

## The role of LOs in building teachers communities of learning

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Despite numerous efforts in the past years, the sharing of experiences and innovative ideas related to educational technology are still limited. We think that a targeted use of the learning object paradigm could contribute to modify this situation. To this end, we devised an approach to pre-service teacher training which aims to build a common ground of shared conceptual and pedagogical knowledge, based on the use of LOs. In our opinion, two different kinds of initiatives are important in this respect: 1) to reshape the preparation on Educational Information and Communication Technology of future teachers; 2) to develop technological tools, centred on repositories, supporting the creation and development of learning communities of teachers exchanging ideas and experiences by means of LO-related work. For this sake, we designed and implemented LODE (Learning Objects Discussion Environment), a prototype of collaborative environment oriented to the mentioned kind of activity. An initial use of this environment in a teacher training course highlighted the tendency of trainee teachers to use LOs in order to get ideas for their work rather than as ready-to-use chunks of educational materials. It also highlighted the need to include into LOs' repositories hints for the construction of educational paths.

**Keywords** Learning Object, Teacher training, Communities of learning, Knowledge sharing environment

### 1. Introduction

Teaching is often seen as a rather independent profession. Though working within a school environment, surrounded by colleagues and students, in many countries teachers have always been scarcely used to collaborate with their peers, comparing issues and experiences and helping each other to improve the pedagogical effectiveness of their activity. This fact constitutes an obstacle to improve education by propagating innovation. This tendency has been slowly changing over the past years, due to the increasing attention given to collaboration as an important way to knowledge construction, yet without giving rise to substantial changes in the way teachers work and improve their professional competence. Collaboration among teachers, however, is currently recognized as an essential tool for teachers to cope with the life-long need of getting updated [3].

In order to overcome this issue, a number of (mostly virtual) communities of teachers have been created. They, however, never managed to become so widespread to make a difference in the educational practice. Let us think, for example, of the teachers' communities developed around the well known project CABRI (<http://www.cabri.com/>): even in this case, despite the number of teachers involved, the valuable work carried out in these communities did not induce a general change in the way to teach geometry at secondary school level. Also initiatives focused on the construction of repositories of educational materials organized in the form of Learning Objects (LOs), like MERLOT ([www.merlot.org](http://www.merlot.org)) or ARIADNE (<http://www.ariadne-eu.org/>) have obtained a limited success, so that teachers who regularly make use of them to get materials and ideas to use in their work are not very numerous.

The limited success of such initiatives might depend on the fact that they implicitly assume that the teachers who should be the final users of the collected educational materials feel at ease with the technological solutions suggested [4], which is often not the case. Sharing innovative educational proposals, as a matter of fact, is a veritable process of technological transfer: it involves the transfer not only of the bare material but also of technical indications on how to use or adapt it in different situations, as well as reports on experiences of application and suggestions for improvement. Without such complementary

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information, the transfer process results incomplete and, as Zelkowitz [6] points out, the quality of transfer processes is fundamental in order to actually diffuse innovation.

In our opinion, modelling the use of the learning object paradigm as a process of technological transfer could contribute to modify this situation, and help promoting the diffusion, on a large scale, of high quality, innovative educational material, as well as of pedagogical experience on their use, with positive influence on teachers' professional development and classroom activity.

## 2. Giving LOs a role in teachers professional development

The LO paradigm can play two different roles in teacher education and practice. Considered as a tool for individual learning and professional growth, LOs provide libraries of materials from which teachers can get ideas to re-elaborate according to their own teaching style and pedagogical orientation. But LOs can also be seen as tools for collaborative learning, because exchanging materials with peers entails considering points of view and teaching approaches that may differ in substantial way from one's own. This may lead teachers to question their teaching habits and improve their skills. In order to support this aspect, LOs' repositories should be integrated within collaborative environments where issues related to LO creation, possible variants and experiences of use could be discussed, and relations between different LOs could be explicated, so as to favour the creation of learning paths.

In order to prepare teachers to exploit these opportunities, however, two different kinds of initiatives should be developed. On one hand, the preparation on Information and Communication Technology of future teachers should be reshaped so as to highlight the aspect which are likely to bring a positive contribution in the educational field. In particular, methods and tools should be proposed apt to support them in experimenting new ideas and sharing experiences and educational materials by means of repositories of LOs. On the other hand, technological tools should be developed, in connection with repositories, supporting the creation and development of learning communities of teachers. Source of learning for teachers in such communities should be the comparison and discussion of orientations and use experiences related to LOs. Repeated experience sharing in such environments, together with new proposals originated by collaboration, could transform repositories into knowledge bases, preserving over time teachers' experience and spreading it through different schools and places. Such environments appear, hence, as means to both create innovative proposals and diffuse them among teachers.

In order to realize this view, we are working out an approach to pre-service teacher training based on the use of LOs within a collaborative environment, LODE (Learning Objects Discussion Environment), that we designed and developed for this purpose. Our approach aims to give trainee teachers a base of methodological and operative competence apt to favour teachers' collaborative working and learning from each other within communities of practice.

## 3. LODE: a collaborative environment for teachers

LODE's main characteristics with respect to the environments currently in use for collaborative work is that it is specifically oriented to sharing pedagogical experience related to LOs. LODE supports its members (who must register to take part in the community) in expanding the knowledge shared in the environment by providing functions for: creating new LOs; re-elaborating LOs; defining connections among LOs; sharing reflections on materials and experiences, in the form of comments; discussing pedagogical and applicative issues; searching for and retrieving materials.

LODE is strongly oriented to personal activity, yet offers wide possibilities of communication and collaboration with peers. There is no general home page, but every user has his/her own home page (Fig. 1), named "My LOs". This shows the list of all LOs in which the user is involved, either for being author (see part (a) in Fig. 1) or for having registered to them (b).

One of the LOs listed in this page (c), which is automatically included in this page for every member of the community, contains the Help Resources for the environment. In the individual home page there are also buttons to access the general operations available, namely browse (d) or search (e) in the environment, and access a personal mail box (f).



Fig. 1. A personal home page in LODE showing: a) authored LOs; b) LOs to which the user is registered; c) the Help Resources LO; d) the browse function; e) the search function; f) access to personal mail box

Clicking on the name of any LO mentioned in this page leads to the LO's home page (Fig. 2), which gives a synoptic view of the metadata (a), the link to the LO's content (b), the logical connections with other LOs (c), the comments available to this LO (d), a link to the forums associated to this LO (e).

Metadata include: title, language, a concise description, keywords, internal category, technical requirements, format of the file(s), user role, related school topic, pedagogical approach, school level. When defining metadata to use in this environment, we analysed internationally accepted standards like LOM [5], but that description of metadata, in our opinion, is too technical to results interesting and easy to use for teachers in general, and for trainee teachers in particular. We decided, therefore, to limit the metadata to essential elements characterizing LOs from an educational point of view, in order to simplify the effort necessary to upload them, yet putting teachers in condition to easily plan for their re-use and feel comfortable handling elements they are familiar with.

The LO content is presented in one or more files, possibly of different formats. The content can include also external resources, such as web pages or files downloadable from a different server.

The logical connections with other LOs currently include 4 possibilities:

- *derives from*: this LO includes some aspects of the linked one, possibly addressed with a different pedagogical approach;
- *substitutes*: this LO was built as a transformation of a previous one for a different context of application;
- *specializes*: this LO could be used to deepen part of the connected LO;
- *complementary*: this LO integrates the content of the connected one from a different point of view.

Once users have registered to work on a LO, they can upload comments on it, sharing points of view, outcomes of experimentations or proposals for pedagogical and operational changes, reflections on the work done and on different ways of applying it. Comments can be added by many people for every LO, including the LO creator, who can, by this means, specify her/his pedagogical intention and describe her/his own experience of use. Comments have their own metadata, which are visualized when a comment is opened. They consist in: author, date of creation, key words and LO associated.

There are two forums associated with each LO, one devoted to technical issues or problems, the other for short pedagogical observations (b). The LO's author can also create new forums on different aspects that he/she considers worth discussing in relation to it.

We associated to the Help Resources LO three forums of common interest: a café for free talk and socialization, a forum for pedagogical issues concerning the general use of LOs, and one for technical

problems. Also in this case, more forums can be added on request, by the web manager who is the “owner” of this LO.

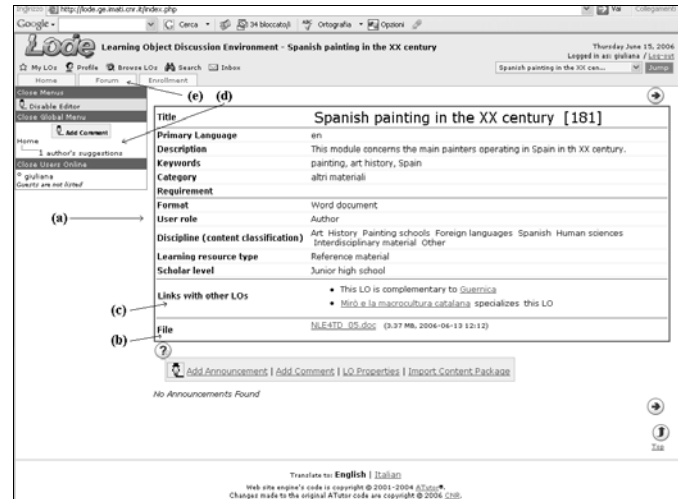


Fig. 2. A LO's home page showing: a) synoptic view of the metadata; b) the link to the LO's content; c) Logical connections with other LOs; d) comments available to this LO; e) link to the forums associated to this LO

#### 4. An experience of use of LODE in a teacher training course

We experimented LODE within the Course “Multimedia in Education” of the Teacher Training School (SISS) of the University of Genoa (Italy) in the winter semester 2005. This course for trainee teachers of secondary school in all disciplines was attended by 120 people. With this experience, we wanted to check novice teachers' appreciation and observe how they made use of the various features of the environment. The trainees had different backgrounds as concerns both the school topics of their interest and the amount of teaching experience they had, which was ranging from none to short periods in public schools and up to several years in private schools. None of them had previous experience with communities of practice.

The activity on LODE carried out with the trainees went on for about one month and included three phases. First the trainees had a concise presentation of the environment, and a period of familiarization with it. Some modules worked out by the trainees of the previous years had been uploaded in the environment, in order to give an idea of how it actually looked like. The trainees were then asked to select, analyse and comment one of the educational modules available on the platform, specifying for it metadata and connections as though the selected LO had been their creation. A forum was opened in relation with this activity, to discuss the terminology used in the environment for the metadata and, consequently, for the search function. This aimed both to check if the terms used were easily understandable for them and to help them feel in the position of shaping the content of the environment instead of simply as visitors. Finally, in the third phase, trainees were asked to contribute to the environment at least one comment on some existing material and a new LO, specifying its metadata and connections with other materials found in the environment, and preparing a report explaining how they had proceeded in this task. This phase aimed to make them fully use LODE's functions and experience in person the issues entailed by the sharing of educational materials.

The LODE environment was in general appreciated by the trainees, who did not find it difficult to learn its function and use [1]. This suggests that the introduction of collaborative activities of this kind in teacher training is feasible and likely effective [2]. The comments and LOs produced by the trainees were uploaded in LODE, which now offers a much richer selection of proposals and lends itself to the development of more articulated experiences in the next school year. It is interesting note, in particular,

how analysing the materials accessible in the environment resulted into a source of inspiration for our trainee, in a non-trivial way. Some of them, for instance, focused on some topic addressed by a LO but developed it by means of a different approach; others chose to deepen some topic connected with a considered topic (e.g., starting from a LO on the famous painting *Guernica* by Picasso, a group of trainees worked out a LO on Spain civil war, while another group concentrated on the life of the painter); others admitted to have been inspired by the methodology (e.g. after considering a guided tour of the old city centre of Genoa to explain its story, a group of trainees worked out an analogous work for their home town); finally, others got from a LO just the general idea.

Some difficulties emerged concerning the terminology used for the metadata and the connections between LOs. Difficulties with the metadata are related to the fact that trainees with different background often are used to slightly different terminology. This suggests that, in order to realize really interdisciplinary repositories and communities of teachers, it is necessary to further investigate what keywords result more intuitive for teachers of different school topics. It also points out that explicitly addressing this aspect should be included in teacher training programs.

Difficulties with the connections between LOs depend on the fact that the types featured by LODE (derives from, substitutes, specializes, complementary to) refer more on the way connected LOs were originated than to their semantic position with respect to the connected LOs. Trainees clearly expressed, in the reports on their productions, the need to specify in which way a LO is derived from, or specializes, or is complementary to some other LO, since this is relevant information to consider in the selection of LO. This issue, as a matter of fact, deserves attention, since the availability of meaningful connections among LOs eases the retrieval of materials related with each other for the construction of consistent and articulated learning paths. We are therefore planning to modify LODE by inserting a level of semantic connections and to propose to our students, in the next course, besides the tasks assigned in the past school year, an activity based on the use of semantic connections among LOs for the organization of learning paths with a given didactical aim.

## 5. Conclusions

The possibility, offered by LODE, to share comments and issues on educational resources and to work out collaboratively new proposals seems to be a good starting point for the construction of learning communities of teachers. The possibility to interact with a LOs' author, and with peers who have already used that material in a class, can help teachers better understand the pedagogical intention underlying their colleagues' educational proposals, spot strengths and weaknesses and reflect on their own teaching activity. Taking part in a community of practice of teachers focused on LOs' can, therefore, become a valuable means to foster teacher's learning and professional development. This is the aim of LODE and of the training activity described in this paper.

## References

- [1] Busetti, E, Dettori, G., Forcheri, P., Ierardi, M.G. (2006). Teachers' appreciation of a collaborative environment on LOs. Proceedings. ICALT 2006, IEEE press, pp. 939-943.
- [2] Busetti, E, Dettori, G., Forcheri, P., Ierardi, M.G. (2006). Promoting teachers' educational re-use of educational material. Lecture Notes in Computer Science, vol4227, pp.61-73.
- [3] Butler, D.L., Novak Lauscher, H., Jarvis-Selinger, S., Beckingham, B.: Collaboration and self-regulation in teachers' professional development. *Teaching and Teacher Education* 20 (5), Elsevier (2004) 435- 455.
- [4] Hand, T.; Gosper, M.; Woo, K.; Gibbs, D.; Kerr, S.; and Rich, D. (2004). "Learning objects: User perspectives on the conditions surrounding their use", Proceedings of the ED-MEDIA 2004: World Conference on Educational Multimedia, Hypermedia and Telecommunications, 21-26 June, Lugano, Switzerland, pp. 66-72.
- [5] IEEE (2002). *Draft Standard for Learning Object Metadata*  
[http://ltsc.ieee.org/doc/wg12/LOM\\_1484\\_12\\_1\\_v1\\_Final\\_Draft.pdf](http://ltsc.ieee.org/doc/wg12/LOM_1484_12_1_v1_Final_Draft.pdf)
- [6] Zelkowitz, M.V. (1996). Software engineering technology infusion within NASA, *IEEE Transactions on Engineering Management*, 43 (3), pp. 250 – 261.