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IMPROVING TRANSVERSAL COMPETENCES BY USING WIKIS IN COLLABORATIVE WORK

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Abstract

Work on transversal competences in university degrees is a teaching line entirely established since the implementation of the European Credit Transfer System (ECTS). Nevertheless, undergraduate students present shortcomings in the development of some of these competences, especially on collaborative work, time management, oral and writing expression, and on the use of information resources.

This paper presents a virtual tool and associated guidelines to enhance the information management during the development of collaborative works, and to facilitate the information availability among the students. Moreover, this tool and the guideline improve the individual monitoring and evaluation of the contributions of the students to the work.

The proposal presented in this work belongs to a teaching innovation project carried out in the Earth Sciences Faculty of the Universitat de Barcelona, and implemented in the subjects General Geology (first-year in the Engineering Geology degree, 6 ECTS) and Geochemistry (third-year in the Geology degree, 9 ECTS).

Keywords – Geology, Engineering Geology, Team working, Wiki, Oral communication.

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1. Introduction

A major educational aim in university degrees since the implementation of the European Credit Transfer System (ECTS) is the work based on transversal competences such as teamwork, oral and written communication or efficient use of the information resources among others. Working as a part of a team is one of the strategies carried out to achieve these competences (Gors, 2011; Pettenati & Cigognini, 2009). During the development of these collaborative works, students must perform a bibliographical search, summarize and organize information and present it in written works, technical reports, posters and / or oral presentations. One of the main deficiencies detected in the development of this type of work is the difficulty of students to develop collaborative work in teams. The general trend is to distribute tasks and to develop them individually, joining the results together at the end to obtain the whole outcome. Another weakness of the students in this type of work is the difficulty of managing the acquisition, the synthesis and the structure of the information and of performing a critical analysis of this.

This paper shows an experience based on the implementation of wikis in collaborative works in order to improve the aforementioned deficiencies and to successfully achieve the transversal competences. At the beginning of the course, lecturers inform the students about several rules to be followed and a planning of activities to be developed during the year. These are intended to enhance a collaborative work and thus, to avoid individualization of tasks. Moreover, the experience aims to improve the oral and written communication and to strengthen the use of reliable information resources. The experience presented is included within the teaching innovation project of the Universitat de Barcelona 2014PID-UB / 057.

The project started on September 2014 in the subject General Geology (first-year in the Engineering Geology degree). Teamwork was promoted by creating working groups of three or four students. At the beginning of the year, each group chose a theme from a list of topics proposed by the lecturers. Working teams then developed bibliographical works, which were presented in poster format. Finally, each group made an oral presentation about the contents of the work. General Geology course was chosen as a pilot test because it is a first-year subject, where new students do not know each other and do not know the university teaching system. Consequently, the difficulties of teamwork were expected to be higher than in subsequent years. For this reason, we considered that this subject was an excellent option to assess the effectiveness of this activity and to influence in the educational aspects of collaborative work at the start of the university studies.

During the academic year 2015-2016, the experience was repeated in the same context and it was also incorporated in another subject, Geochemistry, (third-year in the Geology degree). Both General Geology and Geochemistry are compulsory subjects but in Geochemistry, the group of students is well established and has a more consolidated work dynamics than the first-year students.

The strategy used to influence on the deficiencies detected (teamwork, acquisition and critical review of the information, oral and written expression), was the development of a wiki. Wikis provide numerous advantages in collaborative works development and evaluation (Ebersbach, Glaser & Heigl, 2006; Morcillo, López García, Angosto & Del Toro, 2014; Parker & Chao, 2007). This virtual tool contributes to an environment of collaborative writing, creating the ideal conditions for interaction and active participation in teamwork (Echazarreta, Prados, Poch & Soler, 2009; Judd, Kennedy & Cropper, 2010; Romero Frías, 2010). Wikis improve the information management and sharing, and facilitate the access at this information any time and anywhere. Moreover, wikis provide information about the students contributions (when and what students uploaded), facilitating the tutoring and evaluation processes (Trentin, 2008). This project allows us to evaluate the impact of the wiki into two groups of students with different characteristics.

2. Development of the experience/project

To achieve the main objectives several activities were carried out including tutorials scheduled throughout the year and partial deliveries, preparation of work content through a wiki by the working groups, delivery of final work (written memory and / or poster), oral presentation of the results and evaluation (self-evaluation and co-evaluation).

The following additional tools were also developed and made available to students:

- A detailed evaluation rubric (Table 1). This was intended as a guide for students in their learning process and as an instrument for assessing the achievement of the transversal competences.
- A guideline for monitoring and mentoring the works throughout the course.
- A manual of use and optimization of the virtual tool (wiki). This tool was created through the wiki platform Wikispaces (https://www.wikispaces.com) (Figure 1).

- A manual for scientific writing and designing posters (Argumenta 2006; Universitat de Barcelona, 2009).

The guidelines of activity in the two subjects comprised introduction to the collaborative work, face-to-face tutoring sessions, virtual tutoring sessions, oral and poster presentation, and evaluation (self-evaluation and co-evaluation).

Items		Unsatisfactory	Adequate	Notable	Excellent
Development (25% of the final grade)	Face-to-face and virtual tutoring	Without attending to the face-to-face tutoring sessions and no contributions at the wiki forum	Attending to some face-to-face tutoring sessions and/or sporadic participation at forum	Good attendance at the face-to-face tutoring sessions and active participation in the forum	Attending at all the face-to-face tutoring sessions, asking specific questions and participating actively in the forum
Content (25% of the final grade)	Wiki content. Information research and management	No contributions or contributions without interest	Some contributions but poorly scientifically contrasted	Interesting contributions but with some weaknesses	All contributions are relevant and interesting for the work. All contributions emerge from its own initiatives
	Poster content	Simple and non-contrasted information	The content shows a good understanding, but it has not worked enough	Clear information and showing reflection about the worked subject	Excellent information, showing a good understanding, reflection and conclusions about the subject
Formal presentation (25% of the final grade)	Poster structure	Confusing, incomplete and without clear direction and without following the guidelines of a formal scientific text (Introduction, development, conclusions, references, ...)	Correct content but poor relationship between sections. Lack of some section/s of a formal scientific text (Introduction, methodology, results, conclusions, references, …)	Good organisation and relation between the sections	Excellent organisation and relation between the sections following all the formal rules about the composition of a scientific text
	Poster design	It is not visually appealing (too small fonts, images of poor quality or too small, inappropriate colours...). Too much text with respect to graphic elements …	Not very appealing. Not very balanced design; some figures with poor resolution, gaps, too small text, …	Is visually appealing but with some weakness which break the balance of the design such as a low resolution figure, some too small text, …	It is very visually appealing. All text reads well. The distribution of sections allows a direct understanding of the content. The text and the figures have correct form and size

Items		Unsatisfactory	Adequate	Notable	Excellent
Oral presentation (25% of the final grade)	Verbal communication	The language used is not correct; with poor fluency and colloquial expressions, lack of technical vocabulary, speech unprepared and not creative	Expression and vocabulary deficiencies. Poor creativity and originality in the speech. Low fluency in the speech	Correct language. Correct and fluid transmission of the content	Very good speech and verbal fluency, use of specific vocabulary. Creativity and originality in the speech. Excellent and clear transmission of the content
	Nonverbal communication	Absent or excessive gesticulation, which difficult the transmission of the content. Fixed glance	Gesticulation during the speech is not appropriate. The glance or the gesticulation don't attract the audience	Correct gesticulation transmitting conviction	Correct gesticulation transmitting conviction and encouraging the audience. Glance directed towards all the audience
	Answers to the questions	Incorrect answers to the questions	Just answer some of the questions	Correct answers but with poor reasoning	Correct answers with good reasoning

Table 1. Evaluation rubric used in the academic year 2014-2015 in General Geology in Engineering Geology degree

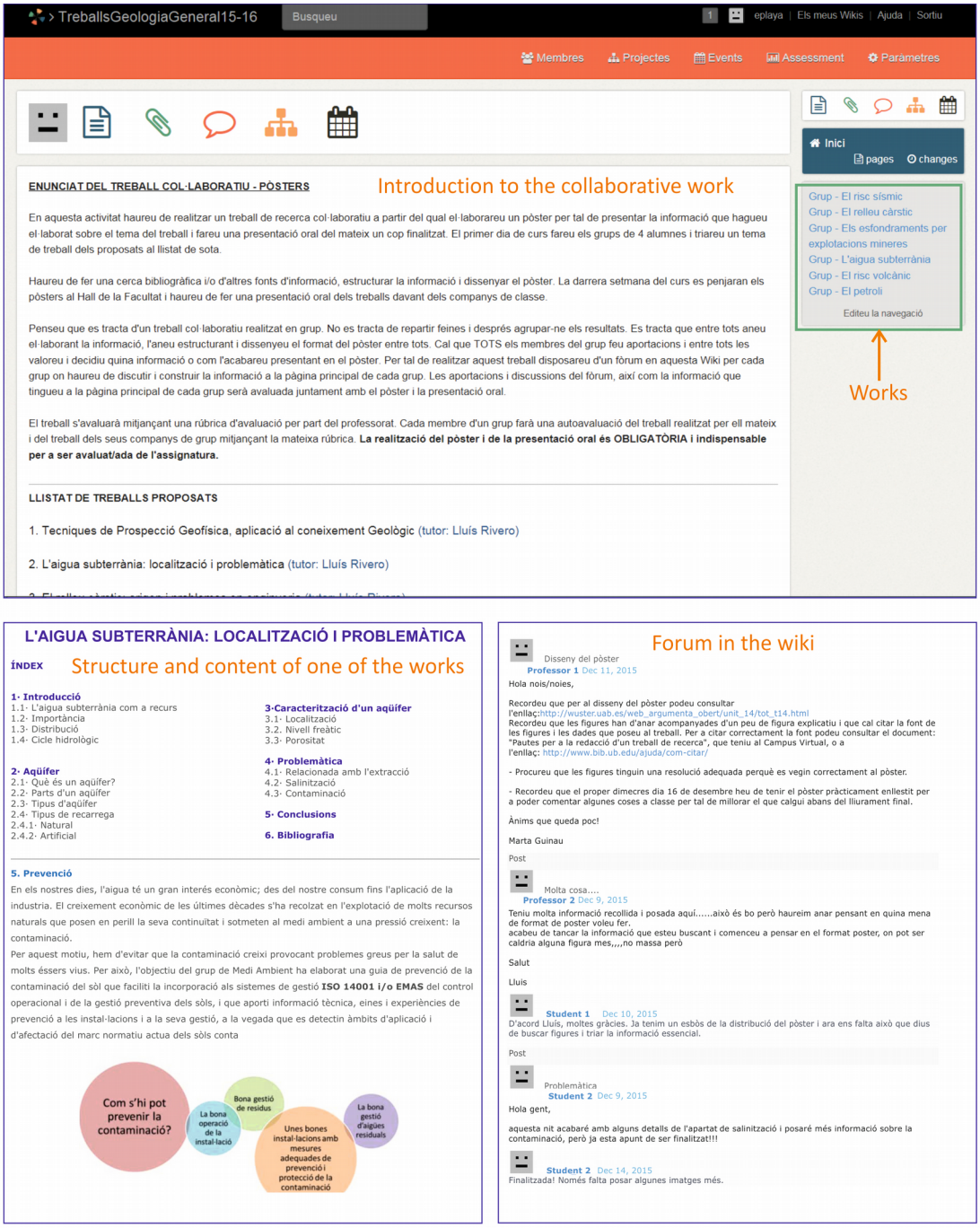


Figure 1. Example of the wiki created in www.wikispaces.com, with a main page (image above) where the collaborative work is introduced. The menu on the right bank contains the links to access to the pages of each work. The bottom left image presents an example of the structure and content of one of the works. The bottom right image shows the forum of the wiki with some messages of the students and the lecturer.

Introduction to the collaborative work

The first day of the course, which was devoted to the presentation of the course, lecturers introduced to students the collaborative work to be developed in groups of three or four students. Timescale, evaluation criteria and available tools were also exposed to them. Lecturers also explained the dynamics of the virtual tool, wiki, and proposed list of topics to be developed.

Face-to-face tutoring sessions

Two or three compulsory tutoring sessions were scheduled throughout the course. In the first sessions, students submitted a first index and a list of already consulted (or pending to be consulted) references. In the following sections the amount of deliveries or reviews of the works increased. In each session, lecturers and students revised the proposals of each group and resolved any doubts about content and development of each work.

Virtual tutoring sessions

Complementary to the face-to-face meetings, several virtual tutorial sessions were also scheduled. In these sessions, students virtually submitted parts of the works by using the virtual tool, wiki.

Oral and poster presentation

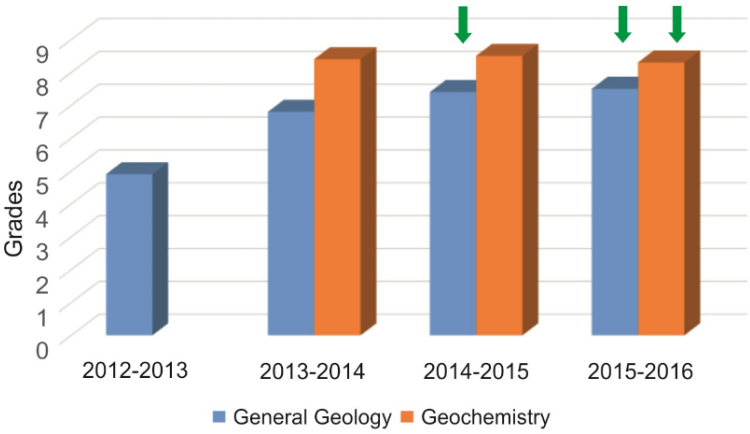
Written reports and/or posters were delivered and publicly exposed in the hall of the Faculty for one or two weeks. Each working group presented and discussed the contents of the poster with the lecturers and the rest of classmates.

3. Results, evaluation and discussion

3.1. Results

The academic results in the subject General Geology reveal a considerable improvement when compared with the results obtained by the students before the implementation of the innovation project (Figure 2). It should be noted however, that the approach of the teamwork at that moment was very different than the one proposed in the innovation project. At that time, the students had to develop a report about a fieldtrip, from the field data complemented by bibliographical information. The results of the resulting work were not at all satisfactory. Consequently, in the academic year 2013-2014 the orientation of the work changed, proposing the development of a topic related to the subject from literature search. This resulted in a

significant improvement in academic results, although there were still gaps in the achievement of certain generic skills such as conducting truly collaborative work, oral and written communication and use of reliable information resources. That is why there was a slight improvement in the quality of the works when comparing the results of the year 2013-2014 (when the innovation project had not started) with the results obtained two years later, when the wiki was already implemented (Figure 2). Although the final marks obtained in both subjects where the innovation project was developed do not show a considerable improvement, it can be stated that there has been a significant improvement in the way the work has developed. The implementation of the wiki, the tutorials scheduled throughout the year and the partial deliveries have greatly enhanced a truly collaborative work among students and the information management.



Subject	Academic year	Nº of students	Nº of works	Average Grade out of 10
General Geology	2012-13	31	9	4,9
	2013-14	26	7	6,8
	2014-15	13	4	7,4
	2015-16	22	6	7,5
Geochemistry	2013-14	47	12	8,4
	2014-15	32	8	8,5
	2015-16	36	7	8,3

Figure 2. Academic results in General Geology (first-year) and Geochemistry (third-year) before and after the implementation of the innovation project. In the graphic, green arrows pinpoint the years when the innovation project was implemented in each subject

The results of the student satisfaction poll evidence differences in the two subjects where the innovative project was developed. Figure 3 shows the responses obtained on the survey for both subjects, revealing that the students of General Geology (first year), without a previous established work dynamics, evaluate the wiki more positively than the students of Geochemistry (third year), which prefer the use of other tools that are more friendly for them such as social networks, Google Drive, etc.

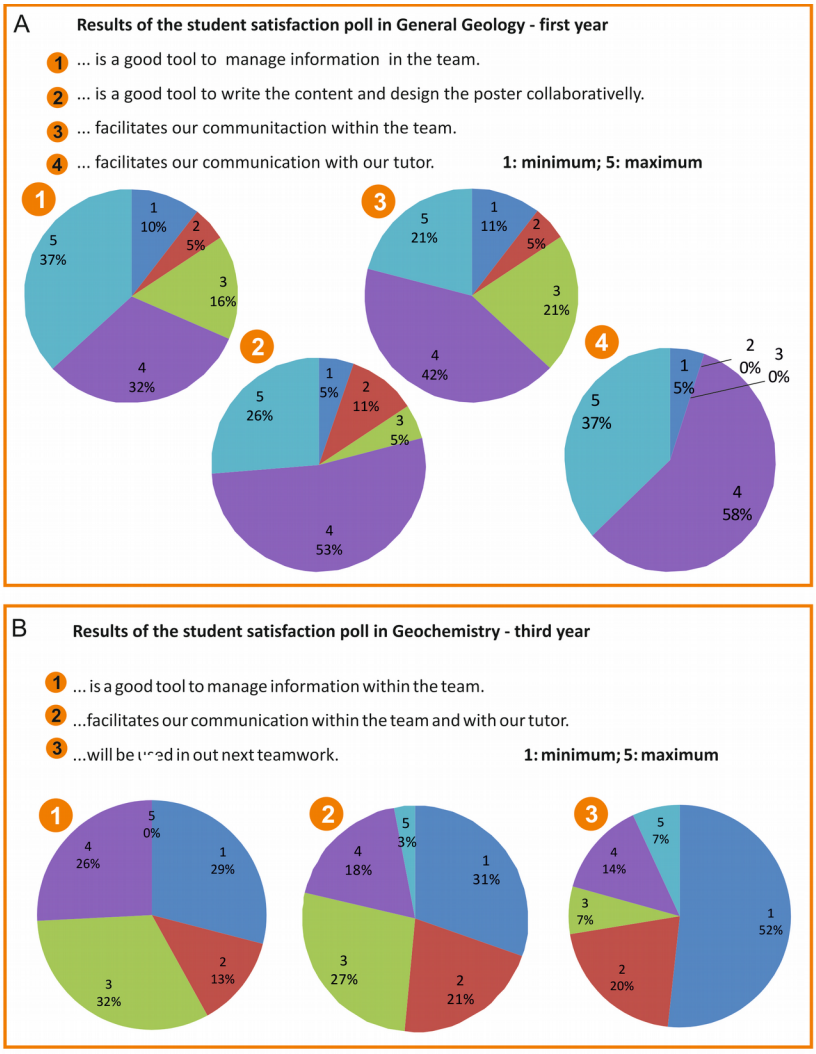


Figure 3. Results of the student satisfaction poll in the subjects where the innovation project was implemented. A. Results in the General Geology subject (first year in Engineering Geology degree). B. Results in the Geochemistry subject (third year in Geology degree)

3.2. Evaluation and discussion

The evaluation of the results of this project was done by the observation and assessment of: The number and quality of contributions to the wiki (editing content or forum contributions), the academic results (grades), and the comparison of these results with the ones obtained by the students before the implementation of this project, and the outcomes of the co-evaluation and self-evaluation.

Taking into account the former indicators, in our opinion the project successfully achieved the main proposed objectives. Several inputs contributed to the accomplishment of the aims of the project. These are:

- Evaluation guides, prepared by the lecturers, allowed the objective and equitable evaluation among the groups of students and were a useful reference for the students to develop the works.
- The report of the contributions of each student at the wiki was used as evidence for the individual evaluation and for the evaluation of the group dynamics. The statistical assessment and the comparison of the results obtained before and after the implementation of the project demonstrated an improvement of the works and in the achievement of the transversal competences regarded in the project.
- The evaluation guides for the co-evaluation and self-evaluation provided useful information to detect the correct attainment of the transversal competences.
- Both the face-to-face tutoring sessions and the virtual tutorial sessions were developed successfully. This was especially satisfactory for the first-year students, who initially lacked from a previous group dynamics. In the third-year groups, however, the use of the wiki was less effective, as students were used to work in a group environment using Google Drive.
- Regarding the forum tool for the communication among group members, there was an important gap in the use of this tool as a communication tool in both subjects. Students preferred face-to-face communication or WhatsApp. However, it was used satisfactory as a virtual communication instrument between students and lecturers in order to get the work back on track in certain situations or to guide the work development in the wiki.
- Concerning the efficient use of information resources at the end of the project, there were still considerable gaps in the search of information. Students tended to use virtual resources only, dismissing the bibliographic resources of the library. A proposal for future years is to provide a list of bibliographical titles of compulsory reading with the intention of accustoming students to consult books, articles and papers that can be found in the library of the Faculty or through Internet.

4. Conclusions

Although there is no considerable improvement in the academic results, the submission of the contents through the wiki platform, the virtual and face-to-face monitoring done by the lecturers and the poster and oral presentations improve the oral and written communication of the students. It has to be considered that the implementation of this innovation project is recent and it is probably too early to perceive the influence of this in the academic results.

The analysis of the answers obtained on the polls for the valuation of the satisfaction of the students about the wiki clearly reveals that they are satisfied with the virtual and face-to-face tutoring and with the group dynamics, but they are more critical about the use of the wiki as a communication tool among the group mates. For this purpose, they prefer to use other tools, which they are more used to, such as WhatsApp.

This project expose the usefulness of wikis as a virtual tool for collaborative works in the university, especially in the first academic year, where the students don't have a team work dynamic established. However, the use of wikis must be reconsidered, in advanced levels, considering other virtual tools such as Virtual Campus or Google drive, among others. Furthermore, it has been found that the approach of work as proposed in this project has improved the development of collaborative works avoiding the individualisation of tasks.

References

Argumenta (2006). *A manual for designin posters*. Retrieved from: http://wuster.uab.es/web_argumenta_obert/unit_14/tot_t14.html

Ebersbach, A., Glaser, M., & Heigl, R. (2006). *Wiki: Web Collaboration* (pp. 383). Germany: Springer-Verlag.

Echazarreta, C., Prados, F., Poch, J., & Soler, J. (2009). La competència "El treball col·laboratiu": Una oportunitat per incorporar les TIC en la didàctica universitària. Descripció de l'experiència amb la plataforma ACME (UdG). *UOCpapers*, 8: 13-23. Universitat Oberta de Catalunya. Retrieved from: http://hdl.handle.net/10256/2836

Gors, B. (2011). Aprendre i ensenyar en col·laboració. In *Evolució i reptes de l'Educació Virtual. Construint l'E-learning del segle XXI*. Ed. Gors, B. Editorial UOC.

Judd, T., Kennedy, G. & Cropper, S. (2010). Using wikis for collaborative learning: Assessing collaboration through contribution. *Australasian Journal of Educational Technology*, 26(3), 341-354. https://doi.org/10.14742/ajet.1079 http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.366.7453&rep=rep1&type=pdf

Morcillo, J.G., López García, M., Angosto, I., & Del Toro, R. (2014). Trabajo de campo con wiki y móviles: El caso de las nubes. (Field work using wiki and smartphone: A study of clouds). *Enseñanza de las Ciencias de la Tierra*, 22(3), 267-273.

Parker, K.R., & Chao, J.T. (2007). Wiki as a Teaching Tool. *Interdisciplinary Journal of Knowledge and Learning Objects*, 3. Retrieved from: http://www.ijklo.org/Volume3/IJKLOv3p057-072Parker284.pdf

Pettenati, M.C., & Cigognini, M.E. (2009). Designing e-tivitiesto increaselearning-to-learnabilitiese. *Learning Papers,* 12(12, February 2009). Retrieved from: www.elearningpapers.eu.

Romero Frías, E. (2010). El empleo de wikis en la docència universitaria: Resultados de una experiencia en Contabilidad. *Revista de Educación en Contabilidad, Finanzas y Administración de Empresas (The Spanish Journal of Accounting, Finance)*, 1(1), 43-58.

Trentin, G. (2008). Using a wiki to evaluate individual contribution to a collaborative learning project. *Journal of Computer Assisted Learning*, 25, 43-55. https://doi.org/10.1111/j.1365-2729.2008.00276.x

Universitat de Barcelona (2009). A manual for scientific writing. Retrieved from: http://www.ub.edu/geologia/geologia_i_llengua/estructura_un%20treball_de_recerca_setembre_09.pdf

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