

## ARTICLE

# Competency training in universities via projects and Web 2.0 tools. Analysis of an experience

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## Abstract

This article presents a university-context teaching innovation proposal that combines various ICT-supported active methodologies to undertake a project. The experience's feature is the design of a blended learning context based on a constructivist learning approach, in which the participating students – divided into three different groups – work on the same project and play an active role, and whose learning is fostered by the use Google+, Google Docs, Twitter and a blog. To present the experience, a description is given of how the project was designed and undertaken, followed by a presentation of the results obtained from the opinions of the students themselves, who were the protagonists of their own learning. The results show how the students rated competency acquisition in this and earlier experiences, and enabled the acquired competencies to be identified for each methodological proposal applied. The conclusions highlight the fact that project work has many benefits; it improves the students' active participation, motivation and engagement, and enhances competency development and meaningful learning. Especially noteworthy are the high ratings given to peer tutoring as a work modality for strengthening competency development, and the fact that the students perceived that taking part in this project allowed them to work and acquire the proposed competencies more effectively than in other educational experiences that they had undertaken in the course of their university studies. .

## Keywords

competencies; projects; active methodologies; Web 2.0 tools

## *La formación en competencias en la universidad a través de proyectos de trabajo y herramientas 2.0. Análisis de una experiencia*

### *Resumen*

*En este trabajo se presenta una propuesta de innovación docente en el contexto universitario, en la que se ha optado por la combinación de diferentes metodologías activas con el apoyo de las TIC para desarrollar un proyecto de trabajo. La peculiaridad de la experiencia es el diseño de un contexto de aprendizaje blended e-learning, bajo un enfoque constructivista del aprendizaje, en el que tres grupos de estudiantes diferentes participan en un mismo proyecto, mostrando un papel activo y cuyo aprendizaje se ve favorecido por el uso de Google +, Google Docs, Twitter y un blog. Para presentar la experiencia, se muestra el diseño y desarrollo del proyecto, y los resultados, a partir de la opinión de los estudiantes, como protagonistas de su propio aprendizaje. Los resultados nos permiten conocer la valoración del alumnado respecto a la adquisición de competencias en esta experiencia y en otras previas, además de identificar las competencias adquiridas en relación con las diferentes propuestas metodológicas aplicadas. De las conclusiones de la experiencia destacamos que el trabajo por proyectos aporta múltiples beneficios al mejorar la participación activa de los estudiantes, su motivación e implicación, el desarrollo de competencias y el aprendizaje significativo. Es destacable la alta valoración que recibe la tutoría entre iguales como modalidad de trabajo para potenciar el desarrollo de competencias, y cómo los estudiantes perciben que la participación en este proyecto ha permitido trabajar o adquirir las competencias planteadas de una manera más eficaz que en otras experiencias educativas que han vivido en su trayectoria universitaria..*

### *Palabras clave*

*competencias, proyectos de trabajo, metodologías activas, herramientas 2.0*

## Introduction

Never before has there been so much scientific output on university teaching methodologies, comprising a multitude of works, experiences and good practices shared by the teaching community. It makes sense, therefore, to take advantage of these resources to innovate and align them with new ways of learning in the digital era. This article presents an experience undertaken in the Faculty of Education at the University of Cantabria (UC), Spain, in the 2011/2012 academic year, which was the result of reflection on and a commitment to understanding the roles of lecturers and students (Filene, 2005). The objectives were to find out how our students rated the experience, to offer resources to enable lecturers to experiment in their classrooms, and to disseminate the results in order to nurture teaching, as advocated by Hernando and Aguaded (2012).

## An eclectic view of the teaching-learning proposal

In this experience, various methodological proposals were combined, each of them having unique characteristics, potential and constraints, while sharing one core principle: the active role of the students and the development of competencies instead of simply learning about the content. All of these aspects were organised and assembled in a project.

An eclectic view of the teaching-learning process was the starting point for this innovative project. It was based on a constructivist learning approach in a blended learning environment, taking the role of the lecturer and his/her disposition towards and self-perception of digital competencies – in relation to the use of digital materials – as a key factor of educational innovation (Tirado, Pérez, & Aguaded, 2011).

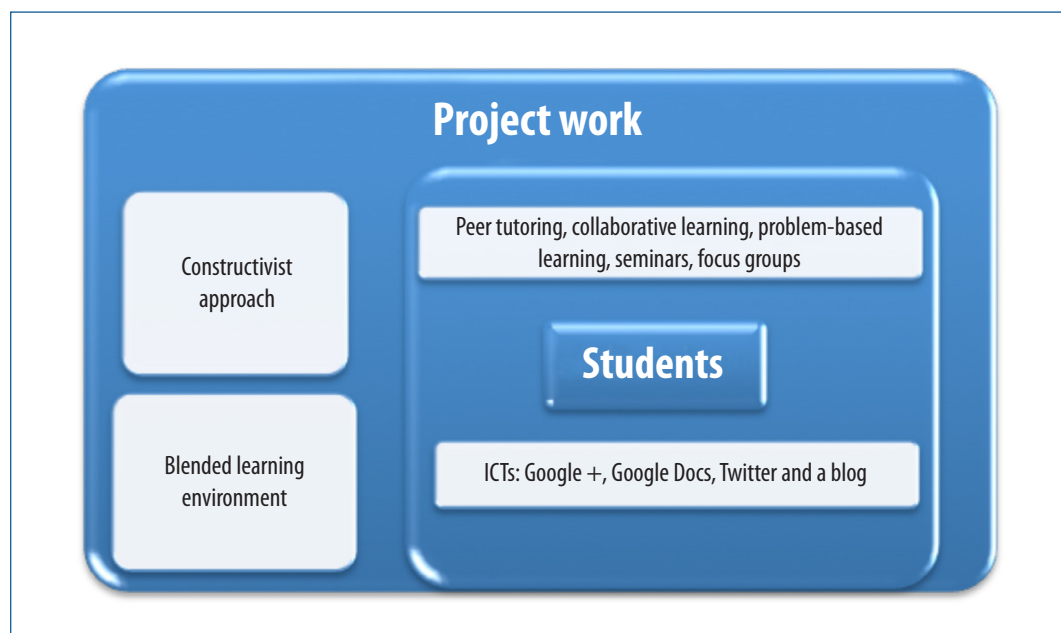


Figure 1: Context in which the experience was undertaken

In this learning approach, the idea is to learn actively and to develop competencies in a constructivist environment, which implies strengthening the students' actions, taking as the premise that students must learn by doing. Instead of reproducing knowledge or learning something off by heart, this means strengthening knowledge construction; boosting reflection on actions and experiences undertaken; fostering collaborative learning or collaborative knowledge construction; proposing research activities in order to solve problems; and fostering meaningful resources, contexts and situations for students. Figure 1 shows the design of the context in which the experience was undertaken.

After designing the context of action in which the experience would be undertaken, several determinant elements were taken into account. First, an ambitious yet attainable objective was set to improve university students' competency training, to consolidate their active learning, to secure their participation and engagement, and to maintain motivation throughout the experience.

### **Project work: a multidisciplinary view of active learning**

In order to undertake this proposal, project-oriented learning was selected as the competency-centred learning methodology or modality, as proposed by De Miguel (2006). In accordance with this author, project-oriented learning can be defined as a methodology in which students undertake an assignment proposed by a lecturer in order to perform a series of research activities, applying appropriate resources and know-how and completing them within established deadlines, usually to solve a problem.

There are similarities between this methodology and the so-called 'project method', 'project work' or 'projects', the origin of which is unclear according to Knoll (1997). They are very popular in pre-school education and the initial cycles of primary education, and have been successfully employed in subsequent stages because, as Parra (2005) has pointed out, these projects are an integrated way of presenting didactic content and activities that is much more motivating for students.

Project work means that students are the true protagonists of their execution and planning because their decisions pervade every stage of the whole process (De Miguel, 2006; Parra, 2005) (Figure 2). Students take part in selecting the activity that they are going to execute, in searching for information, in planning or preparing the activity, in deciding on the work tools, in arriving at the possible solutions or options to solve a problem, etc.; they take part in the implementation or execution of the designed work plan and the assessment phase.

Donoso, Carrasco, López, Hernández, Duarte, and Núñez (2009) consider that using this methodology can help students to learn new concepts and apply existing ones, and to develop cross-disciplinary competencies or skills; it can also improve the students' motivation. Rodríguez et al. (2008) advocate its use to strengthen active participatory learning, the students' motivation, the wholeness of learning, the cross-disciplinarity of content and the relationship to the social context in which learning occurs.

In order to ensure that it is successfully applied, the basic principles of project design for learning need to be met, which, in keeping with Hernández and Ventura (1997), we could specify as follows: learning must be meaningful; in students, learning must foster a favourable attitude towards knowledge; a logical, sequential content structure must be planned; functional learning must occur; rote learning should only be strengthened when it is comprehensive; and the whole process – not just the final results – must be assessed.

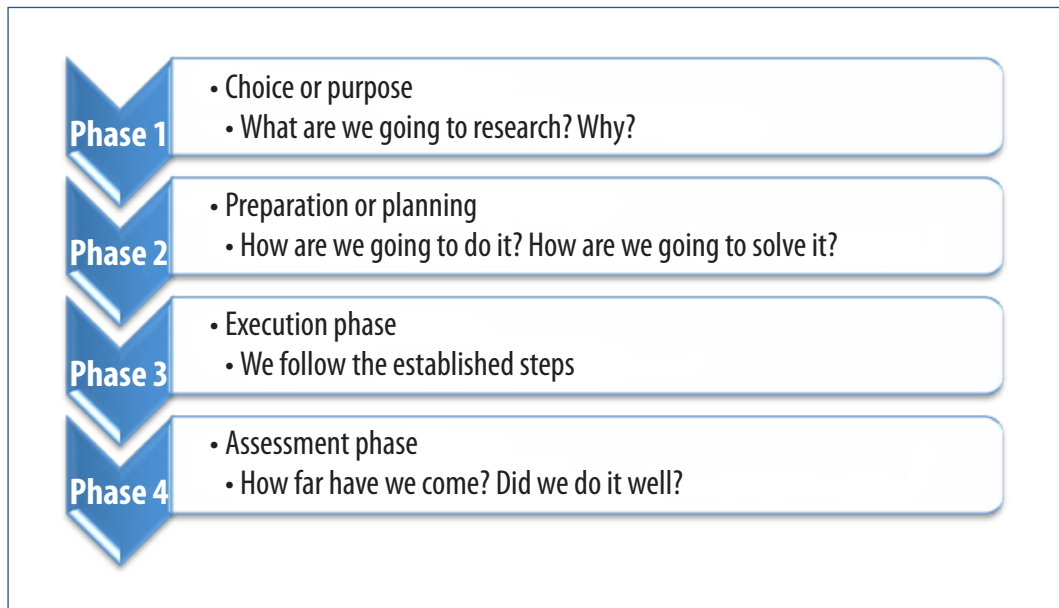


Figure 2: Project phases

## Competency development via project work

Working on competencies – considering them as a means rather than an end (Gairín, 2011) – offers many advantages, such as securing the students' active learning and providing them with the opportunity to interrelate disciplines and to efficiently apply what they have learned to a specific context. According to Zabala and Arnau (2007), it allows real problems and situations to be taken as the basis. In addition, competency-based work implies shaping the students' professionalism and promotes change towards them becoming trained and qualified (Hernández, Martínez, Da Fonseca, & Rubio, 2005).

In this experience, the proposed aim was to work on a series of cross-disciplinary competencies that, based on Lobato (2006), were specified as follows: meaningful learning; intrinsic motivation to take part in the experience by playing an active role; responsibility for one's own learning; social skills; written and oral communication skills; the students' self-directed learning, which had to have a significant research component; self-regulation of time; skills to work in a diverse group, aimed at group work and conflict solving to achieve a common goal; reflective thinking to enhance the learning process and seek continuing improvement; constructive criticism through reasoning, challenge and debate; respect for fellow students; and finally, digital competency based on interaction with audiovisual media, receiving, analysing and producing messages.

## Teaching modalities and methods to facilitate competency development. A shared strategy

It is possible to develop these competencies via project work. However, given the complexity of each competency, the relevance of applying other didactic tools was considered in order to structure

a complete methodological framework that would enable a subsequent analysis of its suitability. The didactic proposals that we came up with combined various teaching modalities and methods: Teaching along more tradition lines based on lectures to convey content directly from the lecturer to the students; seminars for analysing and assessing the process and the results by means of focus groups; or collaborative work among students by means of peer tutoring or problem-based learning as a driver of the students' work.

Presented below is a summary of the features of the didactic resources used – and rated by the students – to develop competencies:

*Peer tutoring*, considered as a work modality based on the formation of pairs or small work groups with an asymmetric relationship between or among the members, in that one member takes on the role of tutor and the other(s) the role of tutee(s); it is centred on collaboration and has many advantages (Durán & Vidal, 2004).

*Cooperative learning*, as a teaching method in which the lecturer takes on the role as organiser of tasks that the students will subsequently do, always interacting with a small group of fellow students, the purpose of which is to cooperatively develop meaningful, active learning (De Miguel, 2006). It is necessary to create a learning network in which so-called 'positive interdependence' is created, that is to say, where an individual student cannot consider a task complete until the others have finished it.

*Work seminars*, conceived as an organisational modality in which meeting moments are established, in groups of between 5 and 12 students, where debate, reflection and an exchange of ideas are fostered around a new topic. While there may be several modalities, there is only one goal: to construct knowledge based on the students' activity and interaction (De Miguel, 2006).

## Web 2.0 tools and their crucial role in this project

Four Web 2.0 technologies were applied to this project: Google Docs, Google+, Twitter and a blog created for the project. Owing to space constraints, we have not given an in-depth explanation of their characteristics, though further below we have considered the function that they had as facilitators of learning and drivers of the whole process.

Using these Web 2.0 tools demands that lecturers have a positive attitude towards technology use, as well as digital competencies that favour their application to the development of the teaching-learning process and, above all, a change of attitude with regard to interiorising the idea that knowledge should be produced and shared by multiple actors. They also demand a considerable change in the role of students because the competencies that they need to develop to use the technologies go beyond the straightforward use of digital tools to become enriched with a command of media competency. This competency, which is crucial for the society in which we live, requires a change in the way all things technological or digital are viewed, surpassing the reception of information and messages via technological devices and screens to become the interpretation, critical analysis, reformulation and broadcasting of messages. This media competency guarantees the citizens' full incorporation into the information and communication society, with a role that is fundamentally active and critical of the media (Aguaded, 2012)

## Description of the experience

The practical application of this proposal required a balance to be struck between the diversity of teaching modalities or methods and the didactic planning that a lecturer had to do for the intended purpose.

The objectives that this project aimed to attain – shifting from a teaching-centred model to a learning-centred model – were to develop the active role of the students and to find out how the students rated the teaching modalities or methods for the development of competencies.

After setting the objectives to be attained, the competencies to be developed and teaching methods or modalities to be implemented, attention then focused on which students to work with, bearing in mind that they would be the true protagonists of the process. Thus, a decision was taken to work with a diverse group made up of students taking different courses who did not know each other. To that end, an invitation was extended to students of three different subjects to voluntarily take part in the experience. The result was a group formed by three master's degree students, three third-year Pre-School Education teacher training qualification students and three third-year Physical Education teacher training qualification students, all attending the UC. The teaching team comprised three lecturers who taught the subjects that the students were taking on their respective courses.

The students' had a personal interest in taking part in the experience because it allowed them to find out about other methodologies, to meet other students and lecturers, and to acquire learning about a different activity. Their participation in this experience would not affect the grades of the subjects they were taking, and was instead proposed as a parallel activity.

The project was undertaken in four phases. In the *choice or purpose phase*, an initial seminar was held so that the students could meet each other and consider the project that would be executed. In this first meeting, the teaching modalities or methods that would be applied were presented, as were the Web 2.0 tools that they would work with in the virtual environment. In addition, the topic or purpose of the project was considered, and an agreement was reached to conduct research on the importance of involving families in their children's education, specifically in the region's rural areas. In this seminar, the work groups were also established, as was the definition of the activities to be executed in applying peer tutoring, as regards the tutor and the tutees. The necessary agreements and rules for working as cooperative groups were made, and the competencies that could be developed in the course of the project were considered.

In this phase, an agreement was reached on the objectives that had to be attained and on the importance of the chosen topic to their university education and future professional development.

In the *preparation or planning phase*, agreements had to be reached on the resources required to attain the objectives and on the various modalities or methods that had to be applied. In this phase, the roles for implementing peer tutoring were defined, as were its likely advantages and disadvantages. Thus, the tasks that the tutors and tutees had to do were established in accordance with their prior training and experience. The outcome was that the Pre-School Education teacher training qualification students would tutor the other two groups in the design of proposals to foster the involvement of families, such as workshops. The Primary Education teacher training qualification

students would tutor their fellow students in the design of a blog for families and teachers to share, bearing in mind the warnings issued by Álvarez (2012) about the fact that full use of all the advantages is not properly made. Finally, the group of master's degree students took charge of the task of tutoring the rest of the group in producing the final document that they had to deliver, which would contain an account of the work done and present a solution to the problem posed.

The group's planning of research work was fundamental because, on the basis of the established work situation, the students would have to search for information and select, organise and relate it to the problem until the problem posed had been solved. The project work would thus cause questions to be posed and answers to be sought.

Subsequent face-to-face meetings in the form of monographic and virtual seminars were planned in this phase.

In the *execution phase* lasting for around seven months, the planned activities were carried out. Work was done in groups of three in accordance with the allocated tasks, and the results were shared with the whole group. The lecturers performed continuous monitoring of the whole process. In this phase, another two seminars were held to share thoughts and opinions, to answer queries and to check on the progress of the whole group in terms of attaining the proposed objectives. In this phase, Web 2.0 tools were systematically used, opinions and information were shared via Twitter and the blog, and group meetings were held via Google+ ('Hangouts'). The students created documents with Google Docs in a shared, virtual manner.

Finally, in the *assessment phase*, the solution to the problem posed was checked to ensure that it was correct, and the project execution and competencies acquired were assessed. The assessment of the project required a view from a number of perspectives, so an attempt was made to assess the project by getting the students' and lecturers' opinions in a focus group held specifically for the purpose of ascertaining whether the proposed objectives had been attained. Owing to space constraints, the outcomes of the focus group will be detailed in another article.

We can nevertheless report that the students' opinions confirmed that the project work had facilitated their responsible, active learning, and that the proposed competencies had been developed by means of the various organisational modalities and methodologies implemented, while maintaining intrinsic motivation.

When assessing the competencies acquired in the project, and in keeping with the recommendations made by Villa and Poblete (2011), we made an overall assessment of them without analysing each of their respective elements. Thus, the assessment process was defined *a priori*; the students were monitored throughout the project; the student's perspective was integrated by means of individual self-assessment; and an instrument suited to the project-oriented learning methodology was applied, meaning that the students produced a final report containing the solution to the problem posed, which was graded as 'excellent'.

Bearing in mind that the students are the true protagonists, their opinions were gathered about competency acquisition regarding the various methodological tools or resources used. To do that, a questionnaire was produced, using a Likert-type scale from 1 to 4 (lowest to highest) to rate the level of attainment of each competency by means of cooperative learning, seminars, Web 2.0 tools



and peer tutoring. The level of competency acquisition in this project and in other experiences or subjects taken previously was also rated in another questionnaire.

Table 1 shows the results obtained for the relationship existing between each pair of variables, as well as the total for the level of acquisition of each competency in relation to the modality, method or technique used. It should be noted that the highest rated competencies were 'respect for fellow students' and 'responsibility for one's own learning', followed by 'meaningful acquisition of content' and 'intrinsic motivation'. The table also shows that cooperative learning and peer tutoring were the most suitable methods for developing competencies, and the support provided by the Web 2.0 tools used was also rated positively.

**Table 1.** Rating of competency acquisition in relation to the modality or method applied

	<i>Seminars</i>	<i>Web 2.0 tools</i>	<i>Collaborative learning</i>	<i>Peer tutoring</i>	<i>TOTALS</i>
<i>Meaningful acquisition of content</i>	2	3.5	3.5	<b>4</b>	<b>13</b>
<i>Intrinsic motivation to take part</i>	3	2.75	3.5	3.75	<b>13</b>
<i>Responsibility for one's own learning</i>	3.5	3.5	3.25	3.5	<b>13.75</b>
<i>Social skills</i>	2.5	2.25	3	3.5	11.25
<i>Oral communication skills</i>	3	2.75	3.5	3.75	<b>13</b>
<i>Written communication skills</i>	2	3	2.75	2.75	<b>10.5</b>
<i>Self-directed learning</i>	2.5	3.25	3.25	3.75	12.75
<i>Self-regulation of time</i>	2.5	2.5	3.25	3	11.25
<i>Group work skills</i>	2.25	2.25	3.25	3.25	<b>11</b>
<i>Reflective thinking</i>	2.75	2.5	2.75	3.5	11.5
<i>Constructive criticism</i>	3	3	2.75	3.3	12.05
<i>Respect for fellow students</i>	3.5	3.75	3.5	<b>4</b>	<b>14.75</b>
<b>TOTALS</b>	32.5	<b>35</b>	<b>38.25</b>	<b>42.08</b>	

In short, we would underscore that the students considered that they had developed the proposed competencies during the project, and that the various methodological proposals had helped to enrich competency-development project work and to secure the students' active learning.

Finally, Chart 1 below shows the students' ratings for competency acquisition in this project and in previous experiences in other subjects. The results show that this project clearly helped to improve

their acquisition of all the competencies apart from reflective thinking, which appeared to have been strengthened in subjects that the students had already taken in their curricula.

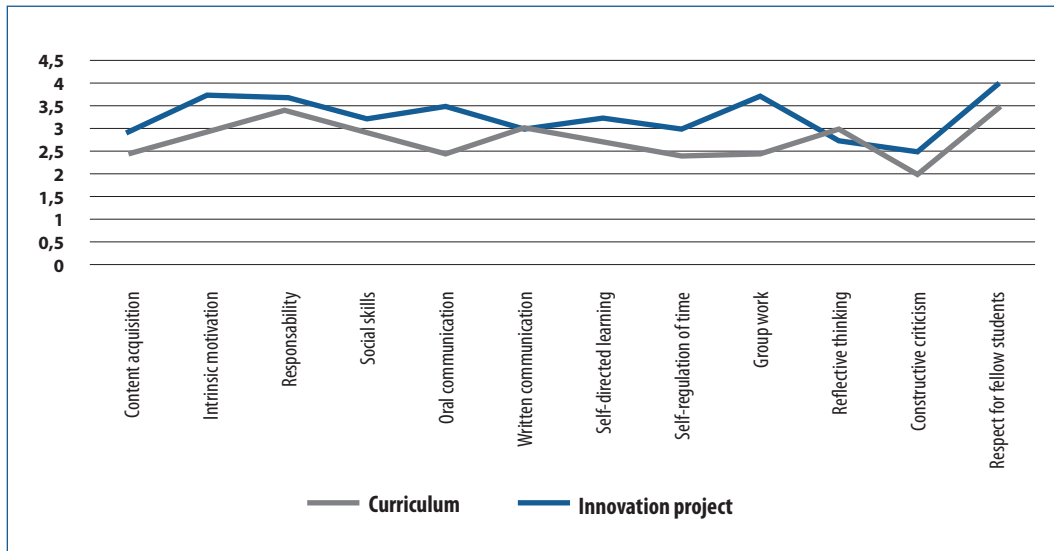


Chart 1. Competency acquisition comparison between the project and the curriculum

These results have informed our decision to continue with this line of work because they confirmed that it really is possible to secure the students' active engagement and to improve learning.

## Thoughts and Conclusions

In the university context, lecturers play a fundamental role in seeking out new ways to improve the teaching-learning process, using all the tools within their reach. This article presented an innovative proposal combining various teaching methods or modalities to facilitate the students' active learning, supported by Web 2.0 tools, to undertake a project in a blended learning environment. The feature that distinguished it from previous works was the execution of a project, in a constructivist environment, by a diverse group made up of students taking different courses.

The results obtained and presented in this article showed that working on projects in a university context was possible, thus demonstrating that the objectives set had been attained. The results showed that the various teaching modalities and methods used had fostered active learning, thus coinciding with the findings of De Miguel (2006).

The students rated the project positively in terms of competency acquisition, as they considered that all the proposed competencies had been suitably developed. At the same time, they considered that these competencies had been developed more successfully than in previous university experiences. The lecturers also rated the project positively, in that it had allowed them to find out about a new way of motivating the students, which fostered their participation in a constructivist learning environment situated within a blended learning model in which Web 2.0 tools played a

fundamental role, in the same sense as that described by Osorio (2010), and Flores and Del Arco (2012). Notwithstanding, we also agree with Bender (2003), in that their initial use might cause the students to become frustrated.

These conclusions coincide with those of Donoso et al. (2009) with regard to improved meaningful learning, competency development and securing greater student motivation.

By undertaking this project, we enjoyed a unique experience with the students and the lecturers, sharing and learning from one another, and conducting research together on real, motivating problems or situations. We agree with Sales (2004) on the benefits of project work for the training of future teachers, in that it introduces them to a methodology that is suited to working in the kind of inclusive educational model towards which we are now inclined, which allows them to learn in a collaborative environment.

We believe that this project is an interesting contribution that will partly help to overcome the lack of proposals, as mentioned by Del Moral and Vilaluste (2012), in terms of the promotion of collaborative learning. Indeed, it should continue to be implemented in order to reach its full potential.

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Her lines of research focus mainly on improved continuing education, particularly for teaching staff, and on media competency. Regarding the latter, she is currently taking part in a competitive research project involving nine other Spanish universities.

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