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Collaborative work with wikis. Analysis of some innovative educational centers

Luis Gonzalez Rodero
Faculty of Education
University of Salamanca
Spain
lgrodero@usal.es

ABSTRACT

The wiki tool, incorporated in the Moodle platform, is able to provide us with a learning environment which is strongly linked to social-construction approaches, facilitating the development of collaborative work projects on-line. Wikis are tools where the exchange of ideas and the collaborative workflow are important factors for development with university students.

This case study analyses and evaluates essential aspects for the successful deployment of a wiki in a higher education proposal.

The proposal of work by projects, has been oriented to students of the first university course, in order to analyze the characteristics of the educational centers of the 21st century, within a collaborative working environment through the use of the Wiki tool.

Our results suggest that a wiki can promote effective collaborative learning, confidence in self-training and peer evaluation, facilitating rapid feedback, intuitive navigation and task performance.

CCS CONCEPTS

• **Human-centered computing** → **Collaborative and social computing** → **Collaborative and social computing systems and tools** → **wikis**

• **Applied computing** → Education → **Learning management systems**

KEYWORDS

Educational technology, communication technology, lifelong learning, on-line learning, Moodle, Wiki, collaborative learning.

1 INTRODUCTION

A wiki is a tool capable of providing a learning environment which is strongly linked to the approaches of social - constructivism and constitutes one of the most useful and practical tools for collaborative work and the exchange of ideas among students.

A wiki is a collaborative work tool that can work in isolation, for example Wikispaces or it can work integrated within a learning platform like Moodle, in the latter situation constitutes the context of our research. The content of the wiki facilitates the collaborative work, allows to create and to edit pages in collaboration. This technology has the potential to complement and develop online collaboration.

The flexibility, openness and simplicity of this technology gives university students new opportunities to develop an interactive collaborative work in a simple way, in a way which has not been possible to develop them previously, using other technologies or other tools.

Students receive information daily from different sources. They should be able to search for and select one that may be relevant to their formation as future teachers of Primary Education, contrast it and put it in common with their classmates. In this sense, the work by projects in the different subjects of their Degree, constitutes an opportunity for the development of their informational competences [1] at the

same time the development of their specific competences in the field of knowledge of a certain subject, and on the other hand, the development of skills linked to the development of collaborative work, in small groups with other students of class [2].

The EU guidelines indicate that it is necessary to acquire a number of key competences of citizens to achieve full personal, social and professional development, in line with the demands of today's world. Knowledge creation is a key requirement not only for skilled workers but also for middle-level citizens. Competences are conceptualized as a "know-how" applied to different social, professional and academic contexts. To make it possible to transfer to different contexts, a requirement is the understanding of knowledge, linked to the competences and the connection of knowledge with the skills or practical skills that integrate them.

Digital competition can be developed from a triple perspective [2]:

• Know: a) Rights and risks in the digital world. b) Specific language textual, numerical, iconic, visual, graphic and sound. c) Main software applications. d) Information sources.

• Know how to do: a) Use technological resources for communication and problem solving. b) Use and process information in a critical and systematic way. c) Find, obtain and treat information. d) Create content

• Be able to: a) Have an active, critical and realistic attitude towards technologies and technological means. b) To have the curiosity and the motivation for the learning and the improvement in the use of the technologies. c) Assess strengths and weaknesses of technological means. d) Respect ethical principles in their use.

Students become active agents in the creation of knowledge, they seek and contrast information, develop their own summaries and ideas, share information with their colleagues, and develop collaborative group work strategies. To do this they use different digital tools that facilitate at all times communication and work among peers on the chosen theme [3].

Internet and information and communication technologies (ICT) have had a profound impact on our society and consequently on university teaching and learning processes. Currently, the mode of learning is changing in the digital age, driven by the interest and use of web 2.0 technologies in education. Web 2.0 technologies focus on the ease of creating new content and sharing content with other recipients. Does a type of technology constitute a wide field of activities developed on-line. It allows the creation of on-line work groups, oriented to specific themes, facilitating the active learning of students in the learning processes [4].

At the University of Salamanca, we have the Studium Virtual Campus, based on the free Moodle platform, which has among other tools, the wiki, allowing easy creation and management of wikis within the e-learning platform [5]. This situation facilitates the development of collaborative works and projects on-line with the wikis tools, incorporated within the platforms, without the need to use other wikis tools external [6] to the university's virtual campus [7] [8].

The pedagogical principles that support Moodle are based on the theory of constructivism, as it facilitates learning in multimedia environments in many different ways: enabling the use of communication tools, providing syllabus and resources to students, monitoring and assessment processes, sharing and group work for students and teachers. Wikis represent a technology that can potentially provide an environment that facilitates the development of the principles of social-constructivism [9]; learning groups can create, include, modify, insert comments in a wiki in a simple way and the result is quickly displayed, being operative and functional in the use of tools like blogs or forums [10].

Wikis make easy to create, broadcast and share content easily. As well as the registration of the different entries and updates of the information, so that if a student who does not belong to a certain work group, makes changes to the work on the wiki of other colleagues, changes are recorded, and if it is an error it is possible to easily retrieve the information published in the wiki, before the last modification. The working group of that wiki can warn the coworkers of the error of including their entry in a wiki that does not correspond to him or not having an appropriate group work attitude; in addition, if the intentionality has been to harm or damage a work group, the faculty responsible for the activity may warn the student responsible for this action and take action in accordance with the damage caused [11].

Wiki allows students to work online synchronously between peers, far from asynchronous situations, which gives them the possibility to work at anywhere and anytime; and this situation increases the flexibility for the group, maximizing students' engagement with the task and duties.

Work through wikis stimulates students to collaborate and share, working in the distance and taking advantage of e-learning university environments, encouraging non-stop exchange and communication among members of a group [12]. Project work demands the use of tools within a virtual environment and, although most students have already used Wikipedia in secondary school [13] and we consider them digital citizens, most of them have not used Wiki as a tool to create and share with other students [14]. Research and evidence suggest that wiki inside the Moodle platform is an excellent tool for online collaboration in an online educational context.

Wikis help create a dynamic, collaborative learning environment where learning happens through open discussion and exchange of ideas and opinions; within the virtual learning environment Moodle and through the Wiki tool it is possible to develop collaborative work environments that facilitate the sharing of knowledge and promote the active participation of the students involved in the task assigned by the teacher.

It is necessary deepen the researches on the potential of the wikis as tools of collaborative work among the university students and to analyze the effectiveness of the wikis in the development of approaches of constructivist social learning. Given the nature of the wikis, where the contributions of the students usually take place in an open environment, although in a closed space as a Virtual Learning Environment (VLE) where only students enrolled in a certain course or subject can access. The contributions of the students in a wiki are made openly, they can be consulted and reviewed by other students and teachers, it is an important aspect both from a pedagogical perspective and the effectiveness of the task entrusted, to observe and analyze the lines of work of other groups on their respective task.

The use of ICT tools has become a key competence in any kind of sector currently, in society, in the labor market, the university has to implement them to prepare students for their personal and professional challenge. Achieving high standards in digital competence is a priority to have a voice in today's social, economic, political or cultural domains, and come to terms with how fast information turns into knowledge [15].

In the present moment, many researchers see a clear link between a country's social and economic growth and digital implementation to process information and knowledge [16].

The present society is characterized by social contexts of great communicative interactivity through devices connected to the networks or mobile character. Collaborative work in educational institutions involves collaboration between teachers and students located in different spaces (both nationally and internationally). This situation acquires a special relevance for the learning and the acquisition of basic competences related to the interculturality, the teamwork, the permanent education. The processes of educational innovation involves a joint reflection of all the actors to consider facing the different challenges, in a process of dialogic reflection of the entire learning community that participates in the formative process, with the aim of improving quality education processes [17].

The tools of web 2.0 are considered as tools that have great potential for the development of educative practices carried out in a collaborative way by the students. These applications seem to have a special functionality in preparing and developing the skills and competences needed to prepare students for the new online work environments, which are characterized by increasing the demand for advanced skills to analyze information and perform complex tasks; in groups composed of students with different capacities and interests. More specifically, the implementation of social software and collaborative learning methods facilitates the development and creation of collaborative learning environments where the proposed tasks appear related or linked to tasks that are performed in real working contexts [18].

For the academic year students can get access to Studium from different devices (computers, laptops, tablets, mobile phones), surprisingly the most widely used device to access promptly is the mobile phone, not the laptop; they can do many things: Read the last messages sent by the teacher regarding a particular subject, check the agenda with teachers' requirements, download lessons, carry out tasks individually or in groups (forums, wikis, surveys, video-conference), and it can be done synchronously or asynchronously with other fellow students [19].

Moodle offers a wide range of tools, that go from messaging for the whole group, particular emails to specific students, questionnaires, surveys, mailboxes, repository of materials, evaluation exercises, workbooks, and of different complexity; for example, from Wikis to work collaboratively, to asynchronous tools like forum; and other tools which have different levels of complexity as for instance the Workshop tool [20].

University students must be able to work in different environments, with different methods; they constitute a fundamental requirement in European Higher Education Institutions. University students are expected to work following academic standards, becoming confident with virtual university tools, making efficient use of resources provided by e-learning platforms [21].

This paper proposes a wiki-based reflection method to follow up regular existing face-to-face classroom presentation activities to promote deeper thinking levels of student during their wiki work [22].

Different studies have looked at the successful use of wikis in education. However, there have also been problems in adopting them; for instance, students may be concerned about the complexity structure of wikis; and the possibilities of vandalism, when a student can erase the work of other classmates; on the other hand plagiarism, by easily copying information from the work done by colleagues in other wikis. In the same way some teachers are reluctant to adopt them for the work of the project due to the great effort that their evaluation, the interactivity and the cooperative effort involved in the creation of wikis [23].

Within the Moodle platform several new technologies are being explored to adapt online education to learning style preferences of learners. One of the most widely used tools in this sense are the wikis.

The wiki is a simple tool that allows multiple people to work simultaneously on the same document [24]. A wiki is a plain tool, that works similar to a word processor; consists of a basic text editor, and a bar that is similar to Word processor but much more easy and with fewer options. Wiki in Moodle allows you to store and retrieve different versions of the documents being uploaded, which makes it quite convenient in case of mistake or accidentally deleting information. It offers a friendly environment and facilitates collaborative work.

Wikis are a tool that encourages students to share their information and knowledge, making it simple to organize and structure information. The technical operation is very easygoing, they generally share the editing tools of basic word processors. This is the reason why wikis have become one of the most frequently used tools at university and secondary schools. It is also being used in primary education these days.

The proposal presented to the students, is within the methodology of work by projects through the development with small groups. To help students become confident with this type of tool it is necessary to encourage projects through online collaborative work among students and teachers, since most academic work in the near future is going to be implemented this way. Teachers working with the same groups will have to assume planning and horizontal coordination among themselves for the benefit of students.

Online learning requires amendments by teachers as well as students for successful interactions occur towards reflective learning. Most degrees at the University of Salamanca are offered on a face-to-face basis, students having permanent on site lessons. However, new teaching processes are becoming common, and they require the use of Studium, not only as repository for content of subjects but also, to promote tasks that demand collaborative work and more efficient training for students.

2 DEVELOPMENT OF THE PROJECT

The aims of this research were to:

- Identify the benefits and issues of using a wiki facility as perceived by students
- To identify good practices working with wikis
- To analyze the possibilities offered by a wiki as an online collaborative and learning tool.

For the implementation of this project references on how to work in innovative schools like the book that was published by Telefonica Foundation about case studies from schools innovating and introducing digital devices in their school work [25]. This book presents successful case studies with projects in primary and secondary schools, some of them in Castilla and Leon.

Another of the books considered as reference for this work is the study by Hernando [26] on the study of how the most innovative schools of the world, considered as referents of the school of the 21st century, which have been collected by Telefonica Foundation, were taken into account, especially those concerning Spanish schools, but also some dealing with experiences in European schools.

The development of the project covered several stages:

1. The students were organized into working groups of 5 or 6 people and had two possibilities to carry out the work: to decide on a group of educational centers to carry out the work on a monographic document on educational innovation, thematic dealt with from different perspectives: books of essays, monographs by renowned authors, OECD reports, UNESCO reports, Santillana Foundation reports on the Monographic Weeks of Education of the last 5 years..

2. Once groups had been organized and works assigned, wikis were created in Studium to start collaborative work (see Fig. 1).

3. A scheme of work was handed out to students, uploading it to their wikis, to share and decide on actions to carry out. This stage lasted a month.

4. When the centers under study were near to our Faculty and students decided to do a field study directly in these centers, a letter for the Heads of the schools involved in the project was provided to students, so that they got in contact to establish a program of visits to the school and the academic support they would need. A final copy of the results would be sent to the school. When the centers were distant and it was not possible to visit them, they proceeded to consult the information published on their websites, as well as information related to the center that had appeared in scholarly or informative journals and newspapers in the locality or the region.

5. In those nearby educational centers we proceeded to visit. Students visited schools and studied their academic organization, infrastructures, educational proposal as well as educational projects, or specific projects of interest to the educational community.

6. Each member of the group uploaded a final report on the wiki, with the necessary coordination between the group members (see Fig. 2).

7. Having completed the report, it was edited following a standardized format.

8. The final results from each group were orally presented to the other groups, as a way to discuss on the background knowledge that they already had about the schools where they would be doing their primary school teaching practice in years three and four.

Access to wikis was opened to all students enrolled in the subject, so they could see the work of their peers and compare with the work carried out by their group (see Fig. 1).

Wikis were created at the same time schools were being allocated to students, and the range of schools visited was mainly from Zamora, next Salamanca and also Leon.

Having decided on the members of the group helped motivate, distracted or slow students to contribute and support their group. The attitude of the students was more positive and respectful, having no complaints of misuse of wikis.

They assumed the suggested scheme of work and developed it all through the established schedule.

Figure 1: Wikis. Work groups.

In order to facilitate the development and evaluation of the work, the teachers provided a guide on the sections that should be included in the work report to be made in the wiki. It is the following:

1.- REPORT. WORK DOCUMENT:

Cover: data of the work group and reference documents for the accomplishment of the work

Index

1.- Reference document object of study (see Fig. 2)

1.1.- Summary by sections.

1.2.- Conceptual map of the different sections.

2.- Documentary research related to the theme.

2.1.- Deepen and investigate innovative centers: each member of the group should investigate a different school, preference will be given to the study of primary schools, in front of secondary schools, first in Spain, second in Europe and

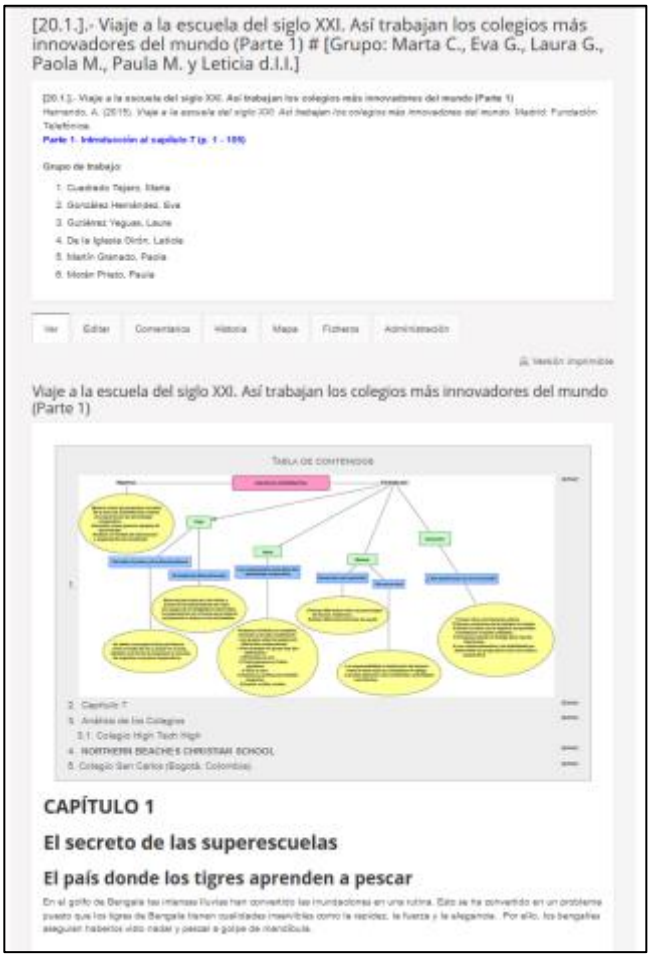


Figure 2: Development of team work in group 21.1 and their wiki's main page.

3.- Analysis of the information.

3.1.- Performs an analysis and evaluation between the educational centers under study: similar and differentiating aspects for the schools of S. XXI

3.2.- Performs an analysis and comparative of the information regarding the reference documents (section 1) and the documents of the research phase (section 2)

3.3.- Critical reflection of the members of the group against the educational centers under study.

4.- Free section. Research and analysis on the topics and contents that the group wish to deepen, related to the subject. Each group will develop creativity, reflection and deepening about the topics that they consider most interesting, from the academic point of view.

Bibliography and documentation used to carry out the work.

3 EVALUATION OF THE PROJECT. RESULTS.

The students' final assessment of the tool used and the process followed were quite positive, and they praised the benefits of using wiki as a tool for collaborative work.

The research presented in the communication corresponds to the work developed in the course 2016 - 2017. During the last course we also worked with Wikis developing a work proposal, which was exposed in the Congress TEEM2016 [27]

Reviewing publications from other colleagues at the University of Salamanca [28] that have also used wikis as a training resource with their students, we can see that they have achieved a quantitative assessment of the experience through questionnaires on-line to provide more accurate data on the evaluation of the experience.

When I finished reading the final version of this research I considered that some quantifiable data, besides the qualitative ones offered by students, would have offered more quantitative and accurate results of the project.

The process of gathering information is developed from survey techniques. In order to know the evaluation of the students about the functionalities and the problems or difficulties that could exist in the development of a collaborative work using the wikis, we proceeded to design a survey of 40 items. The survey was developed with the survey tool available on the Moodle platform. Most of the questions were asked to be answered from the options of a Likert scale with 5 degrees of freedom, and an open-ended question, so that the students could respond in a more personalized way.

The application of the questionnaire is done after the development of a training activity through the use of the wiki in groups of between 5 and 7 students. The survey was available online for 15 days, so that the students could respond to it at the moment they considered the most suitable.

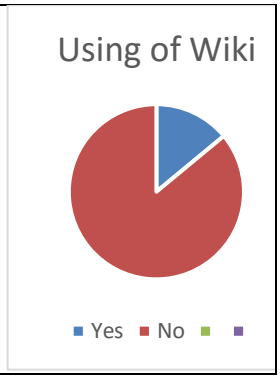
In relation to the class group that carried out the proposed activity of the study of the most innovative schools of the 21st century, approximately 65% of the students answered the survey, 42 students. About 20% of the students enrolled in the subject did not carry out the proposed study and of the groups that initially indicated that they would carry out the study, approximately 15 did not present their work, thus 35% of the students did not perform the task, for the reasons stated above.

Taking into account the answers given by the students in the different questions, we proceed to the development in a second phase, which establishes a process of categorization of the variables to facilitate their analysis.

Bearing in mind the limitations of space for the writing of the communication in the present congress, it is not possible to address the totality of the questions of the survey, we proceed to make a selection of those questions that we can consider of interest. Successive articles and communications will address the remaining items of the questionnaire, pending analysis, for the future.

Table 1: Previous use of the wiki

Item 2.- Have you used the Studium Wiki in other matters of the University other than School Organization or Information and Communication Technologies applied to Education in the School of Education of Zamora?	
Yes	14%
NO	86%
Total	100%

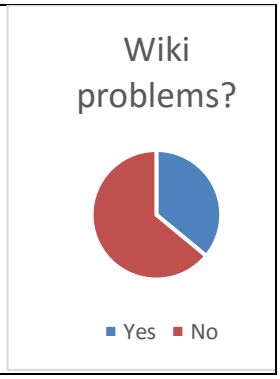


Students have been asked if they had previously used the wiki tool to perform collaborative work in those subjects other than those given by the teacher signing the communication. We can observe that the majority of the students have not had previous experiences of working with wikis, being the present didactic proposal the first one that realizes, using the wiki tool of Studium.

We can therefore indicate that the use of wikis is not very widespread in the field of university education. This is a result within the margins expected in the study (Table 1).

Table 2: Management problems

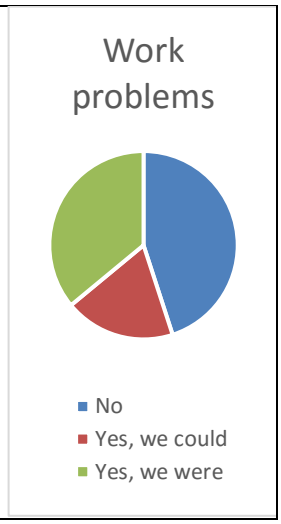
Item 3.- Have you had any problems with handling and editing content with the wiki during the development of the collaborative work report of the Seminar?	
Yes	36%
NO	64%
Total	100%



Once we have verified that approximately 86% of our students have not had previous experiences of working with Wikis, the following question posed: item 3: Have you had any problems with handling and editing content with the wiki during the development of the collaborative work report of the Seminar? The answer to this question we consider coherent that it has a significant inclination towards the yes (36%) (Table 2).

Table 3: Work problems

Item 5.- Have work problems developed with your colleagues during the accomplishment of the task?	
NO	45%
Yes, we could not solve them	19%
Yes, we were able to solve them	36%
Total	100%

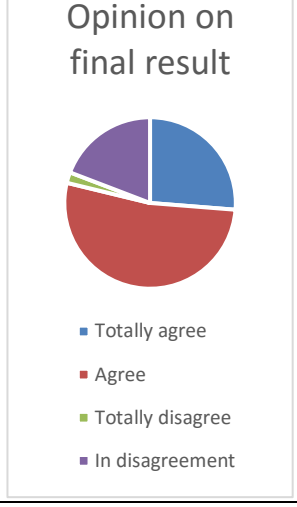


It supposes an important percentage of students with problems, in spite of considering the wiki as a tool of simple handling. Given that most of our students in the sample are freshmen, with a generally age of 19 and 20, we are surprised that they had technical difficulties, when most students were expected to have sufficient digital competence that would allow them to face this task without any difficulty. These results differ from the postulates proposed by Prensky [29].

From the data provided by the students in answering item 5. Have work problems developed with your colleagues during the accomplishment of the task? Were they solved?, We observed in Table 3, the fact that slightly more than half of Students of the course, exactly 55%, have had some type of problem when working with their peers (Table 3). .

Table 4: Opinion on final result

Item 6.- Do you think that the final result of the work could have been better?	
Totally agree	26%
Agree	52%
In disagreement	19%
Totally disagree	2%
Total	100%

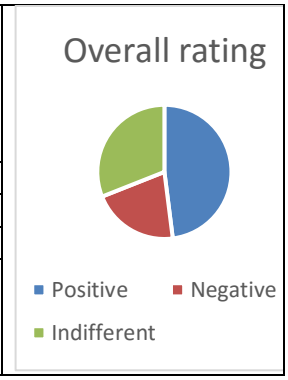


These results may incline us to think that the general evaluation of the wiki carried out by the subjects who have had some type of problem in the group work will be negative, and that, therefore, the hypothesis that we raised in the beginning of the investigation has a negative answer.

If we look at the results obtained in Table 4, with regard to the question: Do you think that the final result of the work could have been better?, we found results not balanced between yes and no while 78% of students respond in the affirmative, the remaining 21% otherwise. Therefore, we can affirm that more than 3/4 of the students consider that the final work could have been better than the final one.

Table 5: Overall rating

Item 7.- The general assessment that you make of the wiki as a resource for the accomplishment of collaborative works is:	
Positive	48%
Negative	21%
Indifferent	31%
Total	100%



The explanation to this question can be obtained from another item, related to the collaborative work among the students of the groups. We found that a large group of students started working on the wiki, for the next phases of the work, instead of being involved in the same, delegate in their comparers, trusting them to do their work; that is, going from being a collaborative work among students to a work done by

a part of that group, that is actively involved in the task. The results suggest that the assessment that some students of the wiki, as a didactic tool for use in university training contexts, is not appropriate (Table 4).

The final data for qualitative evaluation of the project come from those provided by students in tutorials, oral presentations while and after finishing the project, interviews with group members and students log books. All this evidence provides immensely rich qualitative data for final evaluation of the project (Table 5).

The use of wiki as a tool for collaborative work in the subject called 'School as an Organization', which is part of the University of Salamanca degree for Primary Education Teachers, did not present any implementation obstacles, as students had already followed a subject on ICT in a previous academic semester, which helped to sort out how wikis work for group work, and any kind of technical problem had already been clarified.

Wikis in Moodle use an HTML editor that should not pose any technical difficulties to insert pictures; however, and taking into account the high percentage of students who were unable to achieve, two main conclusions seem to be clear:

The new version of Moodle 2.6 incorporates significant technical improvements over previous versions, but it has some technical problems in its implementation. Some technical support from the university computer support service should be required to make the most of the tool.

When wiki as a collaborative working tool had been introduced in the previous ICT subject, most students considered unnecessary to spend much time working on the different options the tool provided. This lack of initial training was a hindrance later on in the project, and obviously it will have to be taken into account from now onwards in ICT lessons, working much more in detail all the tools offered by wiki in Moodle, so they are really confident in using it on any project where it is needed.

Most students involved in the project have also shared and exchanged ideas for the project while on campus, instead of using wiki as a working tool, they attend school on a regular basis and share lessons and leisure time on site, and this has influenced our project because they met to plan, get organized, decide on the relevant information for the project and agree on the components of their final report; and the wiki was finally used to upload the report.

The students' response to the initial proposal, which involved using wiki as a tool to develop a project in groups and with the possibility to work in the distance, shows that they are not used to it, and that they still prefer group work in face-to-face meetings.

At this moment there is a big difference between the wiki tool provided by Moodle and those other working tools, but in the future all these tools could be combined in a more effective way.

At the end of the process of this project, which involved the students´ use of wiki as a tool and later transferring results into a word processor, all technical problems identified by students were overcome: pictures were inserted, text was properly edited, and final drafting and reviewing processes were completed. A final concern for students was using the printing tool that Wiki provides.

This tool required some advanced control of word processors, and students in general decided to transfer the draft from their wiki into a current word processor and editing following University of Salamanca style guidelines.

The students found the combination of both convincing tools, and their main complaint had to do, as usual, with collaborative work, workload and effort achieved by members of the group, which does not always satisfy everybody.

Some groups had to put up with indolence from some member unwilling to cope with duties and tasks. About 15% of group members abandoned and did not complete the tasks, which had to be assumed by the other members of the group, reorganizing and adding extra work.

Most groups felt satisfied with final results, although some groups complained about how intensive that month had been, especially the fourth week. Combining this type of task with the rest of the subject requirements is a challenge for students, who have to make the most of themselves to work and meet deadlines.

A big concern working with the profile of students we get these days is the varied interests they have when they join this degree. There are students who have no interest, take once and again the subjects, and the quality of whatever they produce is really low.

4 CONCLUSIONS

In The use of online collaborative work using Moodle at the University of Salamanca aims at helping students develop skills and strategies for collaborative work which add to face-to-face classroom teaching. Online involvement rates in education actually are growing at much faster rates than the traditional classroom or face-to face learning; specifically, in higher education in all over the world [22].

Different studies have shown that wikis facilitate project-based learning, they may foster collaborative learning, motivate and help students to develop critical thinking skills, enable a deeper understanding of social studies, help preservice teachers to produce high –quality science materials, and develop pre-service teachers' generic skills [23]

Teachers must think of incorporating these new virtual environment tools in their teaching practice to support collaborative work with their fellow teachers. They will help collaborative work in situations where teachers work either in distant rural schools or in different town schools. Collaborative work tools incorporated into e-learning platforms are a valuable aid to the university professors.

The initial experiences of online collaborative work, using tools like wikis, developed with the students of the first courses at the University prepare students, in the improvement of the competences in research task, oriented to the last years of study of the Degree when they decide a subject to specialize.

The results of the surveys carried out, the students participating in the proposal of work on the School of the 21st Century show the potential of the wiki tool for the development of collaborative works within the Moodle platform.

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