

# Dialogic Learning and Interactive Groups: An IMS LD Template Integrated in Runtime Systems

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**Abstract**—Dialogic learning and interactive groups have proved to be a useful educational methodological approach in lifelong learning with adults. The principles of this approach stress the importance of dialogue and equal participation in every stage of the learning process – including the design of the training activities. This paper adopts these principles as the basis for a configurable template that can be integrated in runtime systems. The template is formulated as a meta-UoL which can be interpreted by IMS Learning Design players. This template serves as a guide to flexibly select and edit the activities at runtime (on the fly). The meta-UoL has been used successfully by two significant practitioners so as to create a real-life example, with positive and encouraging results.

**Index Terms**—authoring, enactment, IMS LD, lifelong learning, pedagogical model, template, flexibility.

## I. INTRODUCTION

Some of the main problems of lifelong competence development are related to the enormous diversity among lifelong adult learners. This diversity encompasses a large number of factors such as age, gender and culture but also aspects such as needs and interests. The complexity of this context is also emphasized by the fact that lifelong learners have already accumulated experience in informal learning settings, typically associated to real-life situations, which can hinder the implementation of more formal or traditional learning strategies. This is the rationale behind the research on pedagogical models that is being conducted within the European TENCompetence project. In this project a pedagogical model is considered to be a representation of a pedagogical activity using the IMS Learning Design (IMS LD) specification [1], which can be used for authoring and delivering learning activities [2]. This representation does not need to be a full ready-to-run Unit of Learning (UoL).

In this paper we adopt the methodologies used in Agora as a significant basis for approaching TENCompetence pedagogical models. Agora is an association within the La Verneda School for adult education [3]. Their main objectives are to address social exclusion by providing opportunities for people to train and to update their skills beyond formal education. This is, to provide a space for life-long learning development in which the learners define their own education in relation to their own learning needs.

Agora relies on the principles of democratic participation as a basis for creating of a space for lifelong

learning. Every participant has the opportunity to contribute in a myriad of decision spaces. In this way, the methodology they use in their training activities is based on dialogic learning and interactive groups [4]. Dialogic learning is defined as “the learning that results from the interactions produced by an egalitarian dialogue among participants” [19, p.91]. There are no hierarchies within participants and everybody can participate in the definition of the learning process. A well-trying and known way of implement Dialogic learning’s principles in practical real contexts is making use of interactive groups [19, p.93]. These are heterogeneous groups of persons with different academic levels and experiences that “work together” and “find out” together in a “logical” way guided and coordinated by the trainer [20 and references in there].

Therefore, in the context of adult education knowledge is the result of the convergence of the interactions and experiences’ exchanged through dialogue [18, 21]. In this context, the traditional instructional design guidelines are too rigid since motivation and participation of learners become the gist of the learning process. Consequently, it is necessary to use also in the new design methodologies to tackle the flexibility requirements and also to generate the organizational structures for supporting them [18, p.125]. Flexibility here is not only a desire but it is also the base and the central requisite for the construction of a space for egalitarian dialogue and democratic participation. To propose a technical approach as a solution for this particular educational context is the main rationale behind this research.

We address this problem by adopting the ideas of dialogic learning and interactive groups and integrating them in an IMS LD configurable template (using a terminology according to the framework proposed in [12]) that can be directly integrated in runtime systems. The template is computationally represented in the form of what we call a meta-UoL. This is a fully-fledged UoL offering abstract information derived from other more concrete UoLs. This template incorporates a set of dialogical learning methodological activities that the participants can choose, complete and refine according to the needs of their particular situation. So that participants will end up with a defined UoL adapted to it.

For participative educational methodologies new requirements appear that cannot be supported by the existing approaches. The activities should not be detailed in advance and all the participants should collaborate in the edition process during the execution of the UoL. These

situations demands a different approach to the current IMS LD implementations in which authoring tools are not integrated in runtime systems and where UoLs need to be planned in advance [6, 16].

Nowadays, most of the existing systems treat separately the edition from the enactment phase. Some examples for the edition phase are Reload [8] or Collage [9]. The reference IMS LD engine for the enactment is Coppercore [10]. Coppercore has been integrated in several IMS LD compliant players such as SLeD [15], but these players do not integrate authoring functionalities. However, some studies underline the necessity of developing systems that allow the adaptation of learning designs to the actual context on the fly [6, 7]. Recently, a related research has proposed a mechanism for the introduction of small variations in the original UoL at runtime [11]. It codifies the changes through a set of notifications that are interpreted in the enactment phase. Nevertheless, the roles are previously defined in the edition phase. Thus, this system still considers the separation between the two different phases.

In this context, there are mainly two different situations in which flexibility, in terms of the actual running, is required. First, unexpected situations can occur which would require a UoL to be modified on the fly [6, 7, 11]. Second, it may also be required that the participants should be able to participate in the (on-going) dialogic design of the UoLs. It demands a system that breaks down the frontiers within the enactment and the edition phase and the distinctions between user roles.

Therefore, the aim of this paper is twofold: to define a pedagogical template based on the principles of dialogic learning and the interactive groups, and to formalize the template in an IMS LD interoperable format so that it can be integrated and directly refined (authored) in runtime systems. An additional important contribution of this research is to study which are the possibilities of using the IMS LD specification [14] in such a flexible context. And, moreover, analyze its efficiency when integrating the edition with the enactment phase.

The rest of the paper is structured as follows. The section II deals with the formulation and implementation of the pedagogical template. Section III illustrates the template integrated in the SLeD system [15] through a realistic use case and the result of using the proposals with two significant potential users. Finally, Section IV concludes this paper indicating the future work planned to enhance this approach.

## II. TEMPLATE BASED ON DIALOGIC LEARNING AND THE INTERACTIVE GROUPS

The formulation of the template is accomplished in three phases. First, its design requires a description of the learning context and of the problems detected. Second, a detailed analysis of the dialogic learning and interactive groups methodological approaches. Third, it should be technically implemented according to the IMS LD specification so that it can be interpreted by compliant systems.

### A. Learning context

In educational contexts such as in la Verneda School, the dialogical learning has been proved to be an efficient technique to promote the self-confidence of the learners

and to involve them into the learning process [5, 18 p. 124, 19 p. 93, 21, 22]. However, one of the problems when carrying out the theoretical principles of the methodology in a real context is to find the appropriate activities that fit with them. It requires lot of practice and experience.

The template we proposed in this paper is an attempt for guiding the Agora's coordinator –especially novice- in the edition of UoLs before and during the training session. These UoLs provide a collection of learning processes that can be shared and reused among trainers as a mean for interchanging experiences as well as for facilitating their familiarization with the methodology.

Since the template is accessible for all the participants during the session it is a means for supporting the collaboration and let people decide collectively about the learning design [4 p. 3]. It is also a mechanism for supporting the communication and community building beyond face-to-face possibilities, even at home. Moreover, as it provides an integrated view of the whole session, it also helps the coordinator to avoid repetitive explanations. At the same time, is a way for the learner to freely follow the activity, which enhances their self-confidence and self-evaluation competences.

Therefore, we consider the use of a template as a good solution mainly for two reasons. First, it has proven to be a good approach not only for the reuse of learning designs but also for guiding users in structuring their learning activities [13, 9]. Second, its configurable nature allows users (learners and trainers/coordinators) to refine the learning design according to the necessities of the actual learning context [5, 18, 19].

### B. Design of the template

The design of the template was the result of an iterative process with different phases. Three learning designers followed a top-down and bottom-up approaches considering the theoretical principles of dialogic learning and the Agora coordinators' accumulated experience. That is, they applied a methodology based on theory and practice.

Flecha (2000) [4, p.1] defines seven principles as a guide for implementing dialogic learning:

- Egalitarian dialogue: there are no hierarchies among participants and all the opinions have the same value.
- Cultural intelligence: the group of abilities developed along people's life to carry out operations in their everyday activities.
- Transformation: learning is a transformation process that affects the environment of the learner in many different aspects.
- Instrumental dimension: dialogic learning includes instrumental learning planned and scheduled by the participants. It enhances the ability of reflection to reach consensus.
- Creating meaning: the meaning created through interpersonal interaction.
- Solidarity: knowledge is built together and everyone learns from everyone.
- Equality of differences: exploiting the differences between people for enriching the learning process.

In the first phase on the definition process, the researchers studied individually the principles of dialogic

learning. After that, they did a brainstorming session in which they came up with a list of activities that represent the ideas that arise from the methodology. For example, the principle of solidarity is strongly related to concepts such as collaborating or negotiating. In a second phase, they build a new activity list taking as a reference the actions usually performed in Agora’s sessions. The third phase consisted on making a comparative analysis of the two lists and of generating a final one. The list should contain a number of activities enough rich to represent the organizational structures required for the learning context but short enough to be usable. In the last phase, the characteristics of each activity were defined: “who” the person in the session that decides the characteristics of the activity (the trainer or the learner) could be and “which” the input and the output artifacts treated on it were. At this point, it was decided to suppress the distinction between trainer and learner and consider only the role of participant, since any person can equally take part of the learning design process. Finally it was decided which was the tool that better supported each activity. For this last issue, it was decided to suggest web 2.0 tools because of their popularity, usability and availability, and also for their participatory nature [23]. All these aspects would be part of the configurable elements of the template.

Finally, only seven activities compose the first approach of the template. For each activity, the user is able to take the different types of design decisions as defined in the template, namely: *if an activity type appears and when, the activity description* (task), *the tool support, supporting resources* (supporting the activity), and *the output resources* (resulting from the activity). This initial approach is modified and readapted taking into consideration the suggestions of the users (modifications in section II.B).

The template described here is only an attempt for supporting dialogic learning and interactive groups in the particular context of Agora. Although other approaches could be defined, the evaluation experiences showed that the Agora’s trainers success in mapping the activities in the template with those that they usually perform in their sessions.

C. *Implementation of the template*

In this paper we provide a prototype of a template resulting from first iterative design process that will serve as a guide for future implementations. The current version of the template<sup>1</sup> considers up to four possible different phases formalized as IMS LD *acts*. Within each phase, the user can select the activity type out of the seven types shown in Table I. Once selected, the edition of the chosen activity is enabled. Both the selection activity and each of the possible “edition activities” are modelled as *supporting activities*. See in Fig. 1 the code that implements a support-activity for the definition of the negotiation.

TABLE I.  
TYPE OF ACTIVITIES AND THEIR ASSOCIATED DECISIONS

Summary of the types of activities and the associated design decisions needed to refine the proposed template into a complete UoL.

TYPE OF ACTIVITY AND BRIEF EXPLANATION	DESIGN DECISIONS (Indications on supporting tools, input resources and output artifacts. Additional decisions are visibility, order and description of the activities)
NEGOTIATING In dialogical learning, people decide collectively, through discussion, the aims and contents of their activities.	Tool support: indicate the tool or tools to support the activity, suggestions are: Doodle or Forum to discuss about a topic [...] Input resources: upload a comment or file to support the negotiation activity. Output artifacts: add a briefly description about the expected result of the process (statistics of the votes, the final decision).
DIALOGUING Interactive groups promote solidarity, dialogue between equals, reinforcing the communicative action and expressing implicit knowledge and the abilities.	Tool support: select means of communications based on the equality of learners and coordinators whose comments are not classified as better or worse but appreciated as different [...] Input resources: for example a list of discussion points [...] Output artifacts: description about the expected result [...]
SHARING People help each other in their process of learning; people who know a specific content reinforce it by explaining it to their colleagues.	Tool support: provide spaces of relation and exchange among the learners themselves and between learners and trainers. Suggestions are: Blogger [...], SlideShare [...], Flickr or Youtube [...]. Input resources: motivate the sharing with a resource [...] Output artifacts: description about the expected result [...]
DISCOVERING To foster integration in society and reflections, introduce readings related to culture (classic readings, articles, etc.)	Tool support: suggestions are Wikipedia [...] or Google Reader which allows to sort and classify your readings. Input resources: upload also a text or whatever you would like to be discovered. Output artifacts: description about the expected result [...]
CREATING COLLABORATIVELY Everyone has cultural intelligence. Dialogic creativity implies the confirmation of learning collectively generated by participants’ contributions.	Tool support: select tools that enable everybody to contribute. Each person is different, therefore, irretrievable if not taken into account. Suggestions of tools are Wikispaces or GoogleDocs [...] Input resources: [...] Output artifacts: [...]
SELF-ASSESSMENT One way to foster people gain the autonomy and self-confidence necessary to learn is by offering self-assessment activities [...]	Tool support: suggestions are for example questionnaires tools such as those supporting IMS QTI [...] Input resources: for example a list of tasks with deadlines or a test with its correct answers [...] Output artifacts: [...]
ASSESSMENT (BY OTHERS) Participants can assess any result (such as documents) from their other colleagues and contribute with feedback, so they will help each other.	Tool support: a suggestion is to use a Blog where a student can upload a work and later the others can add their suggestions [...] Input resources: [...] Output artifacts: [...]

<sup>1</sup> Available online at

<http://www.tecn.upf.es/~daviniah/metaUoL.zip>

```
<support-activity identifier="define-activity-negotiation-3"
isvisible="true">
  <title>define-activity-negotiation-3</title>
  <activity-description>
    <title>Define the negotiation activity (3)</title>
    <item identifier="item-negotiation-3"
    identifierref="resource-negotiation-3"
    isvisible="true" />
  </activity-description>
</support-activity>
```

Figure 1 XML code for the definition of the negotiation activity that is codified in a *support-activity*.

When the user finishes the edition by having described the activity (Table I), the actual *learning activity* is available and has the characteristics previously configured. Each design decision is codified with *local properties*. Fig. 2 shows two of the five properties (the description and the supporting tools) of the negotiation activity selected. When the properties of the activity are set to true by pressing OK the activity is completely defined.

```
<loc-property identifier="LP-activity-description-negotiation-3">
  <title>LP-activity-description-negotiation-3</title>
  <datatype datatype="text" />
</loc-property>

<loc-property identifier="LP-tool-support-negotiation-3">
  <title>LP-tool-support-negotiation-3</title>
  <datatype datatype="text" />
</loc-property>
```

Figure 2 Two of the local properties that the user must edit-for completing the meta-UoL.

Finally, the effects of showing and hiding the corresponding activities are achieved with *conditions* (Fig. 3).

```
<if>
  <is>
    <property-ref ref="LP-activity-negotiation-1-fixed" />
    <property-value>>false</property-value>
  </is>
</if>

<then>
  <hide>
    <learning-activity-ref ref="activity-negotiation-1" />
  </hide>
</then>
```

Figure 3 Conditions are used for showing and hiding the corresponding activities as a result of the user's selection.

### III. USAGE SCENARIOS

This section illustrates a realistic use case example and the results of interviews with two target users.

#### A. Use case

To facilitate the understanding of the template potential usage we describe a typical situation with a realistic use case. It happens in the context of a ICT (Information and Communication Technologies) session for elder people in La Verneda school. All the participants in the session have a computer with access to the same template. The process followed when using the template is always the same: 1) Selecting "activity type", 2) Defining/configuring the activity and 3) Performing the activity (Figure 4).

1. The trainer proposes three different alternatives to work on in this session by selecting the "dialoguing"

activity type of the template (1.1). He describes it as an activity in which learners have to discuss about the different options and propose different mechanisms to arrive to a consensus (1.2). Once defined, the participants perform the activity (1.2).

2. Then, one participant proposes to vote the different possibilities (2.1). The trainer agrees with the proposal and let him to refine the "negotiating" activity in the template (2.2). The learner defines it and suggests a web 2.0 tool to do it. Then, all the participants vote and the winner option consists on use the browser to search information on Internet (2.3).
3. The trainer selects the "discovering" activity from the template (3.1). But, in this case, he asks different participants for refining each field in the activity description (3.2). The result is a "discovering" activity that consists on search information about their town using Google and Yahoo!. All participants realize the activity (3.3).
4. To conclude the session, the trainer proposes to put in common the results of the different groups selecting (4.1) and defining (4.2) an "assessment" activity type on the template (to be done by participants, 4.3).

#### B. Using the Template in Sled

The template is formalized as a meta-UoL that can be interpreted by any IMS LD compliant system. This section illustrates its integration in the SLeD [15] player that works under the Coppercore engine [10] (see Fig.5 for an overview of the whole cycle). We use two experiences performed by the two Agora's members in charge of coordinating and conducting training sessions related to lifelong learning of adults in information technologies. This medium-term effort is consistent with the need for rigorous evaluation studies in the field of IMS LD. Although the IMS-LD specification has been released relatively recently, the appearance of mature enough software tools (including players like SLeD) should facilitate deeper evaluation studies in the near future regarding proposals like the ones presented in this paper.

The users participating in the evaluation are representative in the context under study because of their expertise in the use of the dialogic learning and interactive groups methodology and in the application of technological support in their educational activities. They propose for the evaluation test two tasks that are usually problematic for the learners: to write a document and to search on Internet.

Following the guidance provided by the meta-UoL, the Agora's members created the examples in such a way that they represent the activities and the decisions that they normally perform in their training sessions.

The first user proposed to the participants to write a document and save it in a folder. The main objective was to let participants realize that they can become autonomous users in performing this type of tasks (*cultural intelligence* and *meaning creation* in dialogic learning methodology). With this purpose, he chose the *self-assessment* activity and configures it according to his needs. In the second activity he wanted to increase the level of difficulty and edited a task that consists of

*creating collaboratively* a document about the towns where they were born (Fig.5). Finally, he defined a *negotiation* activity in which the participants decide what they want to do in the next session. To support this activity, he recommended the use of the Doodle Web 2.0 [17] tool as suggested by the UoL (Fig. 6). These two last activities are typical when using the interactive group methodology. Since, he did not need a forth activity in the UoL, he set the design of the UoL as finished (Fig. 7).

The second user started by proposing an activity of *dialoguing* for letting the participants talk about the topic to work on in the class. She attached a file with a guide for preparing a learning activity and she asked the participants to provide a file with their ideas. After this, she proposed the participants to use different Internet browsers so that they search for resources to complete their learning design proposal. For this she selected the *creating collaboratively* activity and propose a list of searchers as supporting tools. As a final result of the class, she asked the participants to provide a document with the result of the searches performed.

After these trials we performed a short questionnaire about the usefulness of the tool and the feedback was overall positive. Some of their comments were *"If I had had this tool when I started participating in Agora, it would have helped me more," "I was used to traditional academic formation and in Agora I saw that the teacher is not a teacher!"* or *"It would have been also useful for me to see the lesson plans by other Agora trainers"*. We asked also about the type of activities proposed and the answers where *"The list of activities is very complete and contains the type of actions that we usually do"*. Moreover, they remark the fact that the groups are normally very heterogeneous and that it is good to have a long list of activities for choosing the most adequate. They propose to add a data base functionality for searching examples by type of group or activity.

They also stressed the need for flexibility in this type of contexts, *"There are many situations in which I need to improvise. Tools might not work properly; students do not have a keen interest in the topic or have specific needs, so I sometimes need to reschedule groups and activities to adapt to the circumstances"*. Furthermore, they provided feedback regarding the vocabulary employed in the template and suggested changing some words to enhance their comprehensibility. For example, input resources and output artifacts should be changed by *"supporting resources"* and *"resulting products"*, respectively; or the activities' name as *"creating collaboratively"* by *"create with your colleges"* or *"negotiation"* by some word *"less related to the business vocabulary"*. They also found useful to have the possibility of including more than one resource in each activity.

All these suggestions have been considered and included as central aspects for the future work.

#### IV. CONCLUSION AND FUTURE WORK

In this paper we propose a new approach to IMS LD authoring that can be integrated in runtime systems. This approach is based on a template formulated as an IMS LD compliant meta-UoL which can be interpreted by IMS LD players. The meta-UoL relies on the principles of dialogic learning and interactive groups and is an attempt for guiding the user in the implementation of this methodology. All participants (trainer and learners) has access to the same template and can edit it "on the fly" according to their needs [4, 5, 20, 18, 19]. The template offers also some hints or indications that may be useful to the user when refining the template (Table I). All participants of the session, trainer and learners, have the same rights of modifying the template either a priori or during the learning process. Two Agora's members have used the template successfully to create real-life examples, with encouraging results. It represents the first proposal that integrates authoring with enactment in the context of the IMS LD specification for this type of learning practices.

Future work includes more evaluation tests in order to analyze a wider use of the proposal with learners and find out other requirements that arise from the large authentic contexts. There is also considered to revise the template according to the evaluation results and extend it with more phases and further flexible possibilities, such as enabling the modification of the activity order and their configuration once they have been edited, and adding group-based functionalities for a better support of collaborative activities. In this line, we are also currently working on an approach for saving the users' design decisions with sharing and reusing purposes following the ideas in [12]. Moreover, we expect to provide the practitioners with activity proposals adapted to their contextual situation for facilitating the groups' management.

We also plan to enrich the template by integrating in the same player a questionnaire editor and interpreter based on the IMS QTI specification. Finally, regarding to the suggestions of the Web 2.0 tools, we plan to integrate a list of tools in the template using some of the solutions that are being developed in the TenCompetence Project. We expect to collect and analyze the uses of the tools in actual contexts. With the results, we aim to provide a general framework for a better understanding of these technologies usage in lifelong learning educational context.

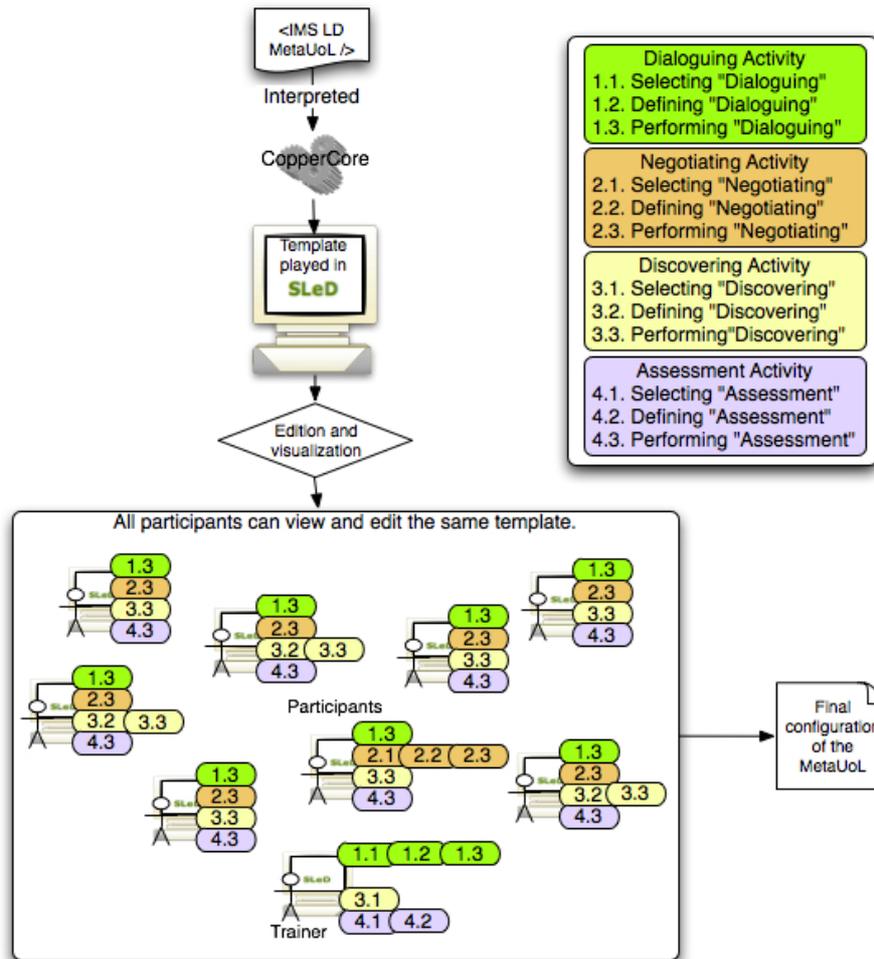


Figure 4 Complete cycle of the configuration of the meta-UoL

- select-activity-type-2
- select-activity-type-3
- select-activity-type-4

**Select Course:**

IMS\_LD-level0-r1 (Learner)

Go

Learning Objectives | Prerequisites | Feedback | Metadata

Considering the principles of dialogic learning, the types of activities in which you may be interested for this phase are:

1. NEGOTIATING: In this activity, people can decide collectively, through discussion, the aims and contents of their discussion.
2. DIALOGUING: In this type of activity people dialogue and express their implicit knowledge and abilities reinforcing the communicative action and promoting solidarity. Provide spaces of communication based on the equality of people and whose various comments are not classified as better or worse, but are appreciated as different.
3. SHARING: In this type of activity the people help each other in their process of learning; people who know a specific content reinforce it by sharing it to their colleagues. Provide spaces of relation and exchange among the learners themselves and between learners and trainers.
4. DISCOVERING: In this type of activity the participants have to read papers from their other colleagues and contribute to them with commentaries, so they will help each other.
5. CREATING-COLLABORATIVELY: In this type of activity people interact and contribute with their knowledge and experience in learning generation. Provide spaces of relation and exchange in conditions of equality in which each person are different and, therefore, has to be taken into account.

NEGOTIATING

DIALOGUING

SHARING

DISCOVERING

**CREATING-COLLABORATIVELY**

SELF-ASSESSMENT

ASSESSMENT

End-of-the-UoL

Figure 5 The user selects the creating collaboratively activity as the first one of the learning design.



Figure 6 The user selects the activity negotiation as the third one. He proposes the recommended tool Doodle as the supporting tool.



Figure 7 View of the UoL resulting from the design process

ACKNOWLEDGMENT

This work has been partially funded by European Commission in the TENCompetence project (IST-2004-02787). The work done in the OpenDock project represents the initial motivation of this research. Thanks to La Verneda School from Barcelona for their dedication and their knowledge about the pedagogical methodologies.

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This work has been partially funded by European Commission in the TENCompetence project (IST-2004-02787). The work done in the OpenDock project represents the initial motivation of this research. This article was modified from a presentation at the 4th Competence Open Workshop in Madrid, Spain, April 2008. Manuscript received 09 May 2008. Published as submitted by the authors.