approach, highlighting the role of human interaction in learning, is described as socio-constructivist. The role of the interaction in the mental development is explained by the researchers by structuring interaction and processes generated by these interactions called "socio-cognitive conflict". This conflict leads the learner to reorganize its previous designs and incorporate new elements of the situation. The socio-cognitive conflict resulting from the confrontation of representations about a subject from different individuals interact. This reorganization of representations from two types of imbalance: the inter-individual when there is opposition between two subjects; intra-individual, when a subject questions his own representations. An opposition between two subjects during situations of social interaction, allows to generate a socio-cognitive conflict whose resolution will generate a cognitive progress. Learning is, therefore, stimulated by socio-cognitive conflicts, knowledge is developed when learners reconsider their own views through negotiation and argument phenomena. This work helped to highlight the link between the cognitive and the social, stressing the importance of dialogue and shared experiences in the construction of knowledge.

C. Pedagogy Project

1) For author/s of only one affiliation (Heading 3): To change the default, adjust the template as follows.

2) Approach and specifications

The pedagogy project is part of what is conventionally called active pedagogies; it refers to a learning model that we will characterize, and according to LAFORTUNE [13] is related to cognitive models, constructivist, and socio-cognitivists.

For William [6], a project is an activity that has a specific purpose, engages in full those who perform it and takes place in a social environment. This method advocates finding solutions to real problems that occur in everyday life.

Today, pedagogy project is a method commonly used by teachers. However, it has many variants and it is difficult to provide a single definition. We retain this method in that learners work together in small teams from a specification to actual production. This work requires authentic project management (task management, time management). We retain that unlike problem solving, there is no single solution to the project and that it takes place over a longer period.

3) Characterization of the pedagogy project

The literature highlights a number of characteristics of the project pedagogies, and their positive effects on learning. A project must put the learner in a situation that is a challenge [7]; it is initiated from a concrete theme of life [8]; it should move towards a concrete and evaluable output ([9]; [10]; [7]).

The assessment consists of several stages that take place at different stages of project process and not just at the final stage ([10]; [11]).

Project-based learning:

- The abbreviation “i.e.” means “that is”, and the abbreviation “e.g.” means “for example”.
- Develops knowledge, management skills, interpersonal skills and knowledge to be taking place in action, know-becoming ([12]).
- Develops also transversal competences ([13]; [10]).
- Strengthens the autonomy and responsibility.
- Develops self-confidence in learners ([12] ;[10])
- Promotes teamwork ([9]).
- Allows implementation of interdisciplinarity ([7]).

4) The phases of a project

As has been said, a project takes place in the following time in several phases, which can be described as follows.

a) Preparation phase: The teacher must be able to offer a wide range of project topics, for which clarifies and explains his pedagogical intentions. It should also allow a breakdown of these subjects among learners in a democratic process [16]. Finally he gives each project a synoptic blank. Learners perform needs analysis, feasibility study and establish the specifications [11].

b) A project structuring phase: A project must first be broken down into stages, and then cut each step into tasks [7]. These should then be planned ([10]; [11]).

*c) Project implementation phase:*To implement a project, is to launch it in reality. It is a long period for which it is necessary to confront the tasks to the outlook reference schedule. About that, we refers to deviations of management.

*d) A project evaluation phase :*The assessment consists of several moments that take place at different phases of project process and not just the terminal phase. The assessment consists of several moments that take place at different phases of project process and not just the terminally ill. According to FORREST [14], formative assessment is frequent and immediate during the project. Summative assessment is carried out through the evaluation of final products.

D. Work objective

The pedagogy project is to make learners work in small teams on common projects to achieve collective production. The first goal of our research is to cover the modeling of a system of learning in a collaborative online context.

To create a collaborative learning environment online, you must prepare the environment to give learners the ability to view projects, tasks, create and participate in discussions with his group to share ideas and improve the way of thinking.

E. Online collaborative learning

The online collaborative learning was experienced at the onset of online education in the late 1980s under the name "computer conferencing" email first, then by forums. As online learning, collaborative learning benefitted learner’s great flexibility of time and place (stimulating autonomy and reflection) and an excellent asynchronous interaction (source of motivation, support, critical thinking, synthesis..) Therefore [16] reported in 1989 that "The collective nature of computer conferencing may be the single most fundamental and critical underpinning the development of theories as well as the design and implementation of educational activities online."

In this perspective, the online collaborative learning is the most important educational contribution of online education. And irrefutable logic of [17], provide online education without benefit learners who follow the advantages of its "most fundamental" is absurd and devalues the remarkable educational tool that is telematics. This does not mean that online education should be limited to collaborative learning online! But it is important that any online program includes a minimum of collaborative learning and operates an appropriate extent and in a manner appropriate to the program and its students.

F. Related works

Much work has been done in the field of collaborative learning and IMS LD specification, we will be limited to 3 examples such as "**Implications of a cooperation model for the design of collaborative tools**" [18] that explains how models socio-cognitive interaction are related to the properties of collaborative tools, "**Modeling of collaborative learning scenarios**" [19] that expresses collaborative learning scenarios by teachers animating virtual classrooms to promote the re-use and share teaching practices. It proposes an approach led by the models in accordance with the recommendations of the Model

Driven Architecture OMG. It presents a meta-model based on IMS-LD enhanced by the concepts of participation model to capture the richness of the interactions inherent in collaborative activities, and "**A system to advise the teachers of collaborative learning situations**" [20] that targets the development of a system of assistance to the teachers in collaborative distance learning. This system is based on an ontology modeling the different components of tutoring (actors, their characteristics, activities, their parameters and resources.) A rule-based inference engine reasons about the ontology to infer advice to the tutor to help adapt learning situations to learners and learning groups by taking into account their behavior and interactions.

For us, this is not the same case and the same vision as our model is more general, it aims on one hand to create a system from which teachers can animate virtual groups for the re-use and sharing of teaching practices and on the other hand the re-use of the content created in other frameworks.

III. IMS-LD

IMS-LD was published in 2003 by the IMS / GLC. (Instructional Management Systems Global Learning Consortium: This specification allows representing and encoding learning structures for learners both alone and in groups, gathered by roles, such as "learners" and "Team"[21]. We can model a lesson plan in IMS-LD, defining roles, learning activities, services and many other elements and building learning units. The course outline is modeled and built with resources assembled in a compressed Zip folder and initiated by an executable ("player"). The latter coordinates the teachers, students and activities as long as the respective learning process progresses. A user takes a "role" to play and perform activities related with it to achieve satisfactory learning unit. In all, the unit's structure, roles and activities build the learning scenario to be executed in a system compatible with IMS LD.

IMS-LD does not impose a particular pedagogical model but can be used with a large number of scenarios and pedagogic models, demonstrating its flexibility. Therefore IMS-LD is often called a meta-pedagogic model. Previous e-learning initiatives claim to be pedagogically neutral, IMS-LS is not intended to pedagogical neutrality but seeks to raise awareness of e-learning on the need for a flexible approach.

IMS-LD has been developed for e-learning and virtual classes, but a course face to face can be done and integrated into a structure created with this specification, as an activity of learning or support activity. If the ultimate goal to create rich learning units, with support to achieve the learning objectives by providing the best possible experience, face-to-face meetings, and any other learning resource are permitted such as video conferencing, collaborative table or any field action research.

IMS LD uses the theatrical metaphor, which implies the existence of roles, resources and learning scenario itself: one room is divided into one or more acts and conducted by several actors who can take on different roles at different times. Each role is to carry out a number of activities to complete the learning process. In addition, all roles must be synchronized at the end of each act before processing the next act.

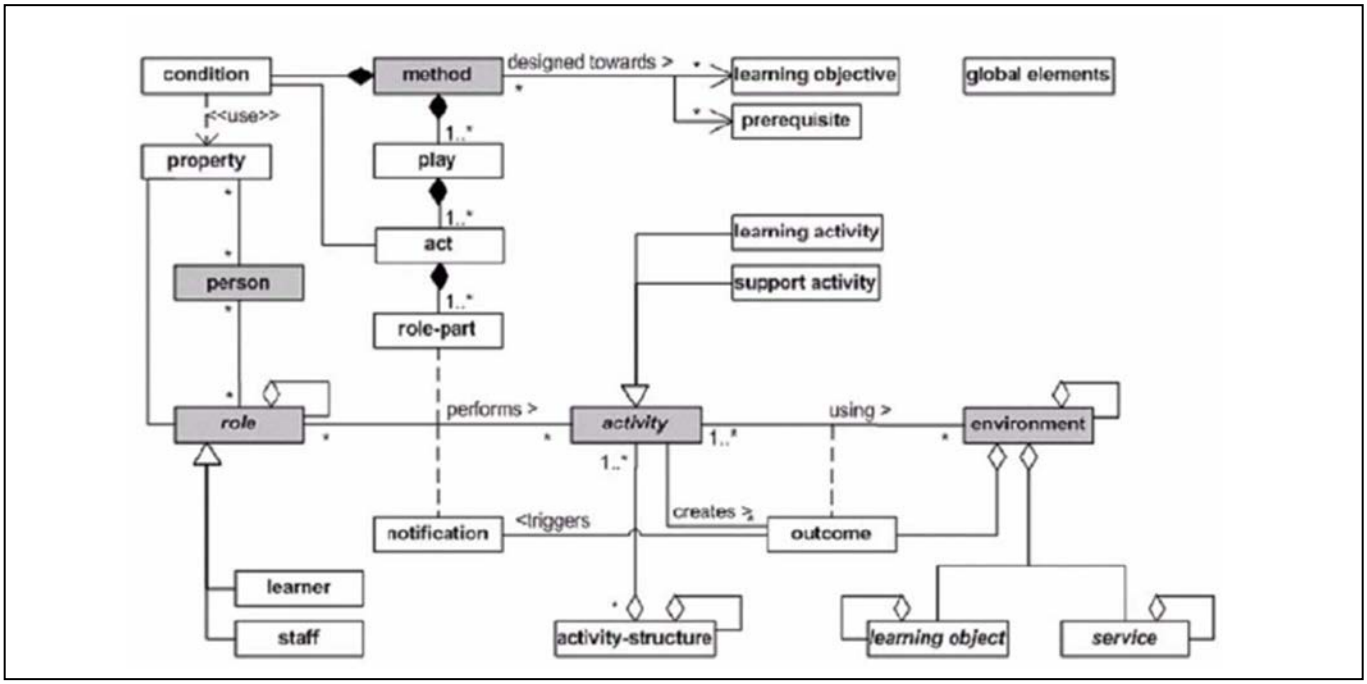

Fig. 1. The conceptual model of IMS LD [21]

IV. Model Design

In our previous work [22] we tried to design a collaborative model of learning online beginning with the study of the IDM approach (Model based Engineering) based on four stages of implementation:

TABLE I. TABLE SERVICE DESCRIPTION

Actor	Service function	Description
Learners	Consult the project	The learner can view the project and its objectives at any time
	Create discussions	The learner may at any time create discussions
	Browse calendar	The learner can browse the defined task calendar.
	Check notifications	The learner can always check for notifications.
	View documents	Learners read the downloaded documents.
	Download documents	The learner can download the documents
	Contact the teacher	The learner may contact the teacher
Teacher	Supervise the learners	The teacher adds, modifies or deletes his learners
	Manage groups	The teacher adds, modifies or deletes groups
	Assign students to groups	The teacher can assign learners to groups
	Create projects	The teacher can create projects
	Set objectives	The teacher can set objectives for projects
	Set phases	The teacher can set project phases
	Set tasks	The teacher can set tasks
	Assign tasks	Teachers can assign tasks to students
	Set calendar	The teacher can set schedules for the tasks and phases
	Upload documents	The teacher can upload documents
	Download documents	Teachers can download the documents
	Initiate discussions	The teacher can start discussions
	Create notifications	The teacher can create notifications
	Assess productions	The teacher can assess the productions undertaken by learners.
Admin	Manage teachers	The admin adds, modifies, or deletes a teacher
	Manage access rights	The admin can manage the access rights of teachers and learners.

- The development of a model without IT preoccupation (CIM: Computer Independent Model).
- Its manual transformation into a model in a particular technological environment (PIM: Platform Independent Model);
- The automatic transformation into a model associated with the target implementation platform (PSM: Platform Specific Model) model must be refined;
- Its implementation in the target platform.

In this section we will talk about the IT design of our collaborative model without using the same approach that we have adopted in previous works, because we have detected the real problems of semantic loss during the transformation of the model.

This led us to develop our model through the outline of the diagram in which we will eventually identify the features of the constituent entities of our model and also the classes diagram in which we will specify the different classes constituents our collaborative model.

A. Use case diagram

The use case diagrams identify the functionality provided by the model (use case); users interact with the system (actors), and the interactions between them.

The main objectives of the use case diagrams are:

- Provide high-level view of the model.
- Identify users ("actors") Model.
- Define the roles of the actors in the model.

Table 1 describes the service function for each actor:

Here are the use case diagrams of the model representing the external actors who will interact with the system and how they will use it:

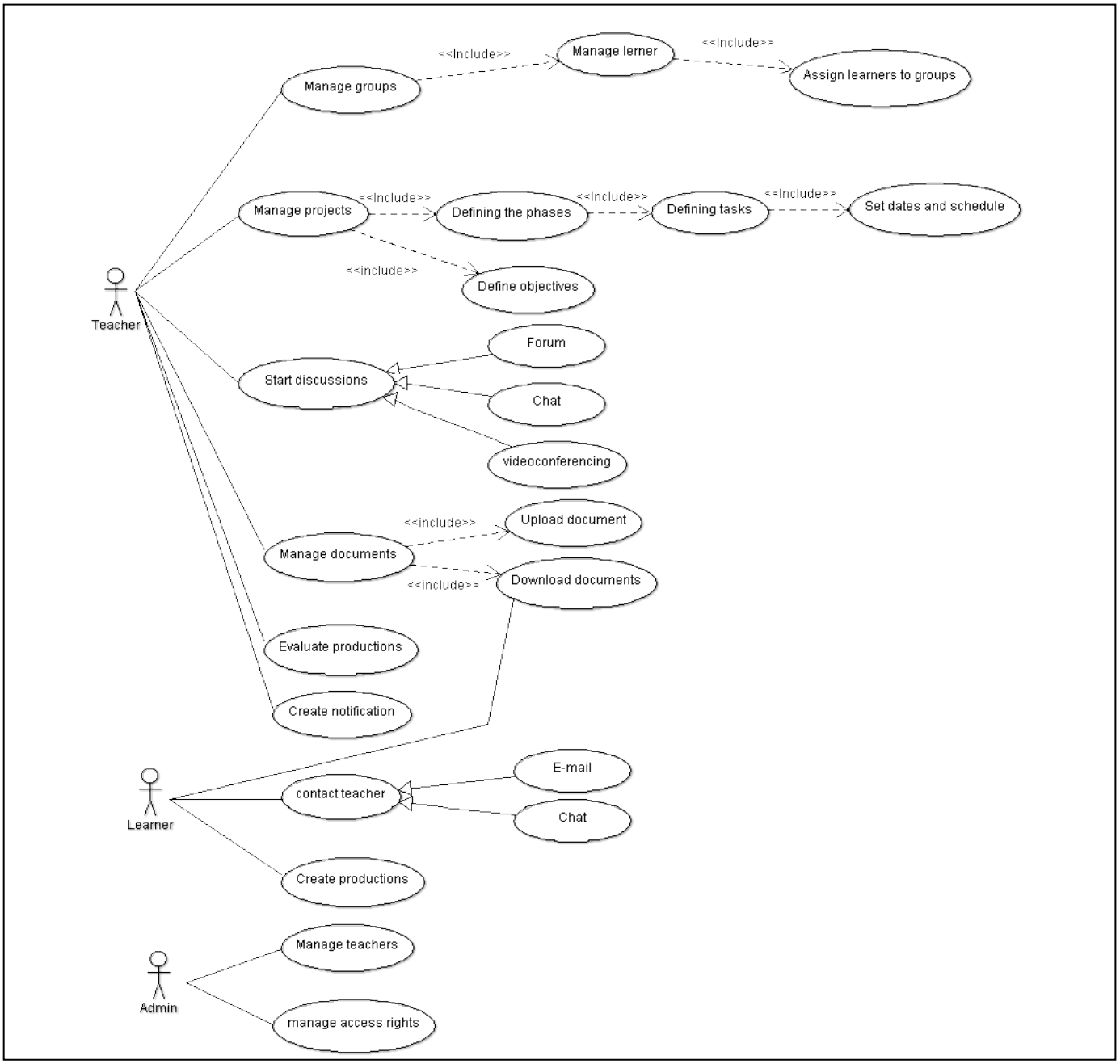

Fig. 2. Use Case Diagram

B. Class Diagram IMS-LD

In this part we will try to create a model based on the theoretical study of our current work and allows simultaneously to ensure its projection to the model, on top of that we will try to recognize our model with the IMS model - LD, this compatibility will not be a direct way c to d, one will use the same terminology but IMS-LD for all classes of our proposed collaborative model, there is an equivalent class in the IMS-LD, which will greatly help us in the implementation level, we present in the following table the different classes of our model and the IMS-LD model:

TABLE II. CORRESPONDENCE BETWEEN THE TERMINOLOGY OF IMS-LD AND THAT OF THE COLLABORATIVE MODEL

Collaborative Meta-Model	**IMS-LD**
Project	Activity
Task	Role
Subtask	Activity structure
Phase	Play
Members, Team	Person
Teacher	Staff
Learner	Learner
Production	Outcome
Notification	Notification
Objective	Learning Objective
Tools	Services

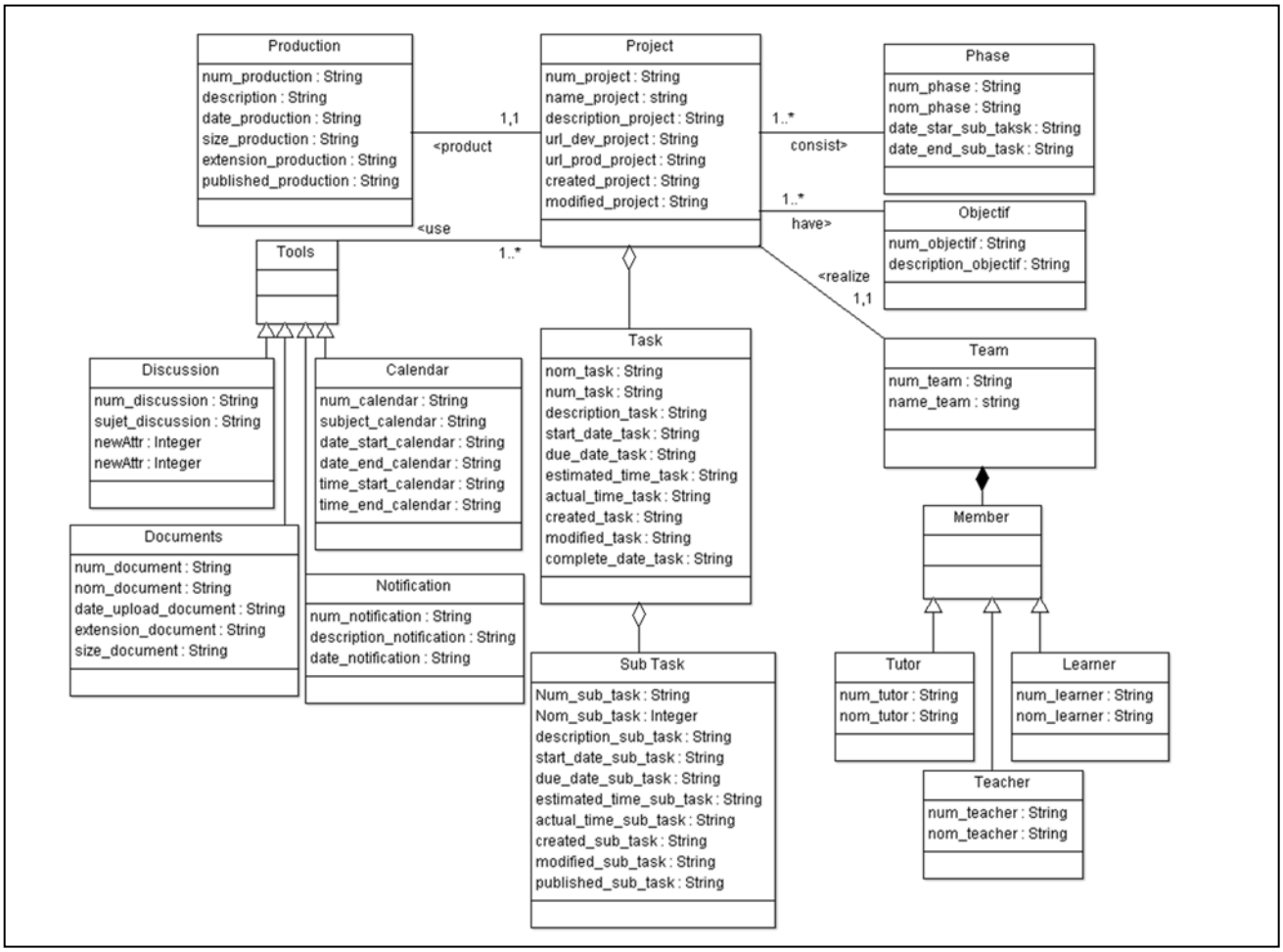

Fig. 3. Class Diagram

V. Conclusion and Perspectives

In our work, we are on the way to the design and modeling of a collaborative online learning model compatible with IMS-LD. This design is based on active teaching learner-centered, and as an example of the pedagogy we opted for pedagogy project that allows us to reach a teaching object through the implementation of projects that are divided into tasks performed by students in collaboration.

To achieve this goal we need to reach the model validation step, which is one of the tasks to be performed in our future work, also we seek a relevant tool among the models validation tools that will guide us better to start the development part.

References

[1] Joseph Cuseo, Marymount College, Cooperative Learning and College Teaching ,2.3 (1992): 5-10.

[2] Panitz, T. (1997). Collaborative versus cooperative learning. A comparison of the two concepts which will help us understand the underlying nature of interactive learning. Cooperative Learning and College Teaching, 8(2). Recuperado de http://pepsic.bvsalud.org/scielo.php?script=sci_arttext&pid=S0254-92472011000100001&lng=es&nrm=iso&tlng=es#

[3] Gokhale 1995, Journal of Technology Education Volume 7, Number 1Fall 1995

[4] Jean Piaget, Psychologie et pédagogie (Folio essais, Paris, ed. 1991, 1935).

[5] Doise et Mugny 1981 Willem Doise, G. Mugny, Le développement social de l'intelligence (InterEditions,Paris, 1981).

[6] William Heart Kilpatrick, The Project Method, Teachers College Record, vol. 19 (2), p.319-335, (1918).

[7] ABDALLAH, F. . Meta-modélisation pour décrire et instrumenter une situation d'apprentissage de pédagogie de projet collectif. Thèse de doctorat en informatique. Le Mans: Université du Maine, 2009.

[8] LEBRUN, M. Théories et méthodes pédagogiques pour enseigner et apprendre: Quelle place pour les TIC dans l'éducation ? (2e éd.). Bruxelles: De Boeck Supérieur, 2007.

[9] PERRENOUD, P. Apprendre à l'école à travers des projets : pourquoi ? Educateur, 14, 6-11, 2002.

[10] William, J. L'apprentissage de projet. Sainte-Foy: PUQ, 2004.

[11] TILMAN, F. Penser le projet: concepts et outils d'une pédagogie émancipatrice. Lyon: Chronique sociale, 2004.

[12] HUBER, M. Apprendre en projets: la pédagogie du projet-apprenants (2e éd.). Lyon: Chronique Sociale, 2005.

[13] LAFORTUNE, L. La pédagogie du projet et développement des compétences transversales : changement de posture pédagogique. Education Canada, 49(5), 16-20, 2009.

[14] FORREST, C. (dir.) La pratique de la pédagogie de projet (2e éd.). Alma: Axone, 2011.

[15] DUMAS, B. Les rôles de l'enseignant en pédagogie de projet. Québec français, 126, 64-66, 2002.

[16] Harasim L., « Online education: a new domain », in Mason R. & al. (ed.), Mindweave, Oxford, Pergamon, 1989, p. 50-52

[17] Salmon G., E-Moderating - The key to teaching and learning online, Londres, Kogan Page,2000.

[18] Gregory Dyke, Kristine Lund. Implications d'un mod`ele de coop´eration pour la conception d'outils collaboratifs. M.N. Lamy, F. Mangenot, E. Nissen. Echanger pour apprendre en ligne (EPAL), Jun 2007, Grenoble, France. Universit´e de Grenoble, Consult´e le 20/04/2009 `a l'adresse: http://w3.u-grenoble3.fr/epal/actes.html, 2007.

[19] Christine Ferraris, Anne Lejeune, Laurence Vignollet, Jean-Pierre David. Mod´elisation de sc´enarios p´edagogiques collaboratifs. 2005.

[20] Rencontres Jeunes Chercheurs en EIAH (RJC-EIAH 2006), May 2006, Evry, France. p. 99-106, 2006

[21] IMS Learning Design www.epi.asso.fr/revue/articles/a0512c.htm

[22] Fauzi El Moudden, Souhaib Aammou et Mohamed Khaldi. A TOOL TO GENERATE A COLLABORATIVE CONTENT COMPATIBLE WITH IMS-LD. International Journal of Software and Web Sciences, 11(1), December 2014-February 2015, pp. 01-08.

AUTHOR PROFILE

Mr. EL MOUDDEN Fauzi Is a PhD candidate in Computer sciences, at the Laboratory of Informatics, Research Operational and Statistic Applied (LIROSA) at Faculty of Sciences, Abdelmalek Essaadi University. He has a Master degree in Instructional design Multimedia engineering at the The École normale supérieure of Martil, Morocco in 2013. His current research focuses on: E-learning, Collaborative Learning and Pedagogy.

Prof. KHALDI Mohamed is a professor at the The École normale supérieure at Abdelmalek Essaadi University, and he is with the Laboratory of Informatics, Research Operational and Statistic Applied (LIROSA) at Faculty of Sciences, Abdelmalek Essaadi University. Tétouan, Morocco.

Prof. AAMMOU Souhaib is a professor at the The École normale supérieure at Abdelmalek Essaadi University. Tétouan, Morocco. He received his PhD in computer science in 2013 within the Laboratory of Informatics, Research Operational and Statistic Applied (LIROSA) at Faculty of Sciences, Abdelmalek Essaadi University. He has a Graduate Diploma (DESA) in Applied Engineering and Technology Education and Training in 2007 at the University of Hassan II, Mohamadia. In research, his current interests include: Cognitive Science and Artificial Thinking, Ontology Engineering, Human-Computer Interaction and Technology Enhanced Learning.