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# A methodological approach to support collaborative media creation in an e-learning higher education context

Adriana Ornellas[a]* and Pablo César Muñoz Carril[b]

[a]*IT, Multimedia and Telecommunications Department, Open University of Catalonia, Barcelona, Spain;* [b]*Teaching and Learning and Educational Organization Department, University of Santiago de Compostela, Lugo, Spain*

This article outlines a methodological approach to the creation, production and dissemination of online collaborative audio-visual projects, using new social learning technologies and open-source video tools, which can be applied to any e-learning environment in higher education. The methodology was developed and used to design a course in the audio-visual communication degree at the Open University of Catalonia. It combines three pedagogical strategies in an e-learning environment: project-based learning, computer-supported collaborative learning and participatory culture as a new form of literacy. Here, we present the objectives, the different stages of development and an evaluation of the methodology.

**Keywords:** e-learning 2.0; PBL; CSCL; Web 2.0; social video; collective media creation

## Introduction

In recent years, there has been a growing tendency to use non-educational-designed resources as educational ones. Higher education institutions around the world have been using the Internet and other digital technologies to develop and distribute teaching and learning (Lee & McLoughlin, 2010). The new Web 2.0 or social technologies (e.g. blogs, wikis, user-driven encyclopaedias and social networking) are being used to implement pedagogical strategies intended to support and facilitate learning through collaborative knowledge construction (Dohn, 2009).

Furthermore, Web 2.0 technologies offer an increasingly feasible way of reshaping the traditional e-learning scenario that is currently based on closed, proprietary and institutionalised systems and content. E-learning 2.0 (Downes, 2005) is an emergent phenomenon, fostered by the 'bottom-up' appropriation of Web 2.0 applications in online education and training contexts (Redecker, Ala-Mutka, Bacigalupo, Ferrari, & Punie, 2009). E-learning 2.0 approaches strengthen traditional academic values of sharing and collaborative creation of knowledge by providing teachers and learners with platforms for collaboration, thus enabling teachers and learners to jointly develop educational content, supporting the exchange of material, facilitating community building and so on. Web 2.0 technologies are open to everyone and anybody can use them. The business model of such tools relies on achieving a critical mass of users, thus proving their utility and resulting in them becoming widely adopted.

*Corresponding author. Email: aornellas@uoc.edu

In fact, in most cases, it is not only users that can interact with the tool, but software applications too. In other words, Web 2.0 tools provide mechanisms for their integration into other software. These mechanisms are called the application programming interface (API). An API is a set of services (usually Web services) that allow other applications to use the functionality of the tool.

Nevertheless, introducing Web 2.0 practices into formal contexts in e-learning not only depends on implementing specific kinds of open and collaborative tools in teaching and learning, but also on a methodological approach to the introduction of alternative pedagogies and the creation of *architectures of participation* (O'Reilly, 2005) in higher education. This paper describes the authors' experience in integrating various Web 2.0 tools and practices for supporting the creation, production and dissemination of collaborative audio-visual projects in an e-learning context in higher education in Spain. We first provide a description of the three theoretical approaches that underpin the methodology applied for the design of an audio-visual communications course in our university: project-based learning (PBL) (Boss & Kraus, 2007); computer-supported collaborative learning (CSCL) (Jones, Dirckinck-Holmfeld, & Lindström, 2006; Stahl & Hesse, 2009) and participatory culture as a new form of literacy (Jenkins, 2006; Lessig, 2004). This is followed by a description of the context in which this methodology and the objectives of the designed course were developed. In particular, we will look at the design of the methodology and the various stages in the development of the collaborative audio-visual project. An analysis of this experience can help us to implement strategies for designing a learning process that focuses on the learner's active engagement, collaboratively working within a joint online space in the construction of an audio-visual product that initiates a change of attitude towards issues such as authorship, copyright, knowledge production, open access, reuse of content and, furthermore, the development of a series of twenty-first-century competences such as navigation, communication and net-based teamwork, among others.

## Theoretical background

In designing any Web 2.0 technology-based teaching method or learning activity, we are not only concerned with selecting effective tools to support collaborative practices, but also with defining a theoretical framework that provides a guideline of how technology can enhance the learning and teaching process. Our methodology is aimed at supporting students as they design and manage audio-visual projects in an online environment. The pedagogical framework that sustains this methodology embraces constructionism and social learning (Laurillard, 2008), also referred to as 'social constructivism' (Vygotsky, 1978; Wertsch, 1985) and brings together three core approaches to collaborative learning.

The first approach is PBL (Boss & Kraus, 2007), which enables students to learn to work as a team in an online environment, engaging in the planning, management and assessment of a rigorous project with a joint focus. In doing so, they practise twenty-first-century skills (such as collaboration, communication and critical thinking) and create high-quality, authentic products and presentations (Ravitz, Hixson, English, & Mergendoller, 2012).

Secondly, the experience here related, developed integrally in an online context, outlines an entire process of project building mediated by ICT tools that facilitate collaborative knowledge building in a virtual environment in an asynchronous way.

In this sense, the CSCL technology (Jones et al., 2006; Stahl & Hesse, 2009) used in the experience described here was the virtual campus of the university, which combines multiple social or Web 2.0 tools such as social bookmarking, remote collaborations tools, blog, video platforms and video channels.

Finally, the product jointly created by the students at the end of the course is an audio-visual production. We can say that audio-visual production in today's world is a collaborative enterprise between producers and consumers (Casacuberta, 2003; Jenkins, 2006). Nowadays, the use of open resources and social software in the field of audio-visual production has meant the redefinition of this enterprise and of the resulting relationship between production, distribution and audio-visual consumption. The many possibilities offered by open video resources for audio-visual creation and production are an exponent of a broader cultural movement that is characterised by providing greater autonomy to independent artists, as well as by the interaction and participation of users in multiple and varied ways (Lessig, 2004). It is clear that the nature of the Internet promotes this kind of collaboration. Consequently, it is only logical that educational institutions should adopt this philosophy of collaboration.

Video on the Web constitutes an emergent reality that combines traditional and innovative forms of editing with essentially new patterns of diffusion and publication. When we talk about video on the Web, we encounter many new concepts related to this emerging audio-visual reality. 'Tag', 'metadata', 'embed', 'link' or 'RSS' are some of the terms used in this new reality of video, just as in the past editors used the terms 'cutting' or 'focusing'. The doctoral thesis of Roig (2008), which focuses on cultural practices and collaborative forms of audio-visual production, highlights the importance of collaborative processes in video production. He studies emerging practices in the creation and distribution of movies on the Internet and introduces another idea that is essential for our understanding of video resources – he places remix and appropriation processes at the heart of the video production process. Remixed videos are created in a collaborative way and are based on raw materials downloaded and reused by the authors. The idea of remixing is one of the parameters that defines the Web 2.0 environment. Applying the philosophy of Creative Commons, copyright-free material is created and uploaded onto websites. Later it can be downloaded, used and shared by other authors. Anyone can edit the original material to create their own project. In fact, remixing entails both the reuse of images in the editing process as well as the reuse of ideas. One of the classic examples of the power of the Web to engage people in a global collaborative project is the crowd-sourced film 'Star Wars Uncut', a project created by fans to remake George Lucas' 1977 classic film, but made entirely from hundreds of 15 second user-generated scene recreations. The film won an interactive media Emmy in 2010.

The combination of the three approaches described above enables us to provide our students with new forms of constructing and representing knowledge, and to promote a shift from an e-learning to a *c-learning* paradigm (Owen, Grant, Sayers, & Facer, 2006) in an online higher education context.

## The context

### *The university*

The Open University of Catalonia (UOC) is a Catalan online university whose mission is to provide people with lifelong learning and education. Learning activities are the central pillar of the educational model at UOC. The students make use of

three core elements with which to complete such activities: resources, collaborative dynamics and teacher accompaniment. UOC's model is also flexible because it is open to the implementation of a very diverse range of learning activities in accordance with the student competencies developed, the area of knowledge or the degree of specialisation at which the student is studying. This means that the dynamics and resources of these activities also need to be very diverse and adaptable to a large range of learning needs and situations. In this regard, UOC is committed to designing learning activities with the most advanced technological and communication resources available, some of which include:

- social tools that facilitate collaborative work (e.g. blogs, wikis, social bookmarking, etc.);
- multimedia content that enables multidimensional content to be offered;
- advanced communication systems, both synchronous and asynchronous, which provide flexible and clear communication adapted to each situation (e.g. videoconference, forums, etc.)
- 3D online environments based on video games that permit interaction with people and objects simulating real situations; and
- access to learning through mobile devices to support mobility.

UOC's educational model promotes participation and collective knowledge building through an interdisciplinary and open approach to students' educational, social and working experience. The model incorporates collaborative learning through methodologies that involve problem-solving, participation in the development of projects, joint creation of products, discussion and research. Efforts are made to introduce entertaining elements to increase motivation and aid learning of complex knowledge (Gros, 2009). Likewise, the latest version of UOC's virtual campus (called Campus 5.0) provides mechanisms to integrate the diversity of Web 2.0 tools into its environment. Thus, students and teachers can build a space tailored to their own specific needs. Another advantage is that the architecture of Campus 5.0 enables the integration of modules from other learning platforms, such as Moodle or Sakai, in addition to applications such as blogs, microblogs, wikis, video platforms, etc.

### *The course*

Within the framework of bringing Spanish university degrees in line with the European Space for Higher Education, UOC has defined a transversal competence common to all degrees: "The use and application of ICT in the academic and professional environments." This competence is dealt with in the course "ICT Competences" (ICTC), which is compulsory for all degrees and amounts to six ECTS credits. Students are advised to take this module in the first semester to form part of their basic cross-sectional credits.

The ICTC course includes content of a reflective, methodological and technological nature linked to the rational and critical use of ICT; collaborative work; learning through doing; and new forms of knowledge representation and construction related to the social web and new literacies (Lankshear & Knobel, 2003). The course involves a continued and progressive process of acquisition of the following ICTC necessary to study and work in a virtual environment:

- planning and management of an online project.
- online teamwork;
- search and retrieval of digital information;
- digital information analysis and processing;
- digital information presentation and diffusion;
- online communication strategies; and
- rational and critical use of ICT.

To develop and teach these competences, the course employs a core strategy of PBL that enables students to initiate, develop and practise each of these skills in an integrated and interrelated way. They do this while undertaking a complex virtual project made up of a set of activities or phases. Although the ICTC course has a universal methodology and approach, the topic of the project and the tools to be used for each degree are defined according to the profile and the specific training needs of students in each particular area of knowledge. The evaluation of the course is based on a model of continuous assessment, on the qualitative assessment and self/co-assessment of the set of activities carried out by students and teachers.

The degree in Audio-Visual Communications at UOC prepares students for professional work in key areas of the communications industry, providing them with the necessary skills to design, plan, implement and evaluate communications projects. For students studying for this degree, the virtual project to be undertaken as part of the ICTC course involves the collaborative development of an audio-visual production. The development of a collaborative audio-visual project based on the use of free and open resources, which involves concepts such as reuse, remix, open access and free distribution, aims to raise awareness among students about the current definition of the concepts and the relationship between audio-visual production, distribution and consumption resulting from the participatory culture of Web 2.0 (Ornellas, Marín, Garreta, & Santanach, 2010).

The specific objectives of the collaborative audio-visual project in the Audio-Visual Communication degree, which consists of creating of a video documentary about a given topic, are:

- acquire design and project planning skills in an audio-visual project that is collaborative and developed in a virtual environment;
- develop skills in the analysis, processing and presentation of multimedia contents;
- acquire communication skills in a virtual environment as part of a learning community;
- share information using social networking tools; and
- develop the individual and collective ability to create content, then organise and present it as a comprehensively structured working script.

**Methodology**

The PBL methodology used means that the course is structured around three basic approaches: the definition of a substantial project that would enable learners to achieve the learning objectives; planning the course by identifying key tasks and

deadlines to ensure adequate progress in the development of the project; and finally the design of an evaluation method in order to establish what resulted from achieving the objectives, as well as to evaluate the process to achieve them.

The entire process of developing the project is undertaken in a virtual way and prioritises the use of asynchronous tools, so that time-space limitations do not determine the students' individual participation in the development of the project. Each virtual classroom has around 65 students and the working groups have a maximum of four students.

Taking into consideration the three main approaches cited above, the final project to be carried out by the students is undertaken in four phases, each of which has an explicit goal and description within the overall structure of the project.

Furthermore, the phases of the project are based on the use of various Web 2.0 tools and open-source software (Figure 1). These tools enable students to collaboratively undertake the tasks of scriptwriting, pre-production, editing, post-production and distribution of the audio-visual project.

### *Stage 1. Planning the project: communication and collaboration in an online environment*

In the first phase of the project, there are a series of individual and group activities that involve the effective use of various ICT tools. Specifically, students have to use the discussion forum of the virtual classroom to participate in a discussion of a case study presented by the teacher. This activity acts as a first necessary step to enable the subsequent creation of working groups, thus resulting in students gaining basic knowledge on how to form compatible work groupings.

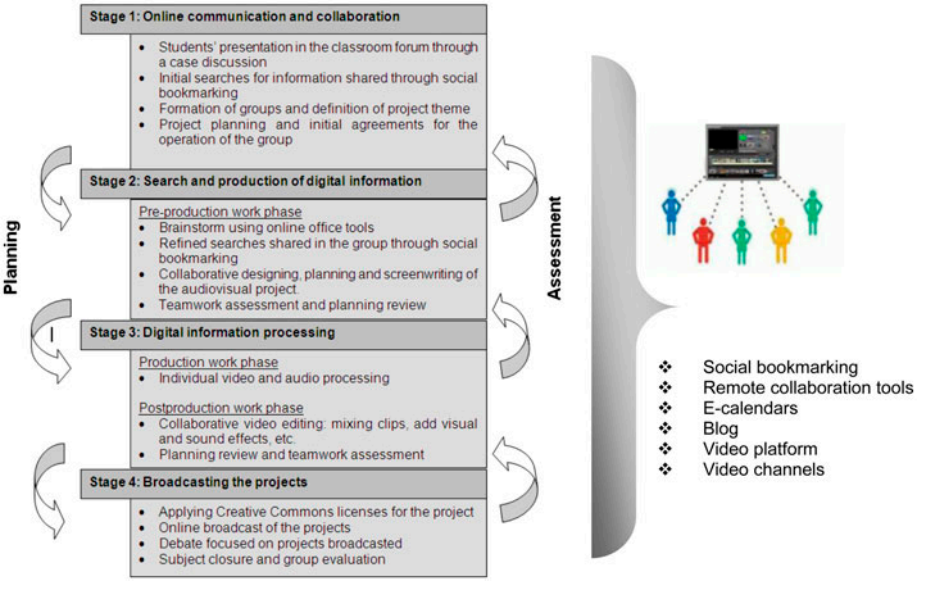


Figure 1. Stages of the online project in the ICTC subject and supportive collaborative Web 2.0 tools.

Parallel to the virtual debate on the case study, and once they have presented a topic for their audio-visual project, students search the Web to find and select web pages containing relevant information (textual, visual, multimedia, etc.) for working on the project. Having identified the resources, students then share them with the teacher and other students in the classroom through social bookmarking, which allows those resources to be properly labelled, described and made available to the entire classroom.

After completing these initial tasks, students must then complete two sequential activities as a group: first, they must create workgroups and, secondly, they have to draw up initial agreements on how the group will operate and on the initial planning of their project. After forming the workgroups, by using the forums of the virtual classroom as a resource, the next task is to draft the initial agreement setting out how the group will operate. To do this, they are provided by the teacher with the basic materials and documents needed. In the drafting of these agreements, each workgroup must reach a common understanding about shared activities in an online environment: roles and responsibilities within the group, levels of participation expected, common interests, expertise, how work will be distributed, the coordination of tasks, how to resolve conflict, etc. In general, all those elements help foster a suitable framework for the proper functioning of the group.

To help promote the discussion and define these initial agreements, they use remote collaboration tools, which enable collaborative editing of documents. Also, with regard to the planning and timing of the project, students use online calendars to collectively timetable the events considered relevant to the project. All group work is carried out in a virtual campus interaction space to which teachers invite the groups of students.

***Stage 2. Structuring the project: shared searches and collaborative designing***

Following completion of the activities in the first phase, students then embark on a second phase – pre-production of the audio-visual project. The activities proposed at this stage are structured as follows.

Firstly, each workgroup has a brainstorming session about the proposed theme of the project. In this way, each of the team members can express their concerns, ideas, the potential advantages and disadvantages of using one or another approach, the feasibility of the idea, etc. For this activity, each group creates a document that they share with the teacher.

Secondly, once some conclusions have been reached as a result of the brainstorming, each workgroup must create a group account on a social bookmarking service. Here, the members of each team share, describe and label all resources identified as necessary for the production of the project.

With the ideas, information and observations obtained and defined collaboratively among all members of the group in the previous two activities, the third part of this phase involves the collective drafting (through remote collaboration tools) of the script for the group's documentary video. This script must bring together those aspects they want to express in the video and how it should be put together. Moreover, drafting the script entails the distribution of tasks among the members of the group, as at the very least, the script should link as many fragments of videos or cuts as there are members of each group.

Finally, the last task, they must carry out is a self-reflective analysis of the group work and planning they have done.

### *Stage 3. Developing the project: individual and collaborative video editing*

Following the completion of those pre-production tasks outlined above, the third phase involves the development and production of the video clips by each of the members in the workgroup. Thus, based on operating agreements established by each group, and depending on the vagaries of each script, each group member individually works on editing one of the several video clips that will make up the final movie. The development of this single clip must be consistent with the overall project narrative, which means that students must follow, as much as possible, the script drafted in the previous phase.

For editing the audio and video, the use of open-source editing tools such Virtual Dub and Audacity are recommended. However, students may opt to use other proprietary software such as Movie Maker, iMovie, Adobe Premiere, Final Cut, etc.

Once each of the group members finishes editing their video clip, they then use a collaborative and online video-editing tool called Kaltura to put all the individual clips together in a final edit. Kaltura is an open-source platform that enables video management, such as creation, interaction and collaboration. An advanced version of Kaltura has been integrated into the virtual campus of UOC through WordPress, an open-source content management system mainly used as a blog publishing application. The integration of Kaltura via WordPress means multiple users can be involved, with the added feature of being able to organise content into categories.

It should be noted that students are also presented with an alternative option for sharing the individual clips produced, which involves the use of a synchronised virtual hard disc.

### *Stage 4. Project closure: broadcasting and discussion*

The fourth and final phase of the collaborative audio-visual video project involves broadcasting the completed videos on the Internet. Different video channels are used (Youtube, Vimeo, etc.) as a means to share the videos. Before broadcasting of the videos, and in accordance with the philosophy adopted throughout the entire project (one based on the (re)use of open source and free resources), each workgroup licenses its video under the Creative Commons. Finally, a forum is set up in the virtual classroom, where each team must embed and present their video, and where there is debate and discussion about the projects presented.

## Results and discussion

The results presented below were obtained by a cross-analysis of the information gathered using two instruments:

(1) Surveys of students' satisfaction conducted by the university at the end of each semester, where the first express their degree of satisfaction with the courses they have taken. This questionnaire is divided into a total of four thematic blocks, namely overall satisfaction with the course, the teaching performance, teaching and learning resources and the system of assessment.

(2) A questionnaire drawn up by coordinators of the ICTC course, which is developed to complement the institutional survey as a means of obtaining more accurate and detailed information regarding the activities undertaken in the framework of the ICTC course.

Overall, the key dimensions that were taken into account when analysing the results obtained by these instruments pivot around five axes (Figure 2).

We will now briefly describe the structure of each of these dimensions, as well as the main results obtained.

Dimension 1, which we have called 'evaluation of the level of skills acquired', focuses on the students' perception of the extent of the skills acquired during the course as set out in the syllabus. This first dimension is divided into a total of eight items (Table 1) with a three-point Likert scale (low, medium and high). As for the results obtained in Dimension 1, we can see that students value very highly the level of acquisition of the core competencies practised in the course.

Dimension 2, called 'evaluation of the teaching performance', was composed of two open questions: 'Did the teacher facilitate your learning in the subject?' and 'Did the evaluation and feedback by the teacher during the continuous assessment help you to carry out the final project?'

Regarding the first question, we should highlight that students greatly appreciated the support of teachers during the learning process and development of the final project. Furthermore, after analysing the responses of students, we have been able to structure them into various categories. Table 2 outlines these categories along with some excerpts from students' responses.

Additionally, students also considered teachers' personalised feedback on individual and group work at the end of each activity to be very useful when carrying out the final collaborative project. Some of the opinions of the students in this regard are compiled in Table 3.

With respect to Dimension 3, 'evaluation of the resources and tools', we have used a three-point Likert scale (low, medium and high) to ascertain the perceived difficulty of use of all the ICT tools employed during the project, including the

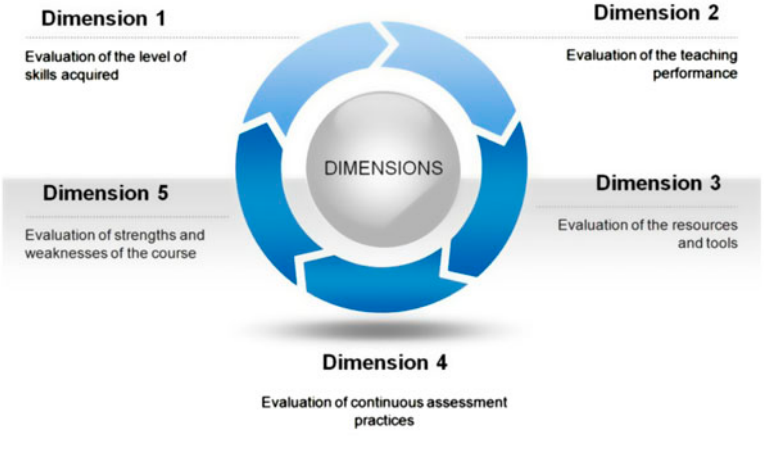


Figure 2. Evaluative dimensions of the instruments.

Table 1. Results obtained from Dimension 1 of the questionnaire: students' perception of the level of skills acquired during the course.

| Skills | | Low | Medium | High |
|---|---|---|---|---|
| Search and retrieval of digital information | *n* | 3 | 15 | 64 |
| | % | 3.65 | 18.29 | 78.04 |
| Digital information analysis and processing | *n* | 3 | 24 | 55 |
| | % | 3.65 | 29.26 | 67.07 |
| Digital information presentation and diffusion | *n* | 1 | 27 | 54 |
| | % | 1.21 | 32.92 | 65.85 |
| Online communication strategies | *n* | 3 | 20 | 59 |
| | % | 3.65 | 24.39 | 71.95 |
| Mastering the basics of digital technology | *n* | 1 | 23 | 58 |
| | % | 1.21 | 28.04 | 70.73 |
| Planning and management of an online project | *n* | 4 | 21 | 57 |
| | % | 4.87 | 25.6 | 69.51 |
| Rational and critical use of ICT | *n* | 3 | 9 | 69 |
| | % | 3.7 | 11.11 | 85.18 |
| Net-based teamwork | *n* | 3 | 11 | 67 |
| | % | 3.7 | 13.58 | 82.71 |

resources (tutorials, video tutorials and manuals) on how to use them. In general, the students appreciated the resources available and the low-medium skills required for using the various ICT tools to carry out the final project. It should be noted, however, that some technical difficulties were encountered with some of the web tools used for collaborative video editing (errors in editing, slow file uploads, difficulty saving edits, etc.). In particular, this was the case with the video platform, which was one of the elements most criticised by students in their assessment of their learning process.

Dimension 4, called 'evaluation of continuous assessment practices', aimed to find relevant information regarding the four continuous assessment practices given during the course. For each of these practices, the students were asked about the following: the appropriateness of the course load, the balance between group work and individual tasks, the clarity of the instructions and the importance of continuous assessment during the final project. In this dimension and in general, we can say that the second practice (which involved, among other things, the completion of the documentary screenplay) and the third one (which involved the production of the documentary) are those that students found more important for carrying out the project.

Finally, we decided to use an open question to evaluate Dimension 5, which focused on 'assessing the strengths and weaknesses of the course'. The responses showed us those areas that needed improvement or those that worked well. Some of the most relevant and significant responses were that the collaborative work and the personalised attention given by the teacher were strengths, while the weaknesses centred on the workload of the course and the technical problems encountered with some of the tools used.

Table 2. Categories and examples of students' responses that emerged from the question *Did the teacher facilitate your learning in the subject?*

| |
|---|
| Responses of students to questions regarding teachers' speed of response to their doubts and queries |
| Student 2. *Yes, the same for their speed in replying to messages and for their involvement. If I had to give it a mark, it would be an Excellent.* |
| Student 49 CAT. *Yes, the teacher rapidly resolved any doubts that were raised.* |
| Responses of students to questions regarding the guidance and clarifications given in the assessment activities |
| Student 5. *Yes, they helped to keep to the work schedule of the course.* |
| Student 6. *Yes, their forum posts were key to understanding the requirements and carrying out the activities, and for planning.* |
| Student 10. *Yes, they always gave additional indications to what was contained in the assessment activities highlighting the most relevant information, e.g. objective, key dates, etc. Therefore, I think they helped us greatly along the way. I would also emphasise their willingness to help at all times and their flexibility.* |
| Student 1. *Yes, at all times, always clearing up any doubts before we got started. The information was always staggered (where possible) and very useful when carrying out the tasks.* |
| Responses of students to questions regarding monitoring of work carried out |
| Student 8. *Absolutely. Besides their careful monitoring of my/our work, they always responded to the (thousands of) queries that I had and always right away. I was very taken with their suggestions, especially at the beginning, when I had a hard time taking on board so many concepts.* |
| Student 29. *Yes, they facilitated my study of the subject.* |
| Student 76. *Yes, they were a constant guide that set the pace and I had the feeling that at all times they were up to date on our progress.* |
| Responses of students to questions regarding the clarity and usefulness of the teacher's guidance |
| Student 80. *Yes, the messages of support were greatly appreciated along with all of their help during the development of our project* |
| Student 82. *Their comments were very helpful to correct and redirect certain parts of the project.* |

Table 3. Examples of students' responses to the question *Did the teacher's evaluation and feedback in each continuous assessment activity help you to carry out the project?*

| |
|---|
| Student 4. *A lot. Always with good advice and excellent monitoring of the work, which took into account all the characteristics of each person.* |
| Student 12. *Yes, I think that the feedback in each continuous assessment activity was very personal and concrete, which was highly valued given that some teachers tend to generalise when it comes to correcting.* |
| Student 49. *Yes, such personalised assessment helped a lot to improve the final project.* |
| Student 3. *A lot, it helped me to see weaknesses/errors that would otherwise not have been perceived as such. Besides, the criticism was always constructive and very respectful, plus it also highlighted the good points which motivates a lot.* |
| Student 8. *Without a doubt. His collaboration is one of the reasons I learned so much and, in fact, I obtained a very good mark for the course.* |
| Student 10 SA. *Yes, because it was very constructive, highlighting strengths and areas for improvement. His feedback was very thorough and maintained a constant flow of communication, making you more involved.* |

## Closing remarks

The results from this study show that by providing a sufficiently rich space that adequately supports students' collaborative work, it is possible to develop collaborative audio-visual projects in an e-learning context. However, for this type of learning methodology to work properly, it is necessary, at the very least, to meet the following prerequisites:

- a specific pedagogical planning process by faculty;
- the selection of online social tools that adequately support the students' collaborative activities and that can be incorporated into the virtual campus to provide more effective learning environments;
- intensive, personalised and continuous monitoring by the teaching staff of the activities of students; and,
- finally, the feedback that teachers should give students following the evaluation criteria established for each of the phases around which the audio-visual project is structured.

In addition, although the methodology described here has been developed and applied to an online higher education environment and in the context of a cross-subject that aims to develop specific ICT skills in students, it is feasible to apply it to other subjects which work with more specific contents as well as to blended learning environments.

Finally, one of the most significant problems that we have to face when supporting the learning process in the use of free Web 2.0 tools is their instability and the relative speed of some of these tools' rapid obsolescence. In this sense, it is very important that the methodology does not focus on the specific tools, but on the service that these can provide.

## Notes on contributors

Adriana Ornellas obtained a PhD in Pedagogy, and is currently a professor at the IT, Multimedia and Telecommunications Department of the Open University of Catalonia (UOC). Her main research interests and activities are related to the following fields: emerging environments and technologies for learning in contemporary society, initial teacher training and professional development in ICT, new literacies and systems for inclusion in digital society and collaborative work in virtual environments.

Pablo César Muñoz Carril is an assistant professor in the Didactics and School Organization Department and Teacher Training Faculty at the University of Santiago de Compostela (Spain).

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