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Training teachers for virtual collaboration: A case study

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Abstract

This study aims to explore the development of teachers' competences when trained in virtual collaboration. In order to do so, we analyse the data gathered from a group of nine in-service teachers who were trained in a forum and a wiki to become future telecollaborative teachers (TTs). During the course, participants worked in small groups and they had to carry out a series of tasks that included reviewing articles on virtual collaboration and implementing a hypothetical exchange. Quantitative and qualitative analyses were performed on the content from the forum, wiki pages and answers to an end-of-course questionnaire. Findings suggest that there is a relationship between successful collaboration and the development of the knowledge base and competences required by the TT. Therefore, ensuring that sufficient quality interaction takes place among group members is essential in order to encourage the emergence of sound and friendly relationships that will facilitate active participation and negotiation of meaning.

Introduction

The integration of virtual collaborative (telecollaborative) exchanges in the foreign language classroom has become increasingly popular in the last 20 years. The implementation of these exchanges worldwide entails engaging students in international communication and collaboration with partners of different cultures and in distant locations with the aim of developing both language skills and intercultural competence (Belz, 2004). Research has also shown the potential of this activity for developing learner autonomy (Fuchs, Hauck & Müller-Hartmann, 2012), pragmatic aspects through social relationships (Kinginger, 2000; Author, 2008) and multiple literacies (Guth & Helm, 2011).

In light of these potential benefits, it is not surprising that there is a growing interest among practitioners who wish to incorporate these exchanges into their lessons. However, organising and implementing collaborative learning online are not always easy and many teachers find themselves unprepared for the challenges this activity poses. According to O'Dowd (2013), the complexity of this activity refers to "many different types of online contact involving various educational contexts, types of partners, online tools and pedagogical approaches" (p. 4). Becoming a telecollaborative teacher (TT) entails developing the competences teachers need when engaging in virtual collaborative exchange and additional knowledge and skills are required when compared with other activities in traditional face-to-face learning settings. The TT also has to work in collaboration with one or more teachers from different cultures who are in distant locations which also requires additional skills. The importance of this specific aspect—achieving successful collaboration with other colleagues—should not be underplayed as many practitioners understand the teaching–learning process as highly individualistic, no doubt the result of their own education and training. Unfortunately, this lack of awareness of what the collaborative

Practitioner Notes

What is already known about this topic

- Training teachers through online collaborative exchanges has the potential for developing their intercultural and linguistic competences.
- Online exchanges can also foster the development of collaborative and digital competences.
- Collaborative learning is affected by social interaction and participation.

What this paper adds

- It examines the relationship between measures of participation and interaction and quality of contributions.
- It assesses specific organisational, pedagogical and digital competences required by the telecollaborative teacher.
- It explores the relationship between collaboration and the development of such competences.

Implications for practice and/or policy

- Understanding how the collaborative process affects the development of the teachers' telecollaborative competences.
- Providing teachers with empirical data to justify scaffolding participation and interaction in order to foster collaboration.
- Implications for research on online teacher education in terms of in(effective) collaboration and its impact on competence development.

process entails often results in teachers feeling reluctant to collaborate or not being able to support students effectively in their own collaborative process (Author, 2010).

Training teachers for virtual collaboration

An increasing number of studies (Dooly, 2010; Lewis, Chanier & Youngs, 2011; O'Dowd, 2015; Author, in press) have focused on how teachers can be trained to acquire and develop telecollaborative (organisational, pedagogical and digital) competences. Some of these studies (Stickler & Hampel, 2007) emphasise the importance of experiential use and the integration of specific technological modes in the teachers' own learning process in order to improve their knowledge, competences and preparation so that they can integrate technologies in their classrooms. Elaborating on this, some authors mention the importance of "exploratory" teaching practice and the need for "experiential modelling" in teacher education. This involves offering teachers the opportunity to become involved in virtual exchanges themselves in order to experience the processes and tools that they will use in their own classrooms (Guichon & Hauck, 2011).

The principles underlying these approaches to teacher education are based on socio-constructivist tenets about learning that emphasise the importance of social interaction for the construction of shared knowledge. This construction process requires active participation, interaction and reflection, and technologies are considered to be mediating tools. The main aim is to encourage participants' understanding of the pedagogical value of online collaborative experiences and motivate them to transfer this knowledge into the classroom (Dooly, 2009). Authors who have followed this experiential approach include Belz and Müller-Hartmann (2003) who present a self-reflective case study of participants' development "as teachers-learners of telecollaboration in telecollaboration" and Fuchs (2005) who describes a project between

Table 1: Profile of participants

	Spain (n = 5)	*Columbia (n = 2)*	*Cyprus (n = 2)*
Teachers of Spanish as a foreign language	1 male (Oscar)	2 females (Gloria, Angela)	1 male (Pablo), 1 female (Penelope)
Teachers of English as a foreign language	1 male (David), 2 females (Emma, Rosa)		
Teachers of French as a foreign language	1 female (Maria)		

preservice teachers located in two different countries who collaborated via email and chat to design a website for computer-mediated communication (CMC)-based language teaching. More recently, Antoniadou (2011) describes the challenges reported by learner-teachers in Spain who collaborated with preservice teachers in the U.S. via Second Life as part of their training to become teachers of English as a Foreign Language. Finally, Müller-Hartmann (2012) describes how future teachers in Germany and the US collaborated together via email and chat in order to develop their intercultural competence and knowledge base of Internet-mediated foreign language education. These studies suggest that training teachers online through engaging in experiential modelling can lead to better understanding the learning process and information and communication technology (ICT) tools affordances, and at the same time participants develop the necessary confidence to implement network-based activities in their classrooms.

Given the highly encouraging findings from previous research, in this study we decided to use an experiential approach to prepare teachers for virtual collaboration and foster their awareness of what successful telecollaboration entails through hands-on experience. We hoped that this practical approach would help them organise telecollaborative exchanges in their future classrooms.

Rationale

During the first semester of 2013, nine in-service teachers enrolled in the course entitled *Intercultural Collaborative Exchanges in Virtual Environments*, which was delivered online as part of a Master's degree on ICT by a distance learning university. The course was taught by a team of three instructors, one of whom is also the author of this paper.

Context and participants

The participants of this study were the above-mentioned nine teachers who were located in three different countries. All but one participant were native speakers of Spanish and they used this language to interact. The level of experience with the use of the technology was very similar and they had no previous experience in telecollaboration, although they were familiar and had used some ICT tools (blogs, wikis, Skype, Hangouts and Google+). Table 1 shows the number and gender of participants in each country. All names have been changed to protect the participants' identity.

Activities and tools

Over the course of 3 months, the teachers had to carry out a series of collaborative tasks, first as members of an online group in the forum of the university's e-learning platform and then in two smaller online groups in a wiki. The tasks were designed following O'Dowd and Ware's (2009) category of "collaborative task" for telecollaborative exchanges. According to these authors, collaborative tasks require learners "not only to exchange and compare information but also to work together to produce a joint product or conclusion [. . .] These types of activities bring about substantial amounts of negotiation of meaning both on linguistic and cultural levels as learners strive to reach agreement on their final product" (p. 178). In this study, students were asked to

Table 2: Description of tasks

	Unit	*Activity*
1	Introduction to CSCL & telecollaboration (contributions and discussion will take place in the forum)	Study and discussion of relevant aspects presented in resources(pre-training).
2	Models of telecollaboration (contributions and discussion will take place in the forum)	Comparison, analysis and critical evaluation of authentic data and samples taken from projects(pre-training).
3	Experiencing telecollaboration (in the wiki, on the group's page #1)	Working in groups: select, read, upload, summarise and review one article about CSCL on your wiki page. Comment and discuss articles with your group members and decide jointly on possible applications to your FL classroom.
4	Organising a telecollaborative project (in the wiki, on the group's page #2)	Decide with your group members how to organise your own exchange. You will need to include guidelines, activities and tools you would use and justify your decisions.
5	Developing tools for the assessment of telecollaboration (in the wiki, on the group's page #3)	Design a tool that allows you to assess different aspects of telecollaboration (eg, portfolio, learning diary, questionnaire, etc).

review articles on telecollaboration and analyse critically examples from authentic online exchanges and design tasks, guidelines and assessment tools to organise a hypothetical telecollaborative project. These tasks were aimed at fostering information exchange, comparison, discussion and reflection that would result in the creation of three wiki pages designed and edited jointly by all group members and whose content had to be the result of consensus and agreement among them. A summary of the tasks is provided in Table 2.

Participants worked on the university's e-learning platform for the first 3 weeks and work carried out during this time was considered to be pre-training as these tasks aimed at preparing the teachers for telecollaboration in the wiki. The role of the course instructors at this point was to provide questions for reflection, answer participants' queries, offer suggestions in order to solve problems and provide feedback on the participants' contributions.

Once the teachers had completed these initial tasks, they were asked to join a wikispace where they had to work in small groups (one with five members and another one with four) which were organised to include males and females and at least one representative from each of the three countries involved. In the wiki, participants were asked to carry out three tasks and detailed instructions and guidance on the basic concepts that should be covered were included on the wiki's home page. Each group was provided with three blank wiki pages on which to develop their entries and they were encouraged to use the discussion facility to interact with other group members. The final version made available to consult online can be found at http://telecollaborationuned2013.wikispaces.com/.

Method

The study was exploratory and attempted to find answers to two research questions:

1 Did the teachers develop collaborative behaviours in the wiki (learning process)?
2 In this context, did the teachers develop the competences required by the TT (learning product)?

In order to answer these questions, we first sent participants a message asking them for their permission to use the data stemming from their work for research purposes. Once consent was

Table 3: Categories of comments from content analysis (modified from Judd et al*, 2010)*

Category	*Description*
Reply	A comment in response to an existing comment
Collaboration	A comment that showed that the author was attempting to develop a shared understanding of some aspect of the page content. Explaining and elaborating. Seeking input and feedback. Reflecting and monitoring. Looking for consensus
Organization	A comment that showed that the author was attempting to organise the task or workload among his/her peers. Initiating activities, setting shared tasks and deadlines
Content	A comment concerned with factual content on or relevant to the target page. Providing information and feedback. Sharing knowledge
Editing	A comment that concerned some aspect of page editing or relevant to the target page
Individual	A comment directed at an individual
Group	A comment directed at the group generally

given, data were gathered from the messages in the forum, the history of the six (three per group) wiki pages and their corresponding discussion pages in order to analyse participation and interaction. In this study, we have used the following measures of participation: (1) number of page revisions, (2) number of messages posted by each student, (3) individual student's contribution to the activity of the group as a whole, and (4) timing of contributions in the forum and wiki pages. In order to analyse interaction among participants, we carried out a content analysis following a modified version of Judd, Kennedy and Cropper's (2010) coding scheme developed specifically for online collaboration. This modified version included further descriptors for the category "Collaboration" (explaining and elaborating; seeking input and feedback; reflecting and monitoring; looking for consensus) and a new category ("Organisation") and its descriptors (a comment that showed that the author was attempting to organise the task or workload among his/her peers; initiating activities, setting shared tasks and deadlines). Finally, we also added others descriptors in the "Content" category (providing information and feedback; sharing knowledge). The new scheme can be seen in Table 3.

A comment was coded into a category if part or all of it matched the description and all comments were scored in at least one of the categories. Each comment was coded by two researchers who worked together to discuss coding procedures and to code the transcripts. The level of agreement between the two coders was high (the interrater reliability coefficient was .87).

In order to answer the second research question, in addition to the content analysis from the wiki pages, we performed quantitative and qualitative analyses of the participants' answers to an end-of-course questionnaire which we designed to gather information about their perceptions regarding the competences that they had developed during the course. The questionnaire included 12 5-point Likert-scale questions and one open-ended question. We asked participants to include their names and to answer it as truthfully as possible because their answers would not have any reflection on their grades but would be used to improve the course and undertake research. The complete questionnaire can be found in the Appendix.

Results and discussion

Participation

The teachers sent a total of 276 posts to the forum and the wiki. They sent a total of 55 posts to the forum with an average of 585.3 words per message. In the wiki, the teachers carried out a total of 99 page revisions and contributed a total of 700 lines (sentences) to the wiki pages. They also sent a total of 144 discussion posts.

Group 1 posted a total of 134 messages. Within their group, there were 31 posts in the forum and they also made 103 comments to their wiki members. Group members made a total 61 revisions

Table 4: Summary of total activity by Group 1

Name	Page revisions in wiki	Text lines (no.)	Discussion posts in wiki	Posts in forum	Total posts	Total activity to forum and wiki (%)
Gloria	22	149	29	7	36	26.9
Emma	11	125	28	7	35	26.1
Maria	23	53	39	14	53	39.6
Pablo	5	40	7	3	10	7.4
Total	61	367	103	31	134	100

Table 5: Summary of total activity by Group 2

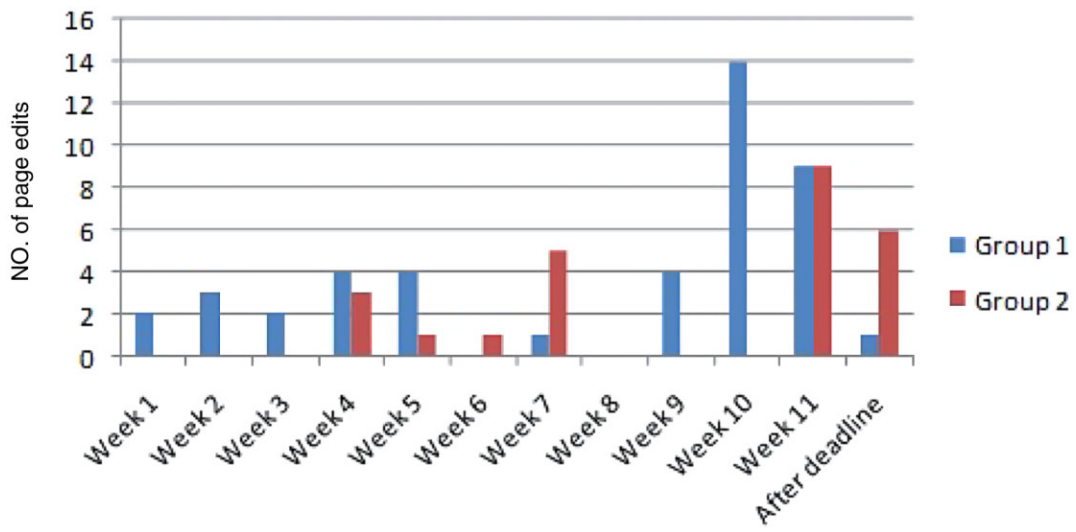
Name	Page revisions in wiki	Text lines (no.)	Discussion posts in wiki	Posts in forum	Total posts	Total activity to forum and wiki (%)
Rosa	12	93	11	2	13	20
Angela	8	103	8	5	13	20
Oscar	7	39	8	6	14	21.5
David	4	44	5	7	12	18.5
Penelope	7	54	9	4	13	20
Total	38	333	41	24	65	100

to their wiki pages, out of which 14 (23%) were essentially cosmetic, resulting in no change to the textual content of the page, while a further 8 (13.1%) involved changes to a single line (sentence) of text. We believe that this may have been due to the fact that participants were saving the pages a number of times during longer editing sessions. Out of the four members of the group, Maria posted most often (53) whereas Pablo posted the least (10). Maria made the largest number of revisions to the wiki pages (23) while Pablo only made five (see Table 4).

Group 2 posted a total of 65 messages—24 were posts sent to the forum and 41 were comments to their wiki members. This group made 38 page revisions to their wiki pages, out of which 11 (29% of the total) were made past the deadline. In addition, 10 (26.3%) were essentially cosmetic, resulting in no change to the textual content of the page, while a further 2 (5.2%) involved changes to a single line (sentence) of text. Within this group, Oscar made the most postings (14) and David made the fewest (12). Rose ranked highest in revisions to the wiki pages (12) whereas David only made four revisions (see Table 5).

Timing of contributions

We also examined the sequencing of the activity in the forum and the discussion pages as well as the timing of the revisions to the wiki pages for particular patterns of (in)activity. In the forum, 43 messages were sent within the task deadline and 12 were sent past the deadline. Most posts were sent during the first week and then they decreased regularly during the remaining 3 weeks. In the wiki, the comparative analysis of the sequencing of the activity between both groups showed some important differences. Participants in Group 1 started sending messages to their peers in the first week and posted regularly throughout the entire 8 weeks allocated to the tasks. Activity increased in weeks six and seven, which means that an intense level of activity started 3 weeks before the final deadline. In this group, Gloria, Emma and Maria were consistent and regular in their contributions, whereas Pablo was the least involved, posting erratically and nearly always at the end of all discussions. In addition to the wiki, participants in this group continued using the forum on the platform and they also used email and Skype when deadlines were drawing closer as a means to achieve consensus and solve disagreements quickly and effectively.



Colour online, B&W in print

Figure 1: Group comparative of temporal distribution of page revisions in the wiki over the time allocated for tasks

Participants in Group 2 also started sending messages to group members in the first week and continued doing so for the first 4 weeks. However, during this time they were not constant and posted erratically, bringing all activity to a complete stop for 3 weeks (5–7) before increasing again in week eight (the last week).

Regarding the timing of the revisions to the wiki page, there are also some noticeable differences between both groups. Group 1 was more consistent overall with their revisions and made more revisions earlier in the semester (10 in week one, 15 in week four) and towards the end (13 in week seven and 9 in week eight). Group 2 made most of the revisions (23) in the last week and after the deadline. Participants in Group 2 made no revisions at all for 3 weeks (5–7) and this period of inactivity coincides with that of the posts (see Figure 1). These trends in both groups are reflective of certain (in)effective group behaviours that will be further discussed in the next section.

Interaction

Using Judd *et al*'s (2010) modified coding scheme, we coded the participants' posts in the forum and wiki into seven categories (group or individual and others as applicable). As illustrated in Figure 2, in the forum participants engaged mostly in providing information, feedback and sharing knowledge (content category), and they interacted mostly with individual contributors. In the wiki, participants tended to address and include all group members in their replies, and they engaged more in organising while focusing also on seeking input and feedback from their group members in an attempt to build shared contributions (collaboration category).

As regards the comparison between both groups (Figure 3), Group 1 ranked highly on seeking input and feedback from group members (collaboration category) while also engaging in fair amounts of contributing (sharing information and knowledge for content building). Members in this group needed to comment often and regularly and they spent a lot of time looking for consensus among group members and also reflecting on other members' comments in order to write their final wiki pages.

Students in Group 2 engaged almost equally on seeking information and feedback from their group members (collaboration category) as they did on providing information and sharing

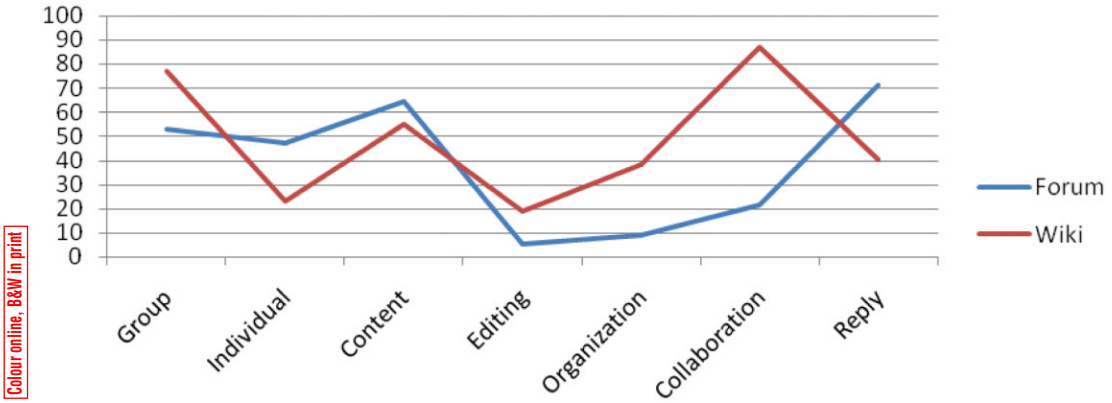


Figure 2: Total percentages of comments in each of the seven contextual categories (mean of two coders) from the forum and wiki

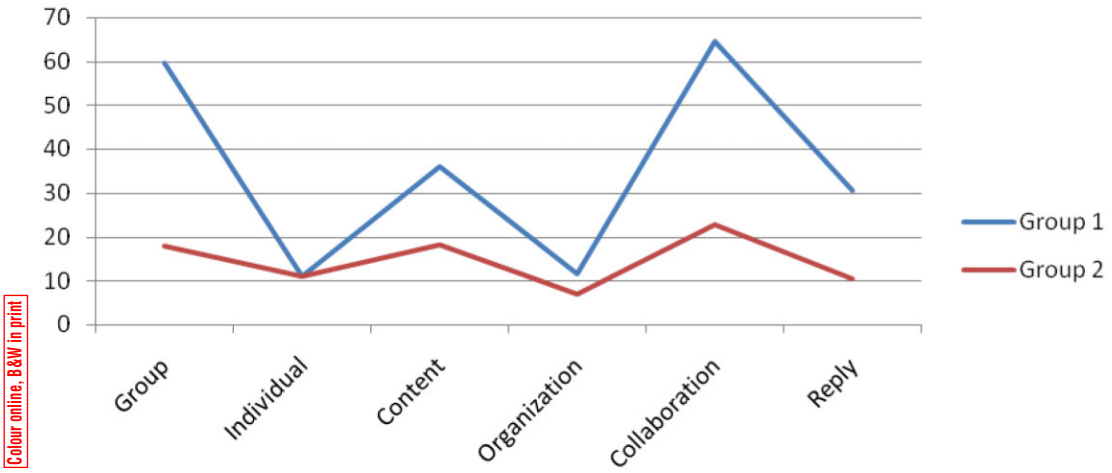


Figure 3: Percentages of comments in each of the seven contextual categories per group (mean of two coders)

knowledge (content category). However, neither of these activities ranked particularly highly. Participants in this group did not feel it was necessary to comment often and this, together with the fact that they stopped all activity for 3 weeks, may have had an impact on their collaborative performance also contributing to the perception that this group did not work well together. Participants in Group 2 did not look for consensus in order to write their final wiki pages, and only two participants (Angela and Rose) reflected on other members' contributions.

After analysing participation and interaction, we discovered that participants showed more collaborative behaviours in the wiki than in the forum. In the forum, the teachers engaged mostly in providing information, feedback and sharing knowledge (content), whereas in the wiki, participants engaged more in organising while focusing also on seeking input and feedback from their group members in an attempt to achieve consensus and build shared contributions (collaboration). The fact that the wiki seemed to foster collaboration and the forum failed to do so may be due to the inherent characteristics of the wiki as opposed to those of the forum (ie, an ability to edit repeatedly and jointly, an ability to track changes, use of the discussion facility). However,

other reasons will also need to be considered as, within the wiki, there were also clear differences between the collaborative efforts made by the groups, as we shall see next.

Quality of contributions

Although there were no roles assigned to the teachers in order to allow flexibility to change roles as needed (Strijbos, Martens, Jochems & Broers, 2004), in Group 1 we observed that leadership was shared among three of the group members (Maria, Emma and Gloria). These participants took turns to initiate and organise the tasks and also facilitated planning by providing suggestions on how to arrange the wiki pages. They also shared knowledge and personal experiences and were highly proactive:

> We still have to write about our experience and what we have learned regarding the collaborative process developed in the wiki. I think that we could start by posting our reflections on the discussion pages and then add the information to the conclusion page after reaching a consensus. (María, May 15)

Maria contributed the largest number of postings in organising work, sharing knowledge, explaining and feedback seeking (44 postings, 37.6% of all postings made by the group members). The next highest numbers of postings from her group's members were Emma (33), Gloria (30) and Pablo (10). From these postings we can see that Maria, Emma and Gloria were trying hard to collaborate and facilitate collaboration among group members: "When you are ready we'll continue the discussion and make a decision concerning what type of tool we can develop" (Emma, May 10). They were also concerned about Pablo who was often missing from the group's discussions, were positive and encouraging with one another, and highly appreciative of their joint efforts:

> As regards the content and explanations we provided I think our questionnaire is a very useful tool, thanks a lot, I think we did an excellent job. (Gloria, May 21)

An analysis of the quality of task content showed that these three teachers, besides developing knowledge base, had also achieved a good understanding of what telecollaboration entails. This can be seen in their contributions which, in addition to incorporating their own experience, were often reflective and took a critical stance towards different aspects of telecollaboration they had learned and researched about:

> [In this article] I find the students' negative attitude towards having to write a learning diary interesting since I've experienced the same with my students. They find it really difficult to understand the usefulness of tools that facilitate reflection on their own learning. I think that this kind of tool requires a change of perspective in the students and we, as their teachers, should facilitate it. (Maria, April 10)

Analysis of Group 2 contributions showed that, similar to the findings in Group 1, there were three teachers who also became the leaders in the group. Rose, Penelope and Angela took turns to initiate each one of the tasks. They sent comments providing suggestions on either how to plan the task or organise the wiki page and contributing information. However, in contrast to the dynamics observed in Group 1, these teachers received either no response or late responses to their comments from the other group members. This forced them to go ahead and organise the wiki page and contribute with little feedback from their peers:

> I'm going to make my contribution and summarize the article titled "Intercultural communicative competence through telecollaboration." Since nobody answered me I assume that you are not interested in reading this article and that you are happy to let me review it. (Rose, April 3)

Out of these three students, two (Angela and Rose) also tried hard to encourage collaboration by asking repeatedly for input and feedback. They urged other members to contribute, but some of their requests were left unanswered and others were answered late. Each of them contributed the largest number of postings in organising work, sharing knowledge, explaining and feedback seeking (13 total postings in these categories, 23.2% of all postings made by the group members). The next highest numbers of postings from their group's members were Penelope (10), Oscar (9)

and David (7). Despite having a similar number of posts in these categories, the working dynamics of this group's members were very different. This can be observed in the first two tasks in which two students (either Rose and Angela in task one or Penelope and Angela in task two) would collaborate together and do most of the work on the wiki page. The rest of the group members would contribute by sharing knowledge, providing input or offering feedback when most of the task had already been done. Thus, lack of timely response and the late contributions sent by some of the group members resulted in comments which expressed resentment on the part of the students that had done most of the work: "You can include it [the information] if you like. I sincerely thought that we had already finished the task but go ahead" (Angela, April 15).

The lack of effective collaboration among group members clearly affected group dynamics and led Angela to suggest, when planning task 3, that individual names appeared at the end of each contribution so that participation and authorship were visibly registered:

> I suggest that we start working on our conclusions on this page. We could include the eleven questions for reflection suggested by the instructors and then answer each one of them. We should write our names at the end of our contributions so that there is a register of our participation [. . .] what do you think? Let's get down to it! (Angela, May 20)

After this point there were no further attempts to collaborate. Group members did not strive to achieve consensus and there was no joint reflection on their contributions.

As regards quality of task content, teachers in Group 2 showed that they had also developed knowledge base about telecollaboration. They showed that they had read the materials thoroughly and were familiar with all the concepts introduced and examples analysed in the course. However, most of their contributions were theoretical and did not show reflection or critical insight regarding either aspects of telecollaboration or their own learning experience as telecollaborators.

The analyses of measures of participation and interaction and quality of contributions reveal that although both groups saw the emergence of a shared leadership among three of the group members, group dynamics were very different in both groups and this affected the learning product. Leaders in Group 1 behaved in a more democratic way, taking the initiative but also responding promptly to one another's requests for feedback and input, trying hard to achieve consensus, and encouraging and motivating the rest of group members. In Group 2 shared leadership meant initiating the tasks either by providing suggestions on how to plan the task or organise the wiki page or by sharing knowledge. However, lack of (prompt) response when asking for feedback or input meant that the leaders in this group went ahead and made individual decisions in order to finish the task. Discussions among all group members and comments were few and far between, and the priority for these teachers was to finish the task rather than foster social interaction and collaboration among peers.

Most members in Group 1 maintained collaboration throughout the semester and seemed to enjoy working together. They were remarkably constant in their work, being productive virtually every week, and contributing regularly, extensively and within the deadlines. Members in this group did more sharing, complimenting, looking for consensus and organising. They revised their wiki consistently throughout the semester and the final version of their wiki pages show awareness, critical stance and reflection about different aspects of their telecollaborative experience. Most members in Group 2 did not succeed at collaborating despite serious attempts by two group members. They showed a more individualistic approach to task completion, limiting themselves to providing information and sharing knowledge without discussing ideas or looking for feedback or consensus. Most members in this group were happy to contribute from time to time in order to meet the tasks' requirements rather than develop a more equitable, consensual and comprehensive group submission that would require more constant collaboration with the other group

Table 6: Questionnaire items with group average responses

	Group 1	*Group 2*
Q1	5	4.8
Q2	5	5
Q3	4.75	3.8
Q4	5	4.2
Q5	4.5	4.4
Q6	4.75	3.8
Q7	4.25	4.6
Q8	5	4
Q9	4.75	4.2
Q10	4.5	4.2
Q11	5	4.6
Q12	4.75	4.4
Mean	4.77	4.33
SD	0.249	0.374

members. Furthermore, contributions by some members were made late in the activity and very close to the deadline which, besides causing tensions between two members, also meant that participants would have had limited opportunities to interact with other members of their group.

Answers to the questionnaire

In order to find answers to the second research question, we elicited responses from all nine teachers who answered all 13 questions. Group average responses to the 12 5-point Likert-scale questions (1 = strongly disagree, 5 = strongly agree) were analysed quantitatively, reporting simple descriptive statistics (Table 6). Group 1's results showed there was consistent agreement regarding knowledge base and competences developed during the course ($M = 4.77$, $SD = 0.24$) whereas group 2 showed less agreement and more dispersion in their answers ($M = 4.33$, $SD = 0.37$). A paired-sample t-test was conducted to compare results in both groups which showed these differences to be statistically significant at $p \leq .05$ ($t\ (12) = -3.55$, $p = .004$).

We then grouped the 12 items in the questionnaire according to the type of information they elicited following O'Dowd's (2013, pp. 9–10) taxonomy of competences of the TT into organisational, pedagogical and digital competences. Finally, we analysed answers to question 13 in which we requested feedback about their experience as telecollaborators on the course.

The teachers' perceptions regarding their organisational competences as TT (Figure 4) were that, after course completion, all of them (9) had learned about the different models of telecollaboration and the differences among them (Q1), and could design the structure of a telecollaborative exchange to suit their students' needs (Q5). Eight teachers responded that they could explain their plans and expectations for the exchange clearly to their partners (Q4) and seven stated that they could maintain successful collaborative/working relations with their partner during the exchange (Q6), while the other teachers remained neutral. Interestingly, it is precisely the question which refers to collaborating with others (Q6) that obtained the lowest results. The lowest answers were given by two teachers in Group 2 ($M = 3.8$, $SD = 0.74$ vs. $M = 4.75$, $SD = 0.43$ given by the teachers in Group 1).

As regards their pedagogical competences as TTs (Figure 5), all teachers responded that they had learned how to integrate telecollaborative exchanges in the classroom (Q7) and that they could find or create tasks that would facilitate attaining some of the learning objectives from their face-to-face lessons (Q8). All nine participants also agreed that they could develop assessment procedures to assess the activities and tasks carried out during the exchange (Q10) and that they

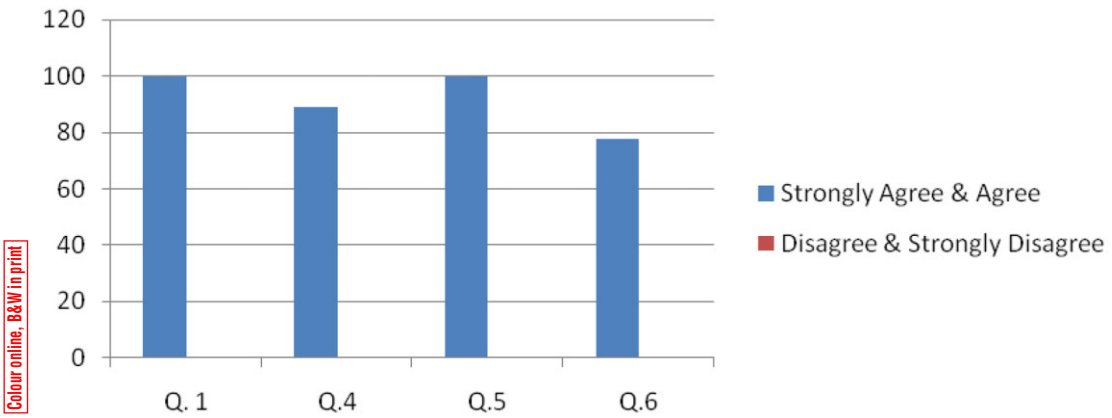


Figure 4: Participants' perceptions of their organisational competences as telecollaborative teachers

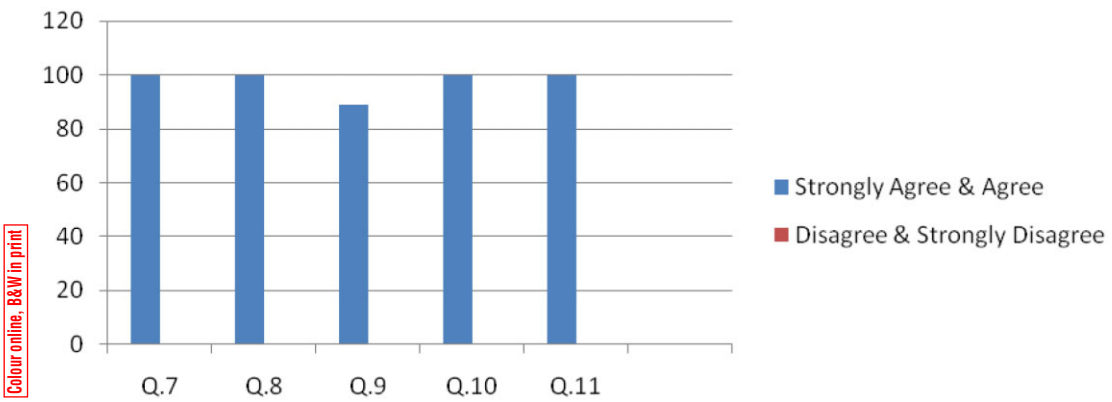


Figure 5: Participants' perceptions of their pedagogical competences as telecollaborative teachers

were capable of providing help to participants in telecollaborative exchanges (Q11). There was less agreement in question number 9, where eight teachers said that they could design tasks that fostered collaboration among students while one remained neutral. Similarly to the findings from question 6, the question that obtained the lowest results was also linked to fostering collaboration, in this case through task creation. The lowest scores to this question were also given by two teachers in Group 2 ($M = 4.2$, $SD = 0.74$ vs. $M = 4.75$, $SD = 0.43$ given by the teachers in Group 1).

The teachers' perceptions of their ICT/digital competences (Figure 6) reflected that all of them had familiarised themselves during the course with different ICT tools (Q2) and knew how to choose the most adequate ICT tools to achieve the exchange's objectives and those of the students (Q13). Question 3 showed less agreement among participants, with seven participants agreeing that they knew how to use web pages to find partners in other countries and two remaining neutral (perhaps uncertain) about this aspect. The lowest scores to this question were given by two teachers in Group 2 ($M = 3.8$, $SD = 0.74$ vs. $M = 4.75$, $SD = 0.43$ given by the teachers in Group 1).

Finally, we analysed the participants' comments to question 13 where they were asked to comment on their experience as collaborative teachers on the course. The teachers' comments

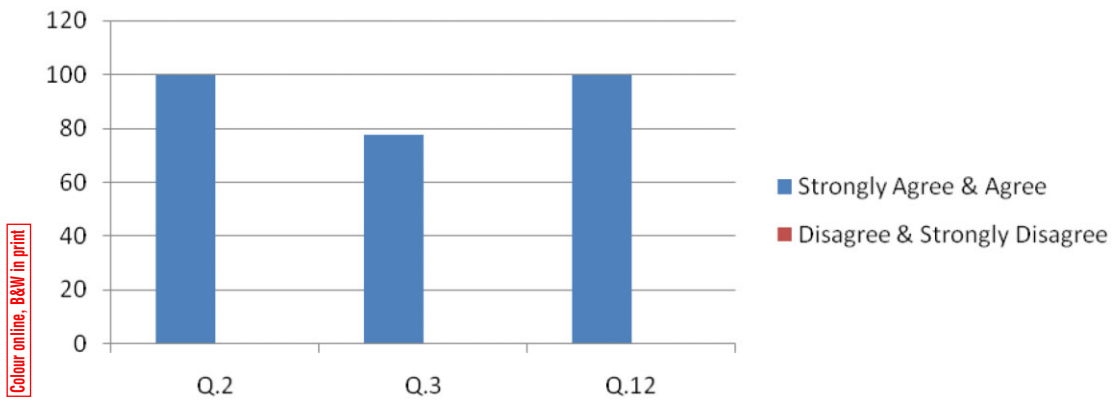


Figure 6: Participants' perceptions of their ICT/digital competences as telecollaborative teachers

showed that they were surprised at how difficult it was to actually engage in telecollaboration. They described the experience as an "eye-opener," "gratifying and revealing," "very positive and stressful," and also commented on those aspects that proved particularly difficult in the collaborative process. Thus, "having different levels of commitment to the tasks," "lack of active participation," "having different time schedules," "having to rely on partners (as opposed to instructors) for feedback," "organising and deciding on work dynamics," "having to solve problems in order to meet deadlines," "needing a high level of commitment in the telecollaborative group" and "organising collaborative work dynamics" were all highlighted.

Conclusions

This study presents certain limitations that need to be considered. The small size sample means that this study does not provide conclusive recommendations, but thoughts for pedagogical implementation and further research. The fact that participants were all in-service teachers may have had an impact on the time they had available for task completion so that, if replicated under different conditions, results may have been different. Despite these limitations, the findings in this study suggest that exploratory practice can allow teachers to acquire the knowledge base and competences required by the TT. Furthermore, there seems to be a relationship between successful collaboration and the development of these competences, because not all the teachers were equally successful at developing specific organisational or pedagogical competences. Analyses of participation, interaction and content indicate that the success of collaboration depended largely on the group members themselves, similar to findings by Arnold *et al* (2009). However, although the quantity of interaction plays a role in establishing social presence, the quality of interaction is more important and it must be a clearly designed goal (Garrison & Cleveland-Innes, 2005). As some authors emphasise, for learning to take place there has to be "interaction as a social activity," which Wang (2004) defines as "a socially reciprocal action involving two or more people" (p. 91). Therefore, ensuring that sufficient quality interaction takes place among group members is essential in order to encourage the emergence of sound and friendly relationships that will also facilitate active participation and negotiation of meaning.

It was also surprising to discover how some of the teachers dealt with the difficulties arising from online collaboration, as one might have expected teachers to look at the telecollaborative experience from a model-learning point of view—more so perhaps than other learners. In order to deal with this challenge and help participants build trust among themselves and a sense of responsibility towards group members, teacher educators might consider creating the groups early in the course and putting participants in touch online to enable them to get to know each other and

each other's contexts. This can also be addressed by designing an extended introductory phase with social tasks to develop group cohesion (Belz & Müller-Hartmann, 2003).

Results also indicate that an analysis of participants' interaction and participation can signal (in)effective collaborative behaviours which affect the acquisition of the competences required by the TT. In this study, those teachers who engaged in successful collaboration gave priority to fostering social interaction over finishing the task, while collaborative group behaviours were characterised by consistent participation, prompt communication, regular group discussion, timely and relevant contributions, and commitment to the task (task organisation, joint responsibility). Taking these findings as general indicators of successful collaboration, in future courses we intend to scaffold interaction to ensure that participation effectively turns into collaboration. Thus, scaffolding would apply not only to task support (Michell & Sharpe, 2005) but also to participants' interaction through social presence. Scaffolding interaction may also be useful in those cases where students cannot manage to develop mutual support through collaboration, as it happened to members of Group 2 in this study.

Participants also need to reflect on the contribution of this collaborative experience to their own understanding and teaching. Therefore, introducing a task that requires participants having to implement an actual telecollaborative exchange in their classes as part of their training could aid this process and reveal whether they are capable of applying what they have learned to their own teaching.

Finally, although triangulation of quantitative and qualitative data offered a fairly comprehensive insight into the complex processes of experiential virtual collaboration, these preliminary findings also highlight the fact that further research is needed to enhance the reliability of findings. Therefore, in future research, we intend to use a combination of ICT tools to discover whether asynchronous and synchronous communication affect scaffolding of interaction and therefore collaboration. We also plan to investigate whether engaging in online collaboration has an impact on the type of knowledge and skills (declarative or procedural) developed by participants who engage in experiential learning.

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Statements on open data, ethics and conflict of interest

The wiki's final version made available to consult online can be found at http://telecollaborationuned2013.wikispaces.com/. All names in this study have been changed in order to protect anonymity. There is no conflict of interest in the work being reported here.

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Appendix

End-of-course questionnaire

We would be very grateful if you could answer this questionnaire and show your degree of satisfaction with what you have learned as telecollaborative teachers during this course.

The telecollaborative teacher (TTT)	*Completely disagree*	*Disagree*	*Neither agree nor disagree*	*Agree*	*Completely agree*
1. TTT knows the different telecollaborative models and the differences among them.					
2. TTT is familiar with asynchronous and synchronous ICT tools.					
3. TTT knows how to use web pages in order to find partners in other countries.					
4. TTT can explain clearly to his/her partner his/her plans and expectations for the exchange.					
5. TTT can design the structure of a telecollaborative exchange (objectives, language use, tasks) that suit his/her students' needs.					
6. TTT can maintain successful collaborative/working relations with his/her partner during the exchange.					
7. TTT knows how to integrate the telecollaborative exchange in the subject or course s/he is teaching.					
8. TTT can find or create tasks for the telecollaborative exchange aimed at achieving some of the learning objectives of his/her face-to-face lessons.					
9. TTT can design tasks that foster collaboration among students.					
10. TTT can develop assessment procedures that reflect the activities and tasks carried out during the exchange adequately.					
11. TTT can provide the help (linguistic, technological, cultural, procedural, etc.) that the participants need.					
12. TTT knows how to choose the most adequate ICT tools (eg, email, blogs, wikis, skype, etc.) to achieve the exchange's and the students' objectives.					
13. Finally, we would like to know your experience as a telecollaborative student-teacher on this course.					