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CEPIS NEWS

IT for Education

IT in Schools. A European Project for Teachers Training

Pierfranco Ravotto and Giovanni Fulantelli

In a context in which both a competence-based educational approach and virtual environments are spreading and the digital competence has been set up up by the European Parliament and the Council as one of the 8 key-competences for lifelong learning, this article aims to teach teachers "what" and "how" to teach. The experience described is taking place in Italy, Romania and Slovenia under the European project Sloop2desc, financed by the European Union in the framework of the Lifelong Learning Programme.

Keywords: Competence-based Educational approach, Digital Competences, ECDL, EU Lifelong Learning Programme, EUCIP, Sloop2desc, Teachers Training, Virtual Classroom.

1 Introduction

The digital competence is one of the 8 key-competences for lifelong learning that the European Parliament and the Council states to be *"necessary for personal fulfilment, active citizenship, social cohesion and employability in a knowledge society"* [1].

Enabling students to acquire digital competence is one of the objectives that schools need pursue. That means both competences as digital users and professional competences in designing, producing and maintaining software and digital services.

This theme entwines with the one of using digital environments and tools in teaching and learning activities.

This article aims to explore "what" and "how" to teach in a period in which both a competence-based educational approach and virtual environments are spreading.

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2 Competence-based Education

The old school view was, and to a large extent it is still like that, the one of a "syllabus" intended as a list of content to be transmitted to students. From this point of view technological changes often led to a mere substitution or addition of content to the list.

Now there is a trend to substitute the old approach to syllabuses-lists of content with a competence-based one, as demanded by the labour market and supported by the European Union. According to the EU Commission, *" 'competence' means the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development"*.

Obviously, for those involved in education, it is necessary to define:

■ "Knowledge": "*the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study*".

■ "Skills": "*the ability to apply knowledge and use know-how to complete tasks and solve problems*" [2].

But knowledge and skills cannot lead to a new list of content to be transmitted more or less in sequence. The teacher's task is to enable students to acquire them in a practical context, because it is in this way that competences develop. It is not a matter of adapting learning to technological changes by adding items to a list of content, but rather of designing practical contexts in which students acquire the relevant knowledge and skills. A competence-based approach requires schools and teachers to abandon self-referencing and assume external points of reference which at IT level can be represented by CEPIS certification and its related syllabuses.

As far as Upper Secondary Schools are concerned, ECDL with all its articulations represents the obvious reference framework: **ECDL Core, Advanced ECDL** - spreadsheet for mathematics, physics and business economics; database for business administration, … – **ECDL4PS** (*for Problem Solving*) for mathematics, physics and business administration; **ECDL CAD** for all subjects involving design; **ECDL Health** for biology, and microbiology, …

EUCIP[1] can instead be the reference framework for IT vocational courses, in particular EUCIP Core and IT Administrator certifications can be acquired.

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[1] EUCIP, the *European Certification of Informatics Professionals*, is a *framework* of competences with a related certification system developed by CEPIS and managed, in the case of Italy, by AICA. The EUCIP Syllabus is based around 21 professional profiles characterized by a common area of knowledge and abilities, the *core*, and a twenty second profile: the *IT Administrator*. The core *Syllabus* and the *IT Administrator* are the profiles which correspond most closely to the competences acquired by the end of IT courses at secondary school.

3 New Environments and Learning Styles

Marc Prensky first made a distinction in 2001 [3] between digital natives and immigrants, or rather between students who are growing up in an environment rich in digital technologies and their teachers. It is unthinkable today to suggest that students should study at school without the communication tools which they are used to, or learn in an environment different from the one in which they "live, build and exchange meaningful knowledge" [4].

It is not simply a question of habits to be met, but also of learning styles: many people think that the early cognitive experiences of this generation have determined a change in their brain structures.

As IT teachers are by definition the ones who should have a better knowledge of the new learning and communication environments originated by the use of ICT, they could play the role of promoting an ICT-based learning which takes place in the new digital environment where the young people are "always connected".

However, this does not happen systematically, and, sometimes, teachers of other subjects are more inclined to use eLearning, blogs, wikis, podcasts, mobile phones, etc. In most cases the teaching of ICT and the use of the computer takes place in a traditional manner: lessons, accompanied by a lot of laboratory work, but within the old approach according to which interaction occurs between teachers and classmates in the classrooms and informatics laboratory, while at home the students are "unconnected". Instead it is time now of *mobile learning*, of an interaction between teachers and students and within the peer groups

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	Modules	Length	Units	
1	Using MOODLE as a trainee and as a teacher	3 weeks	1.1	Using Moodle as a trainee
			1.2	Using Moodle as a trainer
2	Being an online tutor and using web 2.0 tools	3 weeks	2.1	The online tutor
			2.2	To create, organize and share resources in the Net
			2.3	E-cooperation
3	Using and developing open educational resources for an eLearning environment	3 weeks	3.1	Sharing and reusability philosophy
			3.2	Web 2.0 tools for sharing
			3.3	The SCORM model and tools for the production of SCORM compliant LOs
			3.4	The FreeLOms
4	European Competences Syllabus	2 weeks	4.1	EQF
			4.2	8 Key competences
			4.3	Users' digital competences (ECDL)
			4.4	Professional competences: e-CF and EUCIP
5	Collaborative development of educational resources based on EUCIP standard	6 weeks	5.1	Choice of the learning themes to be developed and building-up of groups
			5.2	Planning and development of educational resources
			5.3	Sharing of the learning resourced developed

Table 1: Sloop2desc Courses Organisation.

which, thanks to the Internet and mobile devices, can take place outside school time and beyond the walls of the school. The way of teaching, or rather, of providing opportunities for learning, is destined to change.

4 The Sloop2desc Project

Sloop2desc is a European co-financed project[2] which concerns with both "what" and "how" to teach and which particularly addresses teachers of IT and related subjects, those, in fact,

who are to prepare IT professionals, or at least expert users, of the future. *Sloop2desc* focuses on teachers training as far as the following two goals are concerned:

■ competence-based learning,

■ the use of the Internet and Web 2.0 tools to integrate face-to-face and online learning.

The *Sloop2desc* courses, "To design and develop online courses based on competence-oriented education" are *eLearning* training projects which last

16 weeks and are divided into 5 modules, as shown in Table 1. It is important to be clear about the term *eLearning*. It often refers to courses, which are mainly based on a self-study approach: a set of learning materials which trainees study on their own. In the most "primitive" versions the learning resources were simple PDFs to download or web pages consisting of texts and images. In more up-to-date versions there are audio-video presentations, films, simulations, highly interactive texts. A trainees is basically on his own while learning, even though there are often tutors on hand to help if needed, and some forums where students can exchange opinions and information.

Our model focuses instead on collaboration in a "virtual classroom", where the classroom represents an environment in which interactions be-

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tween teachers and students and between the students themselves develop, as it would happen in a face-to-face dimension.

Module 1 is dedicated to the MOODLE[3] learning environment which is used in the course and which teachers will use with their students. Here the trainees are required to learn its various functions, first as a trainee user of Moodle, and then as a teacher able to create courses and to fill them with learning resources and activities (exercises, forums, etc.). In this module, individual activities (getting familiar with Moodle tools) are central and cooperative activities consist "only" in discussion within forums (questions to teachers/tutors as well as to other trainees, answers and suggestions to "classmates").

In one of the two pilot courses in the Module 1 forum, about thirty trainees with two tutors started 18 discussions and posted 352 messages in two weeks! A similar phenomenon occurred in the other course. This clarifies what we mean by "courses based on interactions".

Module 2 instead focuses on online tutoring and the use of Web 2.0 tools for online teaching and learning. The trainees, divided into groups, are required to analyze some Web 2.0 tools and to prepare - using *googledoc* and a *wiki* - a description of them accompanied by some activities to be proposed to other trainees.

This collaboration no longer involves discussions but "doing/acting together". In the experience of this module, the 10 discussions opened in the forum with 439 messages were only the tip of an iceberg of the communication process occurred among the trainees. The various groups carried out their collaborative activities using e-mail, Internet chatting, Skype and mobile phones!

Module 3, like the first module, is based again on individual exercises, in this case concerning the acquisition of technical competences for producing learning resources using, for example, SlideShare to publish a presentation and also adding a voice comment or *eXeLearning* to produce SCORMs. Such activities are carried out individually but once again within a virtual classroom situation: trainees can ask questions, provide answers, request clarification and give suggestions: 13 discussions in Module 3 forum with 381 posts.

Module 4 focuses on competences, in particular EQF[4], e-CF[5] and EUCIP. This module should have been based

on discussion, but in fact there was less discussion than in other modules: 119 messages in 10 discussions. There are a number of possible reasons:

- several participants arriving late at this phase preferred directly entered the fifth Module where they took part the discussion on EUCIP syllabus, which was supposed to be used as a guide for as a guide for the development of resources.

- the topic was new for many participants and consequently they had little to say on the forums;

- not everyone taught IT professional courses and so they were not interested in e-CF or EUCIP.

For these reasons, in the revised version for cascade courses, we introduced other parts regarding the "8 key competences" and the ECDL family.

Module 5 is the most important and challenging: it is here that what has been studied previously is put into practice; it is not a coincidence that it lasts 6 weeks and that many participants have chosen to keep on working beyond the official end of the course. The participants are asked to form groups on the basis of their teaching subjects and classes, and to choose items from the EUCIP Syllabus (or, in the case of cascade courses, concerning 8 key competences or ECDL or EUCIP) and to produce related learning resources – **single resources** (*learning object*) and **whole courses** - for their students.

In this module there are no further didactic material to study as all the activities are based on the collaborative production of material and courses for the students. Also in this case, interaction between trainees have occurred only to some extent in the two module forums – 34 discussions with 499 posts[6] – since the trainees have interacted by Skype or other tools.

The outcomes of the two pilot courses are:

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[3] MOODLE is the most popular Learning Management System or online learning environment. In the Moodle environment it is possible to create courses consisting of resources (written texts, web pages, links, etc) and activities (forums, interactive lessons, exercises, quizzes, wikis, SCORM objects, questionnaires, etc.). There are different levels of authorization (roles): administrator, course designer, teacher, not editor teacher, students, hosts. The teacher can divide students into groups and monitor their activities. The course can easily be duplicated for different classes or exported to another Moodle platform.

[4] EQF, *European Qualification Framework*, is the European document which aims to make different national qualifications more readable across Europe through a common definition of levels.
[5] E-CF, *European e-Competence Framework*, is a reference framework for ICT drawn up by CEN (www.ecompetences.eu).

[6] To complete the overview of interactions it is necessary to add that there was also a general discussion forum: 42 discussions with 347 posts.

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- 15 SCORM packages related to Informatics content,
- 5 videos related to Informatics content,
- various learning resources for other subjects (in SCORM, doc, pdf and other formats);
- 4 courses on the Moodle platform:
  - a course for *IT Administrator*, Module 1, *Hardware* (almost complete);
  - a course on the topic "Network layer", item 4.5 of Module 4, Expert use of the networks, of I*T Administrator*;
  - a course on *databases*, the Build area of EUCIP Core, item B2;
  - a course on "Educational uses of the Web 2.0 tools".

The two pilot courses in Italy were carried out from February to June (with an extension in July) and were attended by sixty teachers who were not all IT teachers. 20 teachers were selected to work in pairs as tutors in 10 cascade courses, which began in November 2010 and involved about 500 teachers.

An eleventh course, for teachers of "business administration ", who are potentially interested in the Plan area of the EUCIP Core, started in December 2010.

In November another two pilot courses began in Slovenia and Romania. The Slovenian course focused on the EUCIP Syllabus, while the Romanian one used a modified version of Module 4 referring to a competence system in the maritime transport sector.

5 Conclusions

Sloop2desc has entered its second year with a result that we can consider outstanding. We needed to find 400 Italian teachers willing to undertake a challenging course, which does not provide any credits for career promotion. We received more than 1,700 applications! It is a sign of teachers' interest in the course topics: the use of digital technologies in teaching and competence-based systems.

It is a positive sign for the school in our country.

At the moment we have provided courses only for some of those who have applied, but we will do our utmost to involve teachers of other subjects, whose interest shows that there is a potential for opening up Italian schools to the use of digital technologies and for innovating the educational system.

The cascade courses, which have just started, will seek to achieve three objectives:

To spread a model of *eLearning* based on the idea of the Internet as a place for collaborative knowledge construction.

We hope that the teachers involved in the courses will transfer this model of *eLearning* to their class activities, integrating it with face-to-face lessons.

The use of the Internet allows students to access learning resources which are varied, interactive, available at any time and suitable to their personal style of learning, but and particularly useful for extending the relationship with the teacher and the peer group beyond the bounds of the classroom and timetable.

Moreover, when communication tools and digital environments are embedded in education, all the students can be actively involved and interact much more so than in traditional face-to-face activities when the number of students and the little time available

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[7] FreeLOms, *Free Learning Objects management system*, is the OER repository produced in a first version during the SLOOP project and now renovated in the Sloop2desc project.

limits the number of questions which can be asked, the expression of different points of view, the connections, digressions and interactions, or rather all those processes on which knowledge building is based.

To produce collections of *Open Educational Resources* – OER, which any teacher can use to organize learning paths and environments for students.

By "educational resources" we mean any educational material in digital form, from a whole course to single objects: lessons with texts and images, or in audio or audio-video form, simulations, tests, work proposals, etc.

By the term "open" we mean three aspects: accessibility, modifiability and permissions. As far as permissions are concerned, the resources developed cannot be copyrighted with "all rights reserved" but must be left either in the "public domain" or under a licence like *Creative Commons Attribution-Share alike*, which guarantees freedom of use, distribution and modification.

In order to make resources modifiable, access must be granted, where necessary, to their sources. To be accessible, the resources must be uploaded into a repository and must be easily traceable. In module 5 of the courses, the participants are invited to start using resources already developed in the pilot courses and stored in the **FreeLOms**[7] , and then to improve and integrate them producing new ones.

This is particularly relevant for IT Administrator and EUCIP core syllabuses. The setting up of a repository of open educational resources referring to these syllabuses, can really help teachers to design and set up learning environments for their students where they can combine competence-based education with new learning models.

We have mentioned single learning objects and whole courses, but some

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clarification is necessary. The syllabuses, which we have adopted as references, provide a detailed description of the knowledge and skills, which are at the basis of the required competences. An ideal repository should contain resources that correspond to each single item of knowledge and to each single skill (indeed, it would be better to have several resources for each item or skill, so that the teacher, or the student directly, has a choice). We therefore expect that in the *Sloop2desc* courses the teachers will produce resources with this extent of definition. But **a competence is not simply the sum of knowledge and skills**. It is up to the teacher to propose learning paths that offer collaborative activities to the students during which they acquire these skills and knowledge by means of a "learning by doing" approach. This is what we mean by "course". We expect the teachers of *Sloop2desc* to use the resources produced by themselves and by others to construct courses. In fact this collaborative activity, even more than the production of individual resources, is to be recommended.

The courses can and must also be shared with the same characteristics of openness.

To create a Community of Practice of IT teachers.

The learning communities, which have been created in the pilot and in the cascade courses, and the discussion forums in the Sloop2desc site, already constitute the embryo of such a community of practice. The habit of collaborating in designing OERs, sharing them in *repositories*, modifying and using them will be another key element.

When we concluded the previous SLOOP project we wrote that it fitted into an "*idea of the web as a space in which people interact, collaborate,*

produce new knowledge together" [5]. To reach their students via the Internet and to use the Web in their teaching, teachers must acquire the habit of collaboration and sharing in a community, which is typical of Web 2.0.

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Webgraphy
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■ EUCIP site: <http://www.eucip.org>.
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■ e-CF site: <http://www.ecompetences. eu/>.