COLLABORATIVE CREATION OF OPEN EDUCATIONAL RESOURCES: TEACHERS IN THE NET GENERATION

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Abstract
This paper describes the approach followed by three European Founded projects in order to reduce the gap between teachers and Net Generation students. The students use the Web 2.0 environments to share, comment and tag different types of media collaboratively using social network sites. The evolution of the Sloop project results in the following Tenegen and Sloop2desc projects leads teachers to produce, share, comment, tag and modify Open Learning Resources, as their students are used to do on the Web 2.0. In fact, one of the most interesting challenges faced in the three projects was how to train teachers from traditional schools on the use of new tools and environments that support collaboration and sharing in a Web 2.0 perspective. The projects promote the use of social network activities with the aim of encouraging the collaborative production of learning objects thus developing collective intelligence.

1. Introduction

During the last 5 years, the number of repositories of digital educational contents has rapidly increased, as a consequence of the diffusion of e-learning methodologies and solutions in schools. Despite this, the number of teachers using, producing and sharing digital contents is still low. The adoption of the Learning Object (LO) paradigm as the main model for the content in most of the Learning Management Systems set up in schools has not facilitated the use of digital contents by teachers. Actually, the technical standards behind the LO model (e.g. SCORM) represents one of the main obstacles to the adoption of the LO model by teachers, together with the initial lack of software packages that could simplify the creation of SCORM compliant LOs. Consequently, for many years the production of educational materials for e-learning has been demanded to the digital content providers and developers, usually cooperating with traditional editors, thus

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compromising one of the principles of e-learning 2.0: the possibility for a community of teachers to produce and share their own materials.

In order to support teachers in the production and sharing of their educational material, in 2005 we started a European funded project called SLOOP: Sharing Learning Object in an Open Perspective (Masseroni and Ravotto 2005). Two of the main results of the project were an extension of the Learning Object model, called OpenLO, and the concept of a new category of software tools called Learning Object Management Systems (LOMS), which extends the typical functionalities of a Learning Object Repository, providing users with tools to collaboratively produce learning resources. In Sloop, we developed a first example of LOMS, called FreeLOms; by hiding technical aspects and guaranteeing compatibility with standards in a transparent way, FreeLOms allows teachers to concentrate on the content to be developed.

During the 2 years of the project, some important concepts emerged in the Educational Technologies field: a different use and interpretation of the Web, called the Web 2.0 paradigm (O'Reilly, 2005); the existence of a new generation of students, referred to as Digital Natives (Prensky, 2001) and Generation Y (McCrindle,2006), or generally defined as Net Generation; the need and opportunity of Open Educational Resource (OER) models (Atkins et al., 2007; OECD, 2007; OLCOS, 2007). Some of these concepts had been defined some years earlier, but during the last 3-4 years they have become argument of discussion in the schools.

The Sloop project coped with most of the following concepts: the OpenLO model as an application of the more general OER paradigm; the social ties amongst teachers as fundamental elements to elaborate educational materials in a cooperative way; the produced LOs as the result of collective intelligence. The involvement of the Net Generation, even if not part of the project activities, was one of the future activities that emerged during the project: "*A future development - SLOOP 2.0 and freeLOms 2.0 – could directly involve young people, the digital natives [....] a student instead of tagging only photos and videos and downloading music would tag didactic resources adding her/his personal tag to those of the teacher; that a student would access resources not because of the teacher's instructions but because other students has tagged them as useful.*" (Ravotto, Fulantelli, 2007).

The results of the Sloop project have been used to develop two new projects: Tenegen (Connect the TEachers to reach and teach the NEt GENeration), and Sloop2desc (Sharing Learning Objects in an Open Perspective to develop European skills and competences).

The Tenegen and Sloop2desc projects are both, according to the EU policies terminology, Transfer of Innovation (TOI) projects funded to disseminate the results of previously successful projects and adapt existing innovative practices for use in new settings.

Tenegen explicitly aimed at reducing the gap between teachers and the Net Generation. The OpenLO concept is being transferred to the Tenegen project with the objective to encourage teachers to participate in the production of a shared resource, which will be commented, tagged and modified by other users of the Net. In other words, teachers behave as the Net Generation usually does.

In Sloop2desc particular importance is given to the open learning objects produced by the teacher Community of Practice. The Sloop2desc project promoted

two online courses in Italy, involving more than 60 teachers. In each course teachers learned technologies and methodologies related to the production of learning material in a collaborative way. In November 2010 twelve cascade courses in Italy are involving 500 teachers and two new pilot courses in Slovenia and Romania are involving 80 teachers. A key point of the Sloop2desc project is to increase VET teachers' knowledge and understanding of new educational systems that are based on learning competences

The communities of teachers that have been established in each project have collaboratively produced and shared learning resources; peer-to-peer learning processes have contributed to increase theoretical and technical knowledge, to improve capacity development, and to improve the quality of the resources.

Each project presented its own particular characteristics: in Sloop the concepts of collaborative evolution of learning objects were developed. In Tenegen the focus was on the creation of a teachers' network whose aim was to develop OER, and in this project Web 2.0 tools and environments were introduced together with more traditional LO authoring tools. Finally, in Sloop2desc, the new educational models based on the European systems for certification of competences were interleaved with the concepts related to CoP-generated OER.

2. **The Sloop project and its main results**

The 2-year Sloop project, run from September 2005 till September 2007, involved

10 partners from 5 countries (Italy, Ireland, Romania, Slovenia, Spain), and was promoted and coordinated by ITSOS Marie Curie, Italy. Following the successful stories of the free software/open source movement, the main objective of the project was the development of free educational resources accessible from everyone, and open to external contributions.

The Learning Object model was adopted as the paradigm for the digital contents to be produced by teachers. Even though there were several reasons to follow the wiki-way solution, specific considerations convinced us to adopt a more formal model:

- the standards behind the Learning Object model guarantee accessibility, reusability and interoperability that are central concepts in the SLOOP project.
- an approach based on LOs does not limit the digital formats used to develop content, this is different to Wiki where there are some limitations; a solution which does not preclude the possibility to transform any digital content into didactic material fits better with the fundamental ideas of the SLOOP project, i.e. the sharing of digital content which exists already on thousands of computers all over the world. For example, a power-point presentation need a re-engineering work to be adapted to the wiki environment, while the same presentation can easily fit into the LO model and maintain its main characteristics.
- the methods used to search for didactic resources based on the wiki model, up until recently, are usually based on free text search. This places considerable limitations on the identification of didactic resources made up of more wiki pages with hypertextual links. The LO model overcomes this problem by an

ad hoc standard which allows all the resources to be described in a formal way, such as the IEEE LOM (IEEE, 2002);
- finally compliance with the SCORM standard (ADL 2004), which is widespread in the LO world, is mandatory in Italy for organisations supplying distance learning courses at a university level.

Nevertheless, we also took into account the main criticisms that had put in doubt the pedagogical value of LOs: the difficulty to practically guarantee re-usability and the technical difficulties connected to standards in the production of LOs. In order to overcome these limitations, we have defined the Open Learning Object model (OpenLO): *Starting from Wiley's definition of learning object (Wiley 2000) we define open learning object as "any open digital resource that can be reused to support learning". In this definition the term open indicates open content, namely content developed in open format (e.g. Open Document) or content in closed format whose source files are also available (e.g. Adobe Flash). In addition it refers to open licenses (e.g. Creative Commons) thus allowing users to freely modify and reuse learning objects*. (Fulantelli et al., 2007)

Our vision of reusability is not simply based on combining LOs but goes beyond this towards a pedagogical concept of reusability in which a LO can evolve to meet specific educational requirements. The OpenLO model allows users to edit LOs created by different authors, and customize the LOs according to their own pedagogical needs; in addition, communities of educational professionals can work on the same LO and contribute to its collaborative evolution at content level. Finally, the replication of this process of adaptation of LOs at content level over time is a mechanism that can provide pedagogical sustainability of the LOs.

In the implementation of the OpenLO model, and in the definition of educational methodologies based on this model, it is relevant to focus on three main aspects: 1) changing the life cycle of Learning Objects and consequently the methodologies for producing these resources; 2) assigning a dynamic role to metadata, which should evolve in parallel with the life of the learning object. 3) moving from current Learning Object Repositories (LOR) to innovative Learning Object Management Systems (LOMS). To the aim of this paper, we focus on the third aspect. In-depth discussions on the other aspects can be found in (Fulantelli et al., 2008).

According to the report on Free and Open Source Software (FOSS) for Open Educational Resources (VV.AA., 2006), the traditional tools to manage the elaboration of LOs can be divided into: authoring tools, tools to implement learning technology standards, learning object repositories, learning management systems, collaborative environments for sharing LOs. A teacher wishing to develop a LO needs to have all the skills required for using different tools to handle the LOs in the different phases. This represents a major obstacle for teachers in adopting the LO paradigm. In addition, these tools are not suitable for managing the evolution of LOs and controlling the dynamics introduced by the new OpenLO model.

For this reason it is essential to design a new kind of environment which can manage LOs throughout their entire lifecycle. This kind of platform, that we call Learning Object Management System (Gentile et al., 2006), allows teachers and experts to create a network where they can participate collaboratively in the processes of design, development, sharing, reusing and evaluation of open learning resources through a typical Web 2.0 approach. In our vision, a LOMS is a Rich Internet Application; at the same time a LOMS can be seen as a set of services

accessible through the Web from different applications. The goal is to make it easy to use the services provided by a LOMS, and not to impose specific software, but rather to propose a philosophy that makes the creation, management and reuse of digital educational resources efficient and effective.

In the framework of the Sloop project, we have developed a specific LOMS, called FreeLOms. In order to manage learning objects created in a variety of digital formats and provide users with tools to support collaborative activities, FreeLOms has been designed by means of an abstract model of the contents which is able to manage different formats of learning materials, thus facilitating sharing, retrieving and reusing of LOs. FreeLOms includes functionalities for:

- uploading digital educational resources into a repository (LOs in SCORM terminology: Assets, SCOs or Content Aggregations);
- editing LO IEEE Metadata (IEEE 2002); editing of metadata can occur at any stage of the LO lifecycle, and not only when it is uploaded into the platform;
- searching LOs shared by the users; specialized and personalized searches can also be defined (these features meet the needs of authors who usually apply the same search criteria, e.g. to search some specific topics for their discipline);
- managing existing LOs in SCORM vision, by allowing users to edit Assets, SCOs and Content Aggregations (CAs);
- creating Content Aggregations by using the resources available in the repository;
- managing the changes made to the didactic contents through versioning and differencing, both at metadata and content levels (more precisely, these features will make it possible to handle the contributions supplied by each user on the same LO, thus guaranteeing the "collaborative evolution" of LOs);
- transforming digital contents developed in technical formats unsuitable for learning platforms, into contents compliant with the SCORM standards; this functions is limited to some formats
- communicating asynchronously and/or synchronously with other users in order to support group processes; this reflects the typical functionalities available in a Computer Supported Collaborative Work system, providing an efficient environment for the collaborative management of didactic resources.

The Sloop project and the FreeLOms platform have been successfully evaluated both by the community of teachers grown around the project, and from the official evaluator of the EC Agency (grade: 9/10).

3. **The Tenegen project: main objectives**

Tenegen is a 2 year project, involving 11 partners from five countries (Hungary, Germany, Italy, Turkey, and United Kingdom), promoted and coordinated by Prompt-G Educational Centre for Informatics, Hungary.

The project will valorize the results of two earlier LdV projects: SLOOP and NETIS (http://www.ittk.hu/netis/index.html). NETIS provides the philosophical, sociological, and pedagogical basis to support new paradigms of teaching and learning in the Information Society. The aim of Tenegen project is to establish an European environment of connectivism (Siemens, 2005) for VET teachers and trainers, to show the significant advantages of being connected to the Net

generation instead of simply delivering knowledge through virtual classrooms and Learning Management Systems (www.tenegen.eu).

The main objectives of the project are:
-    to elaborate a pedagogical model of network learning and connectivism;
-    to develop an online repository of Open Learning Objects;
-    to develop a TENEGEN network learning environment based on open source LMS;
-    to elaborate and implement five training modules in three languages (HU, EN, TR);
-    to establish pilot training courses for teachers and trainers;
-    to validate and verify the results in VET schools;
-    to disseminate the results all over Europe.

The project intends to deliver the new paradigm of network learning to the teachers and trainers in the vocational education, to help them "to reach and teach the Net Generation".

4. The Sloop2desc project

The Sloop2desc project (October 2009 – September 2011) involves universities, research centres, secondary schools and enterprise representatives, from Italy, Slovenia, Romania and Ireland. The project transfers and extends the results of the former project, "SLOOP: Sharing Learning Objects in an Open Perspective", by adopting effective e-learning methodologies and tools already tested in the SLOOP project.

The project focuses on the definition of Open Educational Resources developed according to the Open Learning Object paradigm, and aims to help VET teachers to increase their knowledge and understanding of new educational systems that are based on learning outcomes and competences. Specifically, the project refers to the European Qualification Framework (EQF), the reference framework adopted by the EU Parliament and Council in April 2008 to establish general criteria for comparing qualification and competence systems developed and/or adopted in EU countries. Since EQF is a competence-based system, there is a crucial need for VET teachers to further their understanding of the evaluation systems that companies are using ever more frequently to select young people when they complete their high school studies. In SLOOP2Desc, VET teachers will "develop pedagogical competences" to be applied to educational activities that take new evaluation systems into consideration. In addition, the project will lead teachers to greater "involvement in the drawing up of study programs". Finally, SLOOP2desc will "improve the links between education and training professionals and the world of work".

The SLOOP2Desc project adopts effective e-learning strategies, resources and tools already tested in SLOOP:
-    a training model based on e-learning 2.0 solutions and the participation of teachers in a community of practice;
-    the OpenLO model;
-    a set of Learning Objects, called MetaLO, developed by teachers and trainers from the project partner institutions;
-    some online courses in which teachers in Italy, Ireland, Romania and Slovenia have cooperatively designed e-learning paths and produced

digital contents for teaching according to a rationale which draws on the open / free software movements. The MetaLOs have been used as learning contents for the online courses.
-       the FreeLOms platform.

Project activities include online training activities in EQF and qualification systems for 400 teachers at secondary schools in Italy, and 90 university lecturers, school teachers and professionals in the training field in Romania and Slovenia.

5. Teachers collaboration to develop OER

One of the most interesting challenges we have to face in the three projects is how to train teachers from traditional schools on the use of new tools and environments that support collaboration and sharing in a web 2.0 perspective.

The learning paths of the Sloop project aimed to provide teachers with the theoretical and practical knowledge needed to use, create and reuse learning resources. The technological evolution between the Sloop and the Sloop2desc projects, radically influenced by the diffusion of the Web 2.0 evolution, brought about a re-organization of the learning objectives, the methodology, and the environment used to manage learning courses. Moreover the Sloop2desc project tackles the issue of competences and intends to develop European skills and competences. In the project the teachers not only acquire knowledge related to e-learning, the use of web 2.0 technologies for learning purposes, and the design and sharing of OER, but also learn how to move from an educational path centered on the curricula to educational paths based on competences.

From the point of view of the learning resources, in the Sloop project these were rigidly related to the Learning Object model and technological standards, while in the Sloop2desc project there is an orientation towards a more open view of learning resources. Unlike Sloop where the resources were Learning Objects compliant with the SCORM and LOM standards, in Sloop2desc the ecological model of the reuse (Ravotto et al. 2009) of existing resources was preferred. In fact, this project considers not only the Sloop LO, but also uses video and other media collected from the Internet web 2.0 sites such as YouTube, Vimeo, Flicker and Slideshare.

From the methodological point of view, in the SLOOP course teachers or tutors always assumed the role of moderator. In the Sloop2desc project, instead, especially in the final module (production of learning materials and courses for students) the collaborative dimension is strongly encouraged.

Finally, while the Sloop project privileges the use of the Moodle LMS environment, in Sloop2desc, in the collaborative phase, teachers are encouraged to use external tools to communicate (Skype), to design the resources (MindMap) and to collaboratively develop learning resources (GoogleDocs).

Common aspects in both Sloop and Sloop2desc projects are:
-       work proposals that learners can develop according to their interests.
-       a learning path based on the learning by doing methodology in which leaning materials are only a starting point for further study and group work.
-       interaction not only between teachers/tutors but within the group in a collaborative learning perspective.

The Tenegen project differs from the two previous projects in the teachers it targets. While the courses in Sloop and Sloop2desc are aimed at teachers already skilled in the use of the Net, Tenegen courses are addressed to "ordinary" teachers who don't usually make use of the Web. In this case one of the main goals of the project was to enable these teachers to use the Internet. The main course syllabus was integrated with modules especially designed to facilitate the teachers' participation in the world of the Internet and enable them to use web2.0 instruments as well as creating a Community of teachers who could share opinions and discuss their learning resources.

From a methodological point of view, since the Tenegen courses had a more traditional target, the consequences were as follows:

- information about the tasks to perform was more detailed and there was more control of the assignments undertaken by the teachers
- interaction was mostly between learners and teachers and rarely within a group
- learning materials tended towards a more traditional approach. For example, the Moodle "book" resource that was chosen allowed teachers to create a printable pdf, so the resource was also available in offline mode.

Only the "networking learning" module proposed a modality of work similar to the connectivism approach as suggested in the Netis project (Bessenyei, 2008).

In the real context we found that this approach was less successful than the other modules. A general analysis shows that this may be attributed to its extreme openness which is better suited to the Sloop target participants than to the "traditional" teachers in the Tenegen project.

In the Sloop2dec project the training activities will focus on e-learning methodologies, the development and sharing of Open Educational Resources using Web 2.0 tools and systems for the production of Learning Objects, the design and development of educational resources according to EQF and European qualification systems. Specifically for Italy and Slovenia, the EUCIP system (European Certification of Informatics Professionals) will be adopted as an example of qualification systems. Certification systems in the maritime field will be adopted in Romania. In Italy, a pilot course ran from February 2010 until June 2010. A second course is running in Italy, Romania and Slovenia from November 2010 until March 2011. VET teachers and professionals, representatives from Industry, stakeholders and policy makers have been invited to contribute to the project.

6. **Conclusions**

Teachers in traditional schools worldwide can properly evaluate and assess the thoughts expressed by the students. The debate reflects a real problem in the traditional educational system: teacher competences need to be renewed in order to reduce the gap between them and their students.

In this paper we have illustrated how three European funded projects have faced these problems proposing a solution to reduce the gap between teachers and their students. The idea of the three projects started in the 2005 was evolved during the years but the concept of encouraging teachers to produce, share, comment, tag

and modify Open Learning Resource, as their students are used to do on the Web 2.0 with different types of media remains fundamental.

In such a way, teachers are involved in network social activities, using Web 2.0 like tools, in this way, teachers emulate their students' learning behaviour.

Teacher education and training is at the top of the European policy agenda (European Commission, 2008), and similar interest can be found worldwide. Nevertheless, each initiative aimed at improving teacher competences should take into account teacher resistance to change: informal and non-formal learning; self-directed learning; collective intelligence are examples of concepts which are popular in the web 2.0 conception, typical of the Net Generation, but hardly accepted by teachers working in traditional contexts.

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