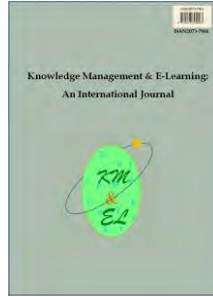

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The use of a wiki to boost open and collaborative learning in a Spanish university

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Abstract: Spanish universities are attempting to offer a more flexible and higher- quality education that is adapted to new social demands. As a result, they are offering a series of technological resources in both university management, as well as, in teaching and research - developments which are encouraged by the educational convergence process, occurring within the European Higher Education Area. In this article, we analyze how a group of university teachers seeks to promote an experience of active collaboration and open education amongst their students through the creation of a Wikipedia site. The goal was to promote a different, more flexible teaching system, where both the teacher and the students break away from their classic roles. This experience was started in order to achieve the following results: 1) motivate learning, 2) encourage active-collaborative learning 3) create a dictionary of the terms related to political science that helps to explain key concepts to students and the public, and 3) improve the quality of education. Despite facing certain obstacles, the results were positive: the students became committed to this practice, learned to collaborate in groups, and solved problems by interacting with their classes; their interest in subjects was increased, and useful tools for other people were created. Moreover, the teachers introduced new pedagogical methods in their classes and made learning relate to their students in a different way. In short, the results show that the use of wiki is effective in improving university teaching.

Keywords: Higher education; Information and communication technology (ICT); Wiki; Collaborative learning; Open education

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1. Introduction

The European Higher Education Area (EHEA) has marked the beginning of a great transformation in the European, and by extension, in the Spanish, university system. Despite some initial controversy, the new teaching methodologies, incentives for teacher and student mobility, new titles and academic disciplines, and new approaches to the labor market, are changes, which appear to be progressively taking over this new educational system (Aguaded-Gómez, 2009, p.7). The EHEA wants to place emphasis upon the quality and renovation of teaching methods. This focus on collaborative learning will lead to a deeper level of learning, critical thinking, shared understandings and a better retention of the subject matter by students (Garrison, Anderson, & Archer, 2001).

The elements to consider in this training plan, which is focused principally upon increasing quality, are, the teachers' pedagogical skills (an essential element in the teaching-learning process based on the acquisition of professional skills) and innovation in teaching (a necessary element for continuous improvement) (Más-Torelló & Olmos-Rueda, 2016, p.439). Evidence suggests this framework has led teachers in recent years to significantly increase their concern for the design of their courses (Laurillard, 2012). The search for new techniques is leading to the introduction of technological tools which contribute to the improvement of the teaching-learning process (Doleck, Bazelais, & Lemay, 2018). Additionally, the virtual learning environments offer multiple possibilities to boost collaborative learning, where teacher and student roles change (Resnick, 2002). This means that the teacher becomes a guide for to the students, providing the use of the resources and tools they need, in order to explore and elaborate new knowledge and skills, acting as a guide of learning resources (Salinas, 2008, p.7). During this process, the student is no longer a passive actor but becomes a more active player in the teaching and learning process.

Nevertheless, in order to produce a successful integration of the technologies in the teaching-learning processes, it is necessary for the teachers, not only focus on the technological resources, but also on the learning experiences that they design, whilst ensuring that the technologies they chose are the most appropriate ones. Thus, the real challenge in this respect is not in technological, but rather in pedagogical innovation. These changes should include the use of information and communication technology (ICT) which is more appropriate to develop quality learning activities for the students, following constructivist and collaborative educational models (Tejedor, García-Valcárcel, & Prada, 2009, p.117). According to a Kirkwood and Prince's (2014) study, a large proportion of teachers use ICTs without changing the teaching method, for example, using Power Point and email. In their research for the European School net, Balanskat, Blamire, and Kefala (2006), conclude that teachers use ICT to support existing pedagogical approaches, without representing a substantial modification to their teaching methods and principles.

In any case, it is perfectly possible to respond fully to the demands made by EHEA if teachers use real web 2.0 tools in the teaching-learning process (Domingo & Marquès, 2011; Faizi, 2018). In web 2.0 content is generated by the users, departing from collective intelligence based on the aggregation of individual contributions, which are not systematized nor guided. We, therefore, find a clearly different context. With web 1.0, the student-reader became a student-surfer. With the web 2.0, the student becomes a

student-author (Sobrinó Morrás, 2011, p.118). Web 2.0 thus opens up four possible ways of learning. First, “learning by doing” allows the student and/or teacher to write and read on the web, under the principle of “trial and error”. For example, in order to learn about a certain topic, online presentations are developed, which the teacher then reviews and corrects. Through this process individual learning is enabled (e.g. GoogleDocs). Second, “learning by interacting” consists of enabling information exchange regarding content management. For example, individuals may make a comment on a certain article, a blog, an online newspaper, or voice communication (email, skype, chat, YouTube, wiki, etc) (Alvear Saravia & Mora Pedreros, 2013, p.81). Third, “learning by searching” involves the search for sources which offer information about a specific topic (e. g. meta-search engines). Finally, “learning by sharing” where learning occurs through exchange between participants, who generate, share and discuss their ideas (Topchyan, 2015).

Among all web 2.0 tools, wikis are one of the most useful due to their high educational value (Tolosa & García, 2011). There are several studies that evidence how Wikis promote the development of research abilities, see Thornton (2013), and Alzahrani and Woollard (2012), proactive learning skills (Morley, 2012), critical thinking (Snodgrass, 2011) and academic commitment (Neumann & Hood, 2009). A wiki is a mechanism that enables the creation of articles and other content, whose management is based on the production of open and decentralized knowledge (Mohammadi & Mahmoodi, 2019). This kind of work reinforces students’ inquiry and citation abilities, and provides experience working in a collaborative environment (Alonso de Magdaleno & García García, 2013). In addition, teaching through these technologies creates new models of interaction, and as a result, students’ motivation for learning increases and teaching becomes more appealing (Mohammadi & Mahmoodi, 2019). To sum up, this is a tool that: a) enables collaborative work among students in virtual environments, b) allows the development of a project-based learning methodology, c) stimulates students’ motivation and involvement in activities that require research, analysis and knowledge creation, d) allows the online publication and dissemination of the works created by a group or team of students, and e) renders the process through which a group project or document is developed, visible by providing information about individual contributions and changes (Area Moreira, 2009, p.2).

Although the wiki was introduced more than ten years ago, its use is relatively new in academia (Chao, 2007; Schaffert et al., 2006). Higher education has only recently begun to explore the potential educational value of wikis as a means to promote deeper learning and integration of learning experiences from both inside and outside the classroom (Chen et al., 2005). There are several papers that present a list of uses of wikis in the classroom. (Duffy & Bruns, 2006; Wang & Turner, 2004), Wikis are increasingly gaining popularity in educational settings because of the potential benefits they bring to teaching and learning (Clark & Mason, 2008).

Wikis can be used to create a set of documents that reflect the shared knowledge of the learning group (Augar, Raitman, & Zhou, 2004). For this reason, a group of teachers in the Departments of Political Science, Sociology and Social Work at the Complutense University of Madrid, tasked their students with creating a wiki which would function as a dictionary for two key subjects, “Fundamentals of Political Science and Management” and “Political Systems of Europe”. The faculty wanted to encourage this innovative and collaborative educational practice which relied on online social networks through which the participants could share information and collaborate to create knowledge (Sloep & Berlanga Flores, 2011). Thanks to this experience, a documentary database is being created, which will help other students in the field, as well as anyone with an interest in learning more about these topics. An additional and perhaps

unintended benefit has been to also encourage collaboration among the teaching professionals in these areas.

This article describes this experience, based on the use of a wiki to drive the exchange of ideas, motivate students, and promote their interest in the subject, as well to facilitate the teachers' review of the students' work. The objectives of using wiki in this study include the following:

- ✓ To motivate the students to study courses with high theoretical content;
- ✓ To boost the levels of active and collaborative learning, which in turn both contribute to lifetime learning;
- ✓ To design learning activities that provides students with the opportunity to relate theoretical concepts to their practical experience;
- ✓ To encourage collaborative participation amongst students by promoting creative knowledge-building processes within their groups;
- ✓ To change the roles of the teachers and students;
- ✓ To create a tool that could serve other students taking related courses, as well as any person interested in this subject; and
- ✓ To create knowledge as a result of enhanced teamwork.

2. Literature review

2.1. Web 2.0 teaching tools

Universities have developed new forms of teaching and learning through the use of ICT, and terms such as web 2.0, Moodle, e-learning, etc., have become much more popular among teachers in light of the changes made by the EHEA. When looking to innovate in educational methods through the use of the ICT, it is necessary to acknowledge the importance of transforming the ideas, beliefs and actions of the educational actors (Díaz Barriga, 2008; Jena et al., 2018; Can, Gelmez-Burakgazi, & Celik, 2019). Despite the temptation of using traditional and inherited teaching methods, it is essential to adapt and incorporate newer tools.

Academic institutions should become involved in the process, otherwise it will be difficult to achieve the desired results. Budgets should incorporate allowances, not only for the new technologies, but also for the research and development of the associated teaching techniques. These budgets should be provided to build the capacity of teaching and administrative staff, as well as to enable students to learn to use these technologies. Given age demographics, it may be the case that a relative proportion of teachers lack knowledge and familiarity with contemporary technologies. On many occasions, it is the teachers who bear the costs of applying these new practices in their teaching activities. This may cause a degree of burnout, which can lead to a return to traditional methods. In spite of this, it is true that in universities there are many instances of "virtual learning", "virtual classrooms", etc. However, these are often projects that are isolated from the general dynamics of the institution and its broader objectives (Salinas, 2008). To achieve real progress, this situation has to change. Pedagogical organizations have to fully engage in this sense, and introduce the measures needed to produce real change in the organizational culture of the institution. In addition, they have to establish a policy that favors the continuation and integration of these kinds of tools inside the EHEA framework. Academic institutions should additionally assure reduced numbers in student

groups. Spanish universities are frequently allowing groups that are larger than the size recommended by the EHEA. This larger class size not only impacts negatively on the quality of the teaching, but also limits the development of teaching innovations.

Teachers should be supported in order to feel safe to launch new teaching practices, especially those requiring extra time and effort to prepare. They should then engage in training and acquire the tools, which will allow them to successfully develop these practices. They should also participate in groups and forums for teaching innovation that allow them to exchange ideas and experiences, create working groups, and remove barriers and to keep up to date with the newest models of shared knowledge creation. Before applying these new tools in their classrooms, teachers should first focus on their pedagogical approach and then chose an appropriate technological model to enhance the program.

The students should be engaged and involved in the process because, if they are not, the new educational methods are unlikely to succeed. A more active involvement in the learning process is required by the student in taking a series of decisions, that range from configuring his/her formative itinerary to the selection of communication tools he/she wishes to communicate with his/her students and teachers through (Salinas, 2008). This requires acting in the selection, usage and organization of information, allowing the student to shape him/herself as a mature citizen of the information society (Salinas, 2008). It must be taken into account that students have different levels of expertise in the use of new technologies. Additionally, they may experience inertia once they start to use new technologies, and be tempted to revert to traditional methods that require less effort.

It is clear, however, that ICTs are promoting a new vision for the acquisition of knowledge and learning (Bartolomé, 1997). They are even changing the roles played by the institutions and their participants in the teaching-learning process, knowledge-creation and dissemination, and the current priorities educational curricula (Ferro Soto, Martínez Senra, & Otero Neira, 2009, p.3). The effort expended is, however, worthwhile because the use of the ICTs provides multiple advantages for the improvement of teaching quality.

Thanks to ICTs, the teacher is no longer the source of all knowledge and becomes a guide for the students, providing the use of resources and tools that are needed to explore and create new knowledge and abilities, acting as guide for learning resources and assuming more of a facilitator's role (Salinas 2004, p.7). Hence, the role of the teacher should be one based on: 1) friendliness with the students (Volery & Lord, 2000, p.218-222; Selim, 2007, p.397-398); 2) motivating students (Martins & Kellermanns, 2004, p.12); 3) handling the e-learning units (Volery & Lord, 2000, p.218; Selim, 2007, p.410, Jena et. al., 2018, p. 26); 4) explaining how to use the platform (Volery & Lord, 2000, p.222; Selim, 2007, p. 410); 5) encouraging student interaction (Volery & Lord, 2000, p.221; Selim, 2007, p.410; Jena et al., 2018, p. 28) (Clemente Ricolfe, Escribá Pérez, & Buitrago Vera, 2010, p.852 and 853).

At the same time, the students take an active role in, and become more responsible for, their learning (Sánchez Soto, 2007, p.199). Students should work in an autonomous way researching, analyzing data, consulting sources, synthesizing ideas and preparing reports. In the meantime, the students also need to exchange ideas with others, allowing knowledge to become interpersonal and collaborative.

ICTs also help overcome the geographical and time obstacles of the traditional classroom and distance learning may present (Cañellas Cabrera, 2006). Educational organizations can offer courses whereby students do not have to be physically present in

a classroom at any time. Students can take courses in centers that are not necessarily in close proximity to their place of residence. Communication between teachers and students may be improved, increasing the mutual flow of information as well as enabling collaboration beyond the physical and academic limits of the university. Both teachers and students have faster access to information. However, because not all as information obtained online is trustworthy, its authenticity and integrity should be verified.

2.2. Collaborative learning

The importance of collaborative learning as a basic skill figures heavily in the current European convergence framework. As a result, faculty members tend to design new teaching methodologies focused on *student-centered learning*. A system which focuses on teaching students how to learn, and encourages lifelong learning. They measure the student's work on the ECTS (European Credit Transfer System) and assume the acquisition of a group of skills to be a key feature of interaction between teachers and students. These skills in turn help to equate and standardize the different European systems of higher education. They also tend to encourage autonomous learning by the students, cooperative work, the development of active methodologies, and propose potential changes in the ways of understanding and developing learning evaluation (Niemi, 2009; Esteve Mon & Gisbert Cervera, 2011; Roselli, 2016). Collaborative methodology thus introduces important changes into the roles of both student and teacher, while more importantly impacting upon the improvement of the collaborative teamwork skills (Hernández, González, & Muñoz, 2014). This emphasizes its double effect: collaborate to learn and learn to collaborate (Rodríguez-Illera, 2001, p.64). It also improves the effectiveness of the learning process for the participants (Rubia, Jorrín, & Anguita, 2009). Given that it requires a deeper level of learning and critical thinking, students tend to share their understandings more and to retain the learned materials for longer periods (Garrison et al., 2001; Johnson & Johnson, 1999). At the same time, it allows students to develop enhanced social and communication skills.

The goal of collaborative learning is to induce the participants to build their knowledge via exploration, discussion, negotiation and debate (Hsu, 2011). Johnson, Johnson, and Smith (1998) consider collaborative learning to be an interactive system that is carefully designed to organize and lead to mutual influence among the members of a team. In this way, each member of the team is responsible for both his /her own learning as well as that of the rest of the members of the group. Salinas Ibáñez (1999) argues that the acquisition of a range of abilities and attitudes is a result of group interaction, whilst Barros and Verdejo (2001) maintain that it is a process by which the students learn as they suggest and share ideas to solve a task. Collaborative learning results from interaction among individuals. Based on their respective contributions, each member creates new knowledge and develops abilities, which benefit other participants.

Some researchers consider cooperative learning, collaborative learning and group learning to be synonymous. Others understand them to be different concepts, each one representing a different aspect of the teaching-learning process. In cooperative learning, the teacher is responsible for shaping the process and should influence the structuring of the teaching process (Barba-Guamán, Valdiviezo-Díaz, & Aguilar, 2018). The teacher then divides the necessary tasks in order to reach objectives, the student solves the tasks in an individual way and the separate results are combined to create the final product. In collaborative learning, the responsibility lies with the student, but it is also shared in a way that knowledge is developed through group collaboration. It is based on teaching strategies that are supported by technology, where the student is responsible for his / her

own learning, and commits to a common task that is built by the whole group. Nevertheless, in both approaches, knowledge is discovered by the students and transformed through interaction with the environment, to be then rebuilt and broadened with new learning experiences.

Wikis allow learners to participate in building resources collaboratively. Wikis can be used to facilitate computer-supported collaborative learning, i.e., the development of collaboration by means of technology to enhance education and research (Augar et. al, 2004). This improves peer interaction and group work and facilitates the sharing and distribution of knowledge and expertise among a community of learners (Lipponen, 2002). Wikis enhance synchronous communication and cooperative learning amongst students, and promote cooperation rather than competition. Moreover, some of the fundamental elements of a successful community of practice, including a virtual presence, a variety of interactions, easy participation, valuable content, connections to a broader subject field, personal and community identity and interaction, democratic participation, and evolution characterize wikis over time (Schwartz et al., 2004). In a broad sense, a wiki can be considered a learning object if it contains an educational purpose (Nash, 2005).

3. Data sources and research methods

This experience is based on an education innovation project, which started to develop during the 2014/2015 academic year, forming part of the Education Innovation Project at the Complutense University of Madrid. As a result of this, a group of teachers and social work, law and political science students, carried out a Web 2.0-based training initiative, by creating a wiki, www.dcpa.wikidot.com. The rules of the program stipulated that only students could publish on that platform. However, it is a public wiki and can be freely accessed by the public.

With the wiki, the students collaborated in order to design an educational project for curriculum integration, departing from an initial framework established by the teacher. This collaborative learning was based on three parameters: 1) it was intentional, answering to a formal planning process, in which the teachers designed and structured the activities to be performed, based on a group of learning goals 2) the members that formed the different groups had to actively commit to working together for the sake of achieving shared goals and 3) the collaborative work would only be considered successful if it significantly increased the students' skills (Barkley, Cross, & Howell Major, 2007).

This practice included a descriptive and critical-analytical approach to foster the development of key concepts captured in the course syllabus. This work was also supported by a survey intended to explore the perceptions, usages and experiences of users interacting with the wiki.

3.1. Participants

The student participants came from two courses: "Fundamentals of Political Science and Administration", part of the syllabus of a Degree in Social Work and "Political Systems of Europe" part of the syllabus of a Double Degree in Political Science and Law. In total, 139 students took part in this activity.

3.2. *Materials*

The materials used to assist the students in performing this practice, using the Moodle, include the following.

- Scripts providing students with guidelines for the formation, interaction and collaboration of the group around the assigned task (Dillenbourg & Hong, 2008; Haake & Pfister, 2010).
- User guides for using the wiki platform.
- Working rules including instructions for the development of the project tasks, style guidelines, work structure, the mid-term review and final delivery dates.
- The list of groups, their representatives and the concepts assigned to develop and enter in the wiki.
- The monitoring framework used by the teachers.
- The evaluation framework for the wiki entries.
- The framework for evaluating the concepts developed by others on the wiki.

The instruments that were provided to the students revolved around the use of generic search engines (i.e. Google), social bookmarkers (i.e. Delicious), specific search engines (i.e. Academic Google, Computers in Libraries, Emerald, IUCAT (Indiana University Catalog) etc.) work repositories (slideshare), videos (youtube, vimeo) etc. The students were encouraged to find information that was useful for the course activities, as well as to organize information management systems.

3.3. *Procedure*

Initially, the teachers and the students involved in the project (henceforth SIP) met to establish the right coordination criteria. The students were then presented with several guidelines. The course syllabus was explained, and they were told that their task would be to work in teams, in order to develop wiki entries explaining concepts or events connected to the course syllabus. Finally, they were told to form a group. Although the distribution of groups is a fundamental task for meeting desired objectives (Dillenbourg, 2002; Guitert, 2011; Isotani et al., 2009), it usually occurs without following a clear methodology, meaning that groups are formed randomly or spontaneously by students. In this case, students were allowed to self-organize in order to maximize their group commitment and learning. It was established that groups should not be larger than 4 members, since a larger number would limit the contributions of some members and a smaller number would reduce the variety of the interactions (Beal, Bohlen, & Raudabaugh, 1964).

Next, they were told that the groups needed to choose between 2 or 3 terms, which were not on the initial concept list provided to them through the Virtual Campus. They had also been provided with other documents, such as a guiding script for the course sections and a style sheet to which the task should adhere. In order to avoid overlaps, each group's spokesperson had to then inform the teacher of the composition of the group and the concepts they proposed to develop. The teacher was in charge of matching the preferences of each group and would then assign different concepts to these, specifying that this activity represented 35% of the course grade - within which the wiki had a considerable weight as part of the total evaluation. The students were assigned this task on the first day of class and a 3-month deadline was provided to upload their work to the wiki.

The teacher and the SIP guided the students to ensure their projects would achieve the requisite quality. The program was intended to teach students to not repeat or duplicate prior work, but to research and synthesize a set of diverse resources. A set of previously mentioned materials were then uploaded to the Virtual Campus, and the students were instructed in the use of several search tools which would help them in the development of the project. In this respect, as some authors note (Dillenbourg & Hong, 2008; Haake & Pfister, 2010), it is necessary to create collaboration guidelines that help direct the students in the areas of group formation, interaction and collaboration around the task or problem. Also, the teacher and the SIP were in charge of clarifying any concerns with the project and the use of the wiki platform. The students were warned that their personal opinions and reflections were going to be taken into account, and that each project was going to be screened for instances of plagiarism.

From this point on, the groups started to work on the development of the different concepts. The members of the group had to subsequently meet up to establish guidelines for the performance and distribution of the tasks. The allocations of roles each group member could have being made by the teacher, or left up to the students. In this case, the latter option was chosen, in order to encourage individual commitment and responsibility in each member.

Initially, the members of the group searched for information about the concept or theme they would develop for the wiki, and developed the index that they would hand to the teacher. He or she could then guide the student and provide them with necessary documentation, answering any open questions, in order to improve the quality of the product. The teachers and the SIP met to set the guidelines for the students' activities, also creating a preliminary evaluation and a questionnaire to measure perceptions of the task.

Groups should develop learning rules while also reporting their processes and results (Rué, 2009). To this end, the first priority should be to define the objectives of the learning activity. Subsequent topics include the topic development, strategy and the procedural selection establishing the appropriate resources, organizing activities and responsibilities, and establishing timetables. At this point, they were able to start drafting the entries for the wiki page in such a way that each part of the group wrote its own part of the wiki, whilst allowing the rest of the group to read it and make contributions as they deemed necessary. In this regard, the students had to be warned that the platform saved the history of the process, so that the teacher could evaluate the contributions of each student, as well as track, step-by-step, the process through which the product had been developed. This feature allowed the teacher to point out the corrections that had to be made and to evaluate each group member's work. At the same time, questionnaires were sent out to determine the perceptions and levels of satisfaction with the project. In this way, when students incorporated changes made by the teacher, the group only had to format the document (keep the font consistent, adjust color, add images and other graphic resources, etc) as well as present the results to the other students, in a face to face class and fill in the aforementioned questionnaire.

3.4. Measures

Student performance was measured in the following aspects.

1. Collaborative and active learning. The following issues were evaluated: whether the group had engaged in continuous work throughout the period, rather than concentrating work towards the end; the level of involvement of all the group's

- members; review of pages; extent of collaborative work, and consideration of recommendations for improvement made in the evaluation between groups.
2. Content of the project. The following variables were graded: information searches, wiki appearance and layout, clarity and syntax, content, glossary and bibliography.
 3. The acquisition of skills and group functionality. A survey was designed to evaluate the skills developed in class and the functioning of the group.
 4. Student perceptions and satisfaction. The survey data was collected through fourteen questions split into four sections. The first section consisted of questions aimed at quantifying the usefulness of the Wiki and its relevance to the learning process. The second section included four questions about the results achieved after using this tool. In the third section students were asked about the measures they considered appropriate to improve the wiki and its possible utility in the future. In the fourth section students were asked about the use of wiki and their involvement in this experience.

4. Results

The results presented in Table 1 demonstrate that the students stated positive effects of using Wiki in developing skills for learning. The t-test result shows that compared to the Social Work students, the Double Degree students found Wiki more effective in creating the conditions for the students to communicate in a horizontal and empathic manner, participation within the group, exchange of information between students, freedom of expression, task performance, and in defining the roles of members.

On all of the other variables, the students from the Social Work and Double Degree cohorts stated that the functioning of the group work was good, or very good. It is therefore possible to conclude that group performance was good, that the group was well integrated and efficient and that all this is related to the commitment of the group members. Ultimately, the results show that, to a great extent, the proper functioning of the group revolved around dimensions that depend on the interactions between the students (most of the variables are located on this area) its structure (definition and diversity of roles) and those related to relevant processes of the group (definition and evaluation of group objectives).

As to the self-assessment survey seeking to measure the impact of developing the wiki on the students, more than 82% of the students considered the tasks attractive and reported that they had increased their interest in the course. More than 75% felt that the activity helped them to work in more active and collaborative ways. 79% said that it improved their learning during the course, and provided them with additional tools for reflection and analysis. However, one group (12.1%) criticized the wiki on the basis that it could not be considered a reliable source. Moreover, most of them said that they had not previously ever made an edit on a Wikipedia page. The questionnaire provided information not only in terms of student experiences, but also for users, which will permit later adjustments to be made to the model.

The second section included four issues about the results achieved after using this tool. More than 80% reported that the wiki facilitated contact with teachers. 73% considered the time permitted adequate to be able to carry out the work, and 82% reported that it allowed them to improve other skills.

Table 1
Perceived usefulness and ease of use of the dual mapping learning environment

Scales	T test		T. student
	Mean		
Skills developed in the class	Social Work	Double Degree	
Analysis and diagnosis of concepts and problems	3.12	3.23	0.638
Planning and organizing initial proposals	3.26	3.17	0.421
Design and development of formative programs	3.26	3.13	0.393
Generating creative material	3.03	3.37	0.539
Knowledge, research and critical thinking	3.02	3.53	3.001
Creating the conditions for the students to communicate in a horizontal and empathetic way	2.82	3.28	0.00*
Elaborating and justifying the proposals	3.10	3.21	0.213
Functioning of the working group			
There is consensus among the group members.	3.12	3.29	0.435
There is a high level of participation in the group.	3.03	3.50	0.003*
There are material resources.	3.24	3.26	0.788
The group exchanges information.	3.01	3.45	0.001*
Students freely express themselves.	2.90	3.36	0.001*
Information about the concept is sought.	2.99	3.42	0.001*
Different individuals within the group are committed.	3.21	3.15	0.669
The group is efficient as a whole.	3.37	3.43	0.870
The group tasks are planned.	3.20	3.18	0.840
The task reaches its goal in collaborative fashion.	3.02	3.50	0.001*
The motivation of the members of the group is high.	3.18	3.14	0.832
The roles of the group members are established.	3.04	3.43	0.000*
There is diversity in the group roles.	2.99	3.45	0.000*

In the third section students were also asked about the improvements they considered appropriate to perfect the wiki as well as its possible utility in the future. Regarding the expectations of its use, the results were generally positive, in that 52.7% were willing to use the Wiki in future as a tool in class and for other courses. 66,3% considered that there was no need to make changes.

Finally, in the fourth part of the questionnaire the students evaluated their participation in this task. The student participation rate was generally high, only 3% of them failed to participate, while 86% of the students passed the task. The use of the wiki has certainly proved to be a teaching resource capable of increasing both student involvement and satisfaction. This was even more so, when the activity was linked to the students' grades in the course. The students expressed a firm belief that the use of the wiki was very useful for this and other courses, related to the political science and social work. At the same time, students gained skills that they would be able to leverage in other learning situations. It is important to highlight that student motivation was also improved, because this kind of tool offers the students course content in a format that is similar to their interactions with contemporary technologies.

The wiki makes it possible to encourage educational innovation (Chen, Jang, & Chen, 2015), and to implement a process of deliberate and systematic change, in order to more effectively reach project goals. The wiki has thus facilitated the collaborative work between teachers and their students, contributing, as defined by Wheeler (2010), to the transformation of the traditional roles of both actors. While teachers had to offer regular feedback and evaluate the contributions on both individual and collective bases, their focus was on programmatic change. Their work was focused on increasing participant motivation, coordinating with other teachers and courses, to consistently provide feedback, in order to enable continuous progress, by stating clearly at the outset the grading standards for student participation, providing effective facilitation for all group meetings, and encouraging the students to collaborate among themselves. Students were being taught to work collaboratively in groups, to interactively address issues arising, to influence each other in areas such as critical reasoning and performance, to increase member participation, and to analyze and reflect on the individual wiki entries, whilst working in a collaborative way with the group in order to promote self-learning and related skills. In the end, it helped the students to develop and consolidate a set of abilities and skills that are useful across a variety of different environments. Finally, they were able to help generate a collective learning methodology that is useful for future generations, as well as for any current internet surfer who wants to use the data stored on the wiki.

Finally, we should highlight that definitions of all the themes of the course were provided including interest groups, introduction to the welfare state, electoral system, etc. Overall, the wiki currently has 137 active terms defined on individual pages, a number which is expected to grow, during successive academic courses. The wiki will thus be of positive and increasing utility to all the students of these classes, as they provide a database of conceptual document that can be accessed frequently during their academic studies, whilst also being accessible to any other citizen who wishes to look up the terms that are presented.

5. Discussion and conclusions

The students learned to work collaboratively demonstrating increased effectiveness in problem-solving, promoting the students' initiative, autonomy, and overall interest in the coursework. The goal of the *wiki* was not only intended to improve the pace of learning content, but also to "develop capabilities related to a new way of acquiring, creating, sharing and distributing knowledge in an informed society" (Adell, 2007).

Students have learned to use a new tool that can be useful for them in the future. They have increased their knowledge beyond the theoretical content of the subjects,

enhancing their academic yield. In addition, the students were committed to the activity, their initiative and autonomy was encouraged, the roles of teachers and students were changed, and a tool has been created which will be valid for other students and the general public.

Teachers had to change methodology to generate new learning styles that were more coherent with the model. At the same time, the teachers had to learn to engage with their students in a different way. This generated a debate among the teachers to determine how to solve issues arising.

However, some obstacles also appeared. All students agreed that, when they started to work in groups, they did not know how to collaborate effectively (Le, Janssen, & Wubbles, 2018), due to a lack of collaborative skills such as acceptance of opposing viewpoints, giving elaborate explanations, providing and receiving help, and negotiating. The "free rider effect" was present in some cases, where a certain member of the group could take advantage of certain benefits, thanks to the work of their teammates, without having participated in the task. In a related development, some students demonstrated reluctance to work in more cooperative ways, because they were used to working individually.

Another problem was that many of the contributions suffered from a lack of content editing, relying excessively on information and source documents taken directly from the online sources they discovered. This occurred despite the fact that teachers warned the students that an antiplagiarism program was going to be used. Moreover, not all the students showed the same abilities in the handling of ICTs, making it difficult to upload and review their contributions. An attempt to solve this problem involved contracting the support of a technician who could help students with their doubts.

Another problem was related to the autonomy given to the groups to enable them to organize themselves and distribute roles and responsibilities. This autonomy was not used equally by all of the groups. For example, the social work degree course, is typically taken early in the program, meaning that these groups were generally younger, and had less university experience. These groups tended to give greater attention to instructions from the teacher, and they tended to follow the course materials offered in a more literal way. Sometimes, they lacked the knowledge to evaluate the relevance of the documents they were reviewing, especially, compared to their more experienced peers, in the double degree programs. In order to increase the probability of success with autonomous learning, it is helpful to know how the processes work, to have strategies that enable the "quick start" of those processes, and to use the specific conditions of the environment and the specific demands of the task to be solved (Lobato Fraile, 2006).

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References

- Adell, J. (2007). Wikis en educación. In J. Cabero & J. Barroso (Eds.), *Posibilidades de la teleformación en el Espacio Europeo de Educación Superior (EEES)* (pp. 323–333). Granada: Editorial Octaedro Andalucía.

- Aguaded-Gómez, I. (2009). Miopía de formación de maestros en España: ¿docentes analógicos o digitales? *Comunicar*, 33, 7–8.
- Alonso de Magdaleno, M. I., & García García, J. (2013). Colaboración activa en Wikipedia como método de aprendizaje. *RIED. Revista Iberoamericana de Educación a Distancia*, 16(1), 13–26.
- Alvear Saravia, A. E., & Mora Pedreros, P. A. (2013). Herramientas Web 2.0 y estilos de aprendizaje: Un aporte a los AVA desde una experiencia investigativa en dos cursos de filosofía. *Revista Trilogía*, 5(8), 77–92.
- Alzahrani, I. Y., & Woollard, J. (2012). *The potential of wiki technology as an e-learning tool in science and education, perspectives of undergraduate students in Al-Baha University, Saudi Arabia*. Paper presented at the International Conference on E-Learning & Knowledge Management Technology. Kuala Lumpur, Malaysia
- Area Moreira, M. (2009). Las wikis en mi experiencia docente. Del diccionario de la asignatura al diario de clase. *Red U-Revista de Docencia Universitaria*, 4, 1–6.
- Augar, N., Raitman, R., & Zhou, W. (2004). Teaching and learning online with wikis. In *Proceedings of the 21st Australasian Society for Computers in Learning in Tertiary Education (ASCILITE) Conference* (pp. 95–104). Perth, Australia.
- Balanskat, A., Blamire, R., & Kefala, S. (2006). *The ICT impact report: A review of studies of ICT impact on schools in Europe*. European Commission: European Schoolnet.
- Barba-Guamán, L., Valdiviezo-Díaz, P., & Aguilar, J. (2018). Gestión emergente de espacios colaborativos de aprendizaje. *Revista Ibérica de Sistemas e Tecnologías de Informacao*, 6(1), 271–281.
- Barkley, E. F., Cross, K. P., & Howell Major, C. (2007). *Técnicas de aprendizaje colaborativo*. Madrid: Morata.
- Barros, B., & Verdejo, M. F. (2001). Entornos para la realización de actividades de aprendizaje colaborativo a distancia. *Revista Iberoamericana de Inteligencia Artificial*, 5(12), 39–49.
- Bartolomé, A. (1997). Preparado para un nuevo modo de conocer. In M. Rosa Gorreta (Coord.), *Desenvolupament de Capacitats: Noves Estratègies* (pp. 69–86). Hospitalet de Llobregat: Centre Cultural Pineda.
- Beal, G. M., Bohlen, J. M., & Raudabaugh, J. (1964). *Conducción y acción dinámica del grupo*. Buenos Aires: Kapelusz.
- Can, I., Gelmez-Burakgazi, S., & Celik, I. (2019). An investigation of uses and gratifications for using web 2.0 technologies in teaching and learning processes. *International Online Journal of Education and Teaching*, 6(1), 88–102.
- Cañellas Cabrera, A. M. (2006). Impacto de las TIC en la educación: Un acercamiento desde el punto de vista de las funciones de la educación. *Quaderns Digitals: Revista de Nuevas Tecnologías y Sociedad*, 43: 9.
- Chao, J. (2007). Student project collaboration using wikis. In *Proceedings of the 20th Conference on Software Engineering Education and Training (CSEE&T)*. Dublin, Ireland.
- Chen, H. L., Cannon, D., Gabrio, J., Leifer, L., Toye, G., & Bailey, T. (2005). *Using wikis and weblogs to support reflective learning in an introductory engineering design course*. Paper presented at the American Society for Engineering Education Annual Conference & Exposition. Portland, Oregon.
- Chen, Y. H., Jang, S. Y., & Chen, P. J. (2015). Using wikis and collaborative learning for science teacher's professional development. *Journal of Computer Assisted Learning*, 31(4), 330–334.
- Clark, C. J., & Mason, E. B. (2008). A wiki way of working. *Internet Reference Services Quarterly*, 13(1), 113–132.
- Clemente Ricolfe, J. S., Escribá Pérez, C., Y., & Buitrago Vera, J. M. (2010).

- Dimensiones clave en la satisfacción con los entornos virtuales de aprendizaje en la enseñanza universitaria: El caso de PoliformaT. *Revista Mexicana de Investigación Educativa*, 15(46), 849–871.
- Díaz Barriga, F. (2008). Educación y nuevas tecnologías de la información y la comunicación ¿Hacia un paradigma educativo innovador? *Revista Electrónica Sinéctica*, 30: 6.
- Dillenbourg, P. (2002). Over-scripting CSCL: The risks of blending collaborative learning with instructional design. In P. A. Kirschner (Ed.), *Three Worlds of CSCL. Can We Support CSCL?* (pp. 61–91). Heerlen: Open Universiteit Nederland.
- Dillenbourg, P., & Hong, F. (2008). The mechanics of CSCL macro scripts. *International Journal of Computer-Supported Collaborative Learning*, 3(1), 5–23.
- Doleck, T., Bazelaïs, P., & Lemay, D. J. (2018). Is a general extended technology acceptance model for e-learning generalizable? *Knowledge Management & E-Learning*, 10(2), 133–147.
- Domingo, M., & Marquès, P. (2011). Aulas 2.0 y uso de las TIC en la práctica docente. *Comunicar*, 37, 169–175.
- Duffy, P. D., & Bruns, A. (2006). The use of blogs, wikis and RSS in education: A conversation of possibilities. In *Proceedings of the Online Learning and Teaching Conference* (pp. 31–38).
- Esteve Mon, F. M., & Gisbert Cervera, M. (2011). El nuevo paradigma de aprendizaje y las nuevas tecnologías. *Revista de Docencia Universitaria*, 9(3), 55–73.
- Faizi, R. (2018). Moroccan higher education students' and teachers' perceptions towards using web 2.0. technologies in language learning and teaching. *Knowledge Management & E-Learning*, 10(1), 86–96.
- Ferro Soto, C., Martínez Senra, A. I., & Otero Neira, M. C. (2009). Ventajas del uso de las TICs en el proceso de enseñanza-aprendizaje desde la óptica de los docentes universitarios españoles. *Revista Electrónica de Tecnología Educativa*, 29: 5.
- Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking and computer conferencing: A model and tool to access cognitive presence. *American Journal of Distance Education*, 15(1), 7–23.
- Guitert, M. (2011). Time management in virtual collaborative learning: The case of the Universitat Oberta de Catalunya. *eLC Research Paper Series*, 2, 5–16.
- Haake, J. M., & Pfister, H. R. (2010). Scripting a distance-learning university course: Do students benefit from net-based scripted collaboration? *International Journal of Computer-Supported Collaborative Learning*, 5(2), 191–210.
- Hernández, N., González, M., & Muñoz, P. (2014). La planificación del aprendizaje-colaborativo en entornos virtuales. *Comunicar*, 42, 25–33.
- Hsu, S. (2011). Who assigns the most ICT activities? Examining the relationship between teacher and student usage. *Computers & Education*, 56(3), 847–855.
- Isotani, S., Inaba, A., Ikeda, M., & Mizoguchi, R. (2009). An ontology engineering approach to the realization of theory-driven group formation. *International Journal of Computer-Supported Collaborative Learning*, 4(4), 445–478.
- Jena, A. K., Bhattacharjee, S., Gupta, S., Das, J., & Debnath, R. (2018). Exploring the effects of web 2.0 technology on individual and collaborative learning performance in relation to self-regulation of learners. *Journal on School Educational Technology*, 13(4), 20–34.
- Johnson, D. W., & Johnson, R. T. (1999). *Learning together and alone: Cooperative, competitive and individualistic learning*. Boston, MA: Allyn & Bacon.
- Johnson, D. W., Johnson, R. T., & Smith, K. A. (1998). Cooperative learning returns to college what evidence is there that it works? *Change: The Magazine of Higher Learning*, 30(4), 26–35.

- Kirkwood, A., & Price, L. (2014). Technology-enhanced learning and teaching in higher education: What is enhanced and how do we know? A critical literature review. *Learning, Media and Technology*, 39(1), 6–36.
- Laurillard, D. (2012). *Teaching as a design science: Building pedagogical patterns for learning and technology*. London: Routledge.
- Le, H., Janssen, J., & Wubbels, T. (2018). Collaborative learning practices: Teacher and student perceived obstacles to effective student collaboration. *Cambridge Journal of Education*, 48(1), 103–122.
- Lipponen, L. (2002). Exploring foundations for computer-supported collaborative learning. In *Proceedings of the Computer-Supported Collaborative Learning Conference* (pp. 72–81). Hillsdale: Erlbaum.
- Lobato Fraile, C. (2006). El estudio y el trabajo autónomo del estudiante. In M. De Miguel (Dir.), *Métodos y modalidades de enseñanza centradas en el desarrollo de competencias*. Madrid: Alianza Universidad.
- Martins, L. L., & Kellermanns, F. W. (2004). A model of business school students' acceptance of a web-based course management system. *Academy of Management Learning & Education*, 3(1), 7–26.
- Más-Torelló, O., & Olmos-Rueda, P. (2016). El profesor universitario en el Espacio Europeo de Educación Superior. La autopercepción de sus competencias docentes actuales y orientaciones para su formación pedagógica. *Revista Mexicana de Investigación Educativa*, 21(69), 437–470.
- Mohammadi, F., & Mahmoodi, F. (2019). Factors affecting acceptance and use educational wikis: Using technology acceptance model. *Interdisciplinary Journal of Virtual Learning in Medical Sciences*, 10(1), 5–9.
- Morley, D. A. (2012). Enhancing networking and proactive learning skills in the first year university experience through the use of wikis. *Nurse Education Today*, 32(3), 261–266.
- Nash, S. (2005). Learning objects, learning object repositories, and learning theory: Preliminary best practices for online courses. *Interdisciplinary Journal of E-Learning and Learning Objects*, 1(1), 217–228.
- Neumann, D. L., & Hood, M. (2009). The effects of using a wiki on student engagement and learning of report writing skills in a university statistics course. *Australasian Journal of Educational Technology*, 25(3), 382–398.
- Niemi, H. (2009). Why from teaching to learning? *European Educational Research Journal*, 8(1), 1–17.
- Resnick, M. (2002). Rethinking learning in the digital age. In G. S. Kirkman, P. K. Cornelius, J. D. Sachs & K. Schwab. (Eds.), *The global information technology report 2001-2002: Readiness for the networked* (pp. 32–37). Oxford University Press.
- Rodríguez-Illera, J. L. (2001). Aprendizaje colaborativo en entornos virtuales. *Anuario de Psicología*, 32(2), 63–75.
- Roselli, N. D. (2016). El aprendizaje colaborativo: Bases teóricas y estrategias aplicables en la enseñanza universitaria. *Propósitos y Representaciones*, 4(1), 219–280.
- Rubia, B., Jorrín, I., & Anguita, R. (2009). Aprendizaje colaborativo y tecnologías de la información y la comunicación. In J. De Pablos (Ed.), *Tecnología educativa: La formación del profesorado de la era de Internet* (pp. 191–214). Málaga: Aljibe.
- Rué, J. (2009). *El aprendizaje autónomo en Educación Superior*. Madrid: Narcea.
- Salinas, J. (2004). Innovación docente y uso de las TIC en la enseñanza universitaria. *Revista Universidad y Sociedad del Conocimiento*, 1(1): 3.
- Salinas, J. (2008). La integración de las TIC en las instituciones de educación superior como proyectos de innovación educativa. In J. Salinas Ibáñez (Coord.), *Innovación Educativa Y Uso De Las TIC* (pp. 15–30). Málaga: Universidad Internacional de Andalucía.

- Salinas Ibáñez, J. M. (1999). Enseñanza flexible, aprendizaje abierto. Las redes como herramientas para la formación. *Revista Electrónica de Tecnología Educativa*, 10, 1–11.
- Sánchez Soto, J. (2007). La calidad del e-learning en su implementación y desarrollo: Investigación evaluativa y consultoría pedagógica. *Teoría de la Educación. Educación y Cultura en la Sociedad de la Información*, 8(1), 193–208.
- Schaffert, S., Bischof, D., Buerger, T., Gruber, A., Hilzensauer, W., & Schaffert, S. (2006). Learning with semantic wikis. In *Proceedings of the First Workshop on Semantic Wikis – From Wiki to Semantics (SemWiki2006)* (pp. 109–123).
- Schwartz, L., Clark, S., Cossarin, M., & Rudolph, J. (2004). Educational wikis: Features and selection criteria. *The International Review of Research in Open and Distance Learning*, 5(1): 11.
- Selim, H. M. (2007). Critical success factors for e-learning acceptance: Confirmatory factor models. *Computers & Education*, 49(2), 396–413.
- Sloep, P. B., & Berlanga Flores, A. J. (2011). Redes de aprendizaje, aprendizaje en red. *Comunicar*, 37, 55–63.
- Snodgrass, S. (2011). Wiki activities in blended learning for health professional students: Enhancing critical thinking and clinical reasoning skills. *Australasian Journal of Educational Technology*, 27(4), 563–580.
- Sobrino Morrás, A. (2011). Procesos de enseñanza-aprendizaje y web 2.0: Valoración del conectivismo como teoría de aprendizaje post-constructivista. *Estudios sobre Educación*, 20, 117–140.
- Tejedor, F. J., García-Valcárcel, A., & Prada, S. (2009). Medidas de actitudes del profesorado universitario hacia la integración de las TIC. *Comunicar*, 33, 115–124.
- Thornton, H. (2013). Wiki literacy: How a teaching experiment in the crowdsourced wikipedia fostered research skills. *Library Journal*, 138(18), 22–24.
- Tolosa, M. C., & García, J. R. (2011). The wikis as educational tools. In *Proceedings of the IATED* (pp. 6767–6770).
- Topchyan, R. (2015). Competencies affecting knowledge sharing in virtual learning teams. *Knowledge Management & E-Learning*, 7(2), 316–333.
- Volery, T., & Lord, D. (2000). Critical success factors in online education. *The International Journal of Educational Management*, 14(5), 216–223.
- Wang, C., & Turner, D. (2004). Extending the wiki paradigm for use in the classroom. In *Proceedings of the International Conference on Information Technology*. IEEE.
- Wheeler, S. (2010). Open content, open learning 2.0: Using wikis and blogs in higher education. In U. D. Ehlers & D. Schneckenberg (Eds.), *Changing Cultures in Higher Education: Moving Ahead to Future Learning* (pp.103–114). Heidelberg: Springer.