Telecollaboration to Improve CLIL and TPACK Knowledge: Aid or Hindrance?[1]

El uso de la telecolaboración para la mejora del conocimiento de AICLE y TPACK: ¿ayuda u obstáculo?

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Abstract: This paper reports on a pilot study on the use of telecollaboration to develop TPACK through the joint analysis of CLIL units created by groups of teacher trainees. The instruments to collect the data were a questionnaire, chat transcripts and a voice recording. Quantitative and qualitative data were analysed to explore type of TPACK episodes taking place, type of telecollaboration, changes or suggestions for improvement of CLIL units, and perceived advantages and constraints of the telecollaboration. Results suggest students' attention focused on technology while talking about the telecollaboration, but on pedagogy and content when talking about the unit.

Keywords: telecollaboration; TPACK; CLIL; teacher education.

Resumen: Este artículo describe una experiencia piloto sobre el uso de la telecolaboración para el desarrollo del TPACK a través del análisis de unidades didácticas creadas por grupos de futuros maestros. Los instrumentos usados fueron un cuestionario, transcripciones de chat y una grabación oral. Se exploró el tipo de episodio TPACK, el tipo de telecolaboración, los cambios o sugerencias de mejora de la unidad, y los beneficios y problemas percibidos. Los resultados sugieren que la atención de los estudiantes se dirige a la tecnología cuando se habla de telecolaboración, pero hacia la pedagogía y el contenido cuando el foco es la unidad didáctica.

Palabras clave: telecolaboración; TPACK; AICLE; formación de profesores.

INTRODUCTION

The evolution of ICT has allowed foreign language education to extend beyond the geographical limitations and traditional communities of the classroom. Many studies have reported the benefits of such connections to the real world, and one of the multiple possibilities has been the connection among learners from different locations in what has been termed telecollaboration.

Telecollaboration has been shown to be an effective way not only of connecting learners and teachers for the purposes of developing their language but also for the advancement of pre-service teacher trainees' language teaching skills and knowledge. Relevant research studies have demonstrated telecollaboration can bring about linguistic (Bueno-Alastuey, 2010, 2011; Vinagre & Muñoz, 2011) and intercultural competence gains (O'Dowd, 2003, 2007; Vinagre, 2008, 2010). Other authors have also reported that it contributes to the enhancement of trainee teachers' digital skills (Jauregi, de Graaff, van den Bergh, & Kriz, 2012; Guth & Helm, 2012) as well as to their teaching with technology (techno-pedagogical) skills (Dooly & Sadler, 2013).

The advantages of telecollaboration are inscribed in current educational theories based on sociocultural views of learning, which highlight the dialogic and mediated nature of knowledge development (Lantolf, 2000; Vygotsky, 1978). Within such a perspective, distance telecollaboration projects can facilitate learning through the provision of interaction opportunities using computer technologies which serve as mediating tools between the learners/partners in their dialogic exchanges.

Recent research on telecollaboration has explored its potential in the field of teacher training, signaling that telecollaboration can provide trainees with a dialogic space which will facilitate the development of their techno-pedagogical-content skills (henceforth TPACK, Koehler & Mishra, 2009). Given the current need of teachers to be able to teach with technology (Chapelle & Hegelheimer, 2004), telecollaboration projects offer opportunities to experience digital technologies in language education and to reflect on their affordances and the challenges related to their implementation (Bueno-Alastuey & Kleban, 2014).

Furthermore, if the task is related to their content pedagogical knowledge (for example, a discussion on their knowledge of Content and Language Integrated Learning (CLIL)), these kinds of projects can have an impact on trainees' TPACK. This framework highlights the complex relationships that exist between content, pedagogical and technological knowledge areas and it is used for defining what it is that teachers need to know to integrate technology effectively (Archambault &

Crippen, 2009). This kind of knowledge will be a valuable asset to strengthen pre-service teachers' capacity to develop effective programs for bilingual education.

The development of teaching with technology skills within telecollaboration projects has been given some attention in previous publications (Antoniadou, 2011; Hauck, 2007), but telecollaboration as a way of enhancing trainee teachers' online and offline language teaching skills has hardly been explored (Dooly & Sadler, 2013). Furthermore, providing telecollaborative tasks with pedagogical content can aid further in the development of TPACK. Since in cases of telecollaboration for teacher training projects, pre-service teachers engage in acts of pedagogical reasoning such as comprehending, transforming of texts and tasks, formulating instructions and reflecting on their pedagogical knowledge (Shulman, 1987), it is worthwhile to investigate how such pedagogical and techno-pedagogical reasoning and actions are developed in the context of distance collaboration.

Moreover, although there is evidence that the collaboration included in these projects leads to positive effects in terms of increased teaching expertise (Dooly & Sadler, 2013), more studies that explore the content of distance telecollaboration exchanges are needed.

Telecollaboration and clil

Telecollaboration projects have been reported to offer many linguistic benefits to foreign language students, including non-native pre-service foreign language teachers, for example the improvement of oral (Bueno-Alastuey, 2013; Lee, 2007; Tian & Wang, 2010) and written language skills (Guth & Marini-Maio, 2010; Wylie 2010), authentic language practice (Bueno-Alastuey, 2010, 2011; Polisca, 2011), and increased motivation (Jauregi & Bañados, 2008). They also 'can enrich and internationalize the teaching and learning experience of language and culture, placing it in a real sociocultural context' (Jauregi & Bañados, 2008, p. 202).

All the aforementioned benefits can impact on non-native pre-service teachers' linguistic fluency and proficiency in a positive way (Grosbois, 2011). Furthermore, telecollaboration endeavors can also contribute to the development of teacher trainees' TPACK (Koehler & Mishra, 2009). This knowledge has been defined as 'a representation of the knowledge required to use technology in an educational setting in ways that are contextually authentic and pedagogically appropriate' (Abbitt, 2011, p. 281).

Telecollaboration projects which were originally planned to provide experiential use of technology for language learning in pre-service training courses have been found to bring about improvements of technology-related competencies. For

instance, Antoniadou (2011) noted teacher trainees' satisfaction with the positive impact of learning to use specific technology and on 'experiencing the potential of integrating technology and network-based instruction in their teaching' (p. 248), while Hauck (2007) reported that students improved their general ICT skills as a result of using the digital tools necessary for participating in a telecollaborative exchange.

The first hand experiences which pre-service teachers can gain when experiencing telecollaboration enable them to become aware not only of available communication modes but also of their respective affordances (Furstenberg, Levet, English, & Maillet, 2001; Hauck, 2013; O'Dowd, 2003, 2007). Moreover, telecollaboration allows teacher trainees to critically reflect on practical applications of diverse communication tools and to enhance their teaching competence (Dooly & Sadler, 2013; García Esteban, 2015) by increasing pre-service teachers' awareness of issues related to telecollaboration projects' design and implementation (Bueno-Alastuey & Kleban, 2014). Such tasks offer teacher trainees real experiences related to facing and solving the problems inherent to using technology, which can 'strengthen [pre-service teachers'] self-confidence in dealing with technical problems and other challenges related to technology integration' (Schmid, & Hegelheimer, 2014, p. 10), while trainees are 'still within a supportive environment' (Dooly, 2009, p. 4).

The development and expansion of CLIL in Europe and around the world has served to increase the prominence of L2 and foreign languages in school curricula, and it is being promoted in most education systems as a way to enhance bilingual education. Coyle, Hood & Marsh (2010) describe CLIL as "a dual-focused educational approach in which an additional language is used for the learning and teaching of both content and language" (p. 1). Even though the current development of CLIL has produced much research on content and language integrated learning (Ruiz de Zarobe & Cenoz, 2015), there are important gaps in how to make it more effective (García Esteban, 2013). Classroom-based research on how best to integrate language and content is required if we are to enhance teacher effectiveness in CLIL settings. Furthermore, the expansion of CLIL poses a particular challenge to those involved in teacher training, as we need to prepare students for new contexts, and equip them to work with methodologies that are still developing (Ruiz de Zarobe, Sierra, & Gallardo del Puerto, 2011)

Desirable practices for CLIL practitioners are collaborative content creation, peer assessment and motivation for the acquisition of content and language (Duffy, 2008). Teacher training programs should provide effective specific training for CLIL teachers. Otherwise, the general view might be that teaching content through another language is simply doing it in another language, when the truth is that there is a range of other key factors to take into account (De Graaff, Koopman & Westhoff.,

2007). CLIL specific training contributes to teacher trainees' pedagogical knowledge, but usually involves using online learning and teaching technologies for the delivery of content to students. Digital technology provides educators with different possibilities for engaging students with content and collaborative practices, representing a shifting pedagogical paradigm for the use of a new set of tools within education (Duffy, 2008; Warschauer & Matuchniak, 2010; Dudeney, 2011).

As teacher education influences future teachers as to what is regarded as important and what is not, and addressing teaching and learning from an interdisciplinary perspective can enhance professional vision (Van Es, & Sherin, 2002), the integration of technology and CLIL could be pursued to enhance pre-service teachers' TPACK knowledge. Consequently, our study aims to evaluate the effect a telecollaboration session based on CLIL knowledge exerts on teacher trainees' TPACK knowledge.

Materials and method

The aim and design of the study

This pilot study was designed to analyze the impact a telecollaboration session based on CLIL might have on pre-service teachers' trainees TPACK and CLIL knowledge in order to evaluate whether this instructional method could be beneficial for teacher training purposes. The objective of the telecollaboration was for the students to reflect on six different aspects of some units they had created, and to have experiential use of a technological resource to better prepare them to overcome the reported constraints of technology in their future practice. In order to analyze the impact of the session, and based on the TPACK, in the view "that teaching is a highly complex activity that draws on many kinds of knowledge ... [and] is a complex cognitive skill occurring in an ill-structured, dynamic environment" (Mishra & Koehler, 2006, p. 1020), the following factors were selected as a guide for the analysis:

a) Similarities and differences in the ratings of the groups in each location related to their CLIL units and knowledge.
b) Aspects of the CLIL unit and episodes in the telecollaboration related to I) technological, II) pedagogical, III) technopedagogical, iv) content knowledge and their intersections, and any suggestions for improvement related to the CLIL unit.
c) Type of telecollaboration (collaborative, levelled, or reflective).

d) Advantages and constraints of the telecollaboration endeavor.

The participants

The participants were two intact groups of pre-service teachers from the Public University of Navarre (UPNA) and the Cardenal Cisneros University Centre (CUCC, University of Alcalá) in Spain. The UPNA group comprised 26 students, 21 to 25 years old, who were doing their final year in a Degree in either Primary or Pre-school Education. The students were doing two specific subjects in English: *CLIL*, which had 60 hours contact time and 90 hours of personal work, and *New Technologies applied to Language Learning*, which had 30 hours contact time and 45 hours of personal work. The CCUC group consisted of 29 students, aged 21 to 24 (except one 45-year-old woman), doing their final year in a Degree in Pre-school Education. The students were doing a subject in English called *Designing and delivering effective lessons for the English Infant Classroom* (CLIL), consisting of 48 hours contact time and 102 of personal work.

This pilot study was designed so that students in the first group could integrate what they were learning in both subjects, and students in the second group could reflect on the process of creating an effective CLIL unit.

The instruments

Three instruments were used to collect the data: the checklist 'How CLIL are you?' (Dale & Tanner, 2012), which includes six aspects the students had to reflect about and which the students completed in their telecollaboration session and handed in afterwards, the chat transcripts, and a voice recording.

The procedure

The students were divided in 10 groups and completed the checklist 'How CLIL are you?' (Dale & Tanner, 2012) analyzing a CLIL unit they had created in face-to-face conditions. They completed the checklist in their own location in face-to face conditions. Once the checklists had been completed, students carried out a telecollaboration session using *BigBlueButton*, an open source web conferencing system for on-line learning. They contacted their partners in the other location and discussed and explained their answers to the questionnaire. Once students had carried out the telecollaboration, chat transcripts and a voice recording were analyzed in order to evaluate the possible impact of the session.

Data analysis

The quantitative and qualitative data from the checklists were analyzed using descriptive statistics for the whole group and later for each of the groups to compare the perceptions of both groups. However, these data will not be used in this paper.

Secondly, the transcripts and the voice recording were analyzed using content analysis, which has been described as a "research technique for the objective, systematic, quantitative description of the manifest content of communication" (Berelson, 1952, p. 519). It allows for a variety of textual analyses and typically involves comparing, contrasting, and categorizing a set of data (Schwandt, 1997). Content analysis has been used for the analysis of different data such as audio, video recordings or transcripts of classroom discussions, interviews, observations, field notes and, more recently, computer mediated communication (Bueno-Alastuey, 2011; Mason & Romiskowski, 1996).

Once we had decided on the factors to be analyzed and considered that all of them could contribute to providing a clearer picture to the usefulness of the experience, we created a protocol for identifying and categorizing the target variables. After the transcripts were coded, data was analyzed both to evaluate the usefulness of the experience and to identify relationships between the different factors.

The categorization of the variables included defining them, and so a definition was provided for each category. First, to analyze the aspects of the CLIL unit and episodes in the telecollaboration related to I) technological, II) pedagogical, III) technopedagogical, IV) and content knowledge, and their intersections, each episode in the conversation when a students' attention was drawn to one of those aspects was identified and coded depending on the focus of the episode (following definitions provided by Schmidt et al., 2009, p. 125) into:

- *Technological episodes* (T), which refer to episodes when the attention was focused on knowledge about technology.
- *Pedagogical episodes* (P), which refer to those instances when the attention was focused on the methods and processes of teaching and includes knowledge of classroom management, assessment, lesson plan development, and student learning.
- *Content related episodes* (C), which refer to episodes when the attention was focused on "knowledge about actual subject matter that is to be learned or taught" (Mishra & Koehler, 2006, p. 1026).
- *Techno-pedagogical episodes* (TP), which refer to those occasions in which attention focused on the knowledge of how various technologies can be used

in teaching, and on understanding how using technology may change the way teachers teach.

As our purpose was to analyze the effect of the telecollaboration on only two of the dimensions of the TPACK framework (pedagogical knowledge and technological knowledge) and we wanted to know what provoked the episode, we further distinguished between episodes related to the CLIL unit and those related to the telecollaboration itself. Consequently, we coded episodes into CLIL T, CLIL P, CLIL C and CLIL TP, and TEL T, TEL P, TEL TP. We included CLIL *other* in the coding so that if there were any episodes related to the other three kinds of knowledge of the framework (pedagogical-content knowledge, technological-content knowledge, or technological-pedagogical-content knowledge) they would be included there. However, we predicted that kind of episodes would not happen often.

We signaled the episodes in the data, counted them and analyzed qualitative data related to them. We also looked for and coded any suggestions for improvement of the CLIL units the students provided and any change that might be made due to those suggestions.

Secondly, we analyzed three characteristics of the telecollaboration which could involve improvement or create better conditions for learning to take place: I) whether there was collaboration or only cooperation-reporting their ratings but without discussion-in the exchange, II) whether all participants intervened or the discussion was dominated by some members of the groups and III) whether the telecollaboration included some kind of reflection or was just informative.

Finally, any comment related to the telecollaboration was coded into positive and negative and identified as advantages and constraints.

Only the data related to the transcripts and the voice recordings have been used in this paper.

RESULTS AND DISCUSSION

The analysis of the learners' responses and reflections on their own CLIL learning with telecollaboration are illustrated by the data below.

Episodes related to TPACK knowledge

The majority of episodes were related to the CLIL units (153 vs. 77). In total, students commented the most on technological problems (34% of all episodes), followed by pedagogical issues (29%), and on the same number of content and

technopedagogical aspects (18%). However, if we consider the focus of the conversations depending on whether the comment was related to the CLIL unit or to the telecollaboration itself, episodes related to the CLIL unit were mostly related to pedagogical (62 episodes/41%) and content (40 episodes/26%) aspects, while the comments related to the telecollaboration (77 episodes) were mainly related to technology (59/77%).

Table 1. Technological, pedagogical, content and technopedagogical episodes in the telecollaboration, suggestions for improvement and changes to the CLIL unit

	CLIL T	CLIL P	CLIL C	CLIL TP	CLIL Others	TEL T	TEL P	TEL TP	Changes or suggestion for improvement	Type of change proposed
G1	1	7	3	4		12	2	0	1	TP
G2	0	8	7	0		7	0	3	1	P
G3	0	3	3	0		3	0	0	0	
G4	12	25	5	13		10	0	4	5	C P T C
G5	1	2	1	5		11	1	5	3	P TP C
G6	2	6	4	0		1	1	0	0	
G7	1	1	0	0		3	0	0	1	P
G8	1	4	4	0		1	0	0	0	
G9	1	4	3	0	3	1	1	1	1	P
G10	0	2	9	3		10			1	P
G11			1	2						
TOTAL	19/ 12%	62/ 41%	40/ 26%	29/ 19%	3/ 2%	59/ 77%	5/ 6%	13/ 17%	13	

Concerning the episodes related to technological knowledge (19/12% CLIL T and 59/77% TEL T), students' (G1-10) and teachers' (G11) conversations focused mainly on technological problems and the inability to communicate both verbally and visually with their distant peers because of excessive noise in the chat room (TEL T) and lack of webcams.

CUCC: I can hear you
UPN: you can't see me cause I don't have a webcam (G2)

Both the lack of cameras and the fact that all the speakers seemed to be in the same virtual space made the sound too loud and produced multiple interferences and distortions. Therefore, student conversations were mostly related to interferences and their inability to communicate orally.

Nevertheless, technical restraints involved the groups sharing technological knowledge to search for alternative ways to complete the task. This decision making process about the best alternative way of exchanging information concerning a specific project permitted students to reflect on the affordances of technology to use complementary unplanned tools. The most common decision was to carry out the discussion via chat exchanging data with visuals and tables, or using other technological resources such as e-mail (TEL T).

CUCC: We have to complete a checklist about our didactic units
UPN: maybe the best way is through here (Chat)
CUCC: have you got the worksheet of the checklist completed? can you send us an image or photo by e-mail? (G8)

Pre-service teachers explored ways to carry out virtual collaboration in a confident and critical way using diverse resources to present and discuss pedagogical contents (their CLIL lesson plan). Telecollaboration allows, therefore, the exchange of information when students participate in collaborative networks using technological tools actively, as recommended by the OECD (2005).

Regarding pedagogical knowledge, more than half of the discussion taking place in the telecollaborative session focused on reporting on the elaboration of the CLIL lesson plans and related activities. Students commented on how they had used different pedagogical approaches for their lesson plan development, for example, microteaching, and others, to activate previous knowledge in the classroom, related to motivation and scaffolding, etc. (CLIL P).

CUCC: the topic was chosen because we thought that the space is something that motivates children
UPN: So you use children's experiences, flashcards and a puppet to activate previous knowledge, don't you?
CUCC: we used digital flashcards (IDB) to discover the previous know- ledge and our puppet caught the attention of our classmates

> UPN: In general, we use riddles, songs, flashcards also, real objects to activate knowledge to catch their attention, we read a story about the topic (G6)

As stated by Ohana & Otten (2009), discussing teaching strategies and resources allows pre-service teachers to share ideas, pedagogical knowledge and skills. These actions include the ability to manage and evaluate an assignment appropriately in order to achieve the subject objectives. In this sense, the use of technology for evaluating different techniques such as micro-lessons can facilitate teacher education with operations such as "revision of time, planning and facilities for practicing subject skills" (Pool et al., 2013, p. 455). Most of the pedagogical episodes were related to facilities (resources and materials) during the telecollaborative experience.

A limited number of pre-service teachers shared digital and traditional resources (CLIL TP), as well as different ways of evaluating discerning their own weaknesses.

> CUCC: what are you weaknesses?
> UPN: planning the hots and lots
> UPN: we think we have to balance the use of LOTs and Hots
> UPN: we have activities planned but maybe we need to revise them and make a progression when it comes to cognitive requirements and contexts and also dealing with the four Cs
> CUCC: we make a revision task for hots and other activities for lots (G7)

As defined by Shulman (1987), instruction occurs when (student-) teachers apply their transformation of subject matter to the classroom in "observable forms of classroom teaching" (p. 15). This includes teacher and student-led interactive, small group tasks, and all other observable aspects of classroom management. Students reviewed the underlying pedagogy within their CLIL units following Coyle's 4Cs conceptual framework for CLIL (2005).

> CUCC: our microteaching taught the elements of the space
> CUCC: we tried to teach children different concepts about that
> UPN: we have planned a didactic unit based in CLIL, it means, we take into account dual focus, content and language

Revision of content teaching including the development of CLIL concepts (i.e. Bloom's taxonomy) was done telecollaboratively. Students valued the need for following an appropriate approach for content and foreign language acquisition. "We

think that this is a really interesting way of teaching content through a second language and to acquire L2 through the content"(G9).

However, other characteristics, such as the fact that CLIL is considered a useful methodology to develop language skills and content language (structures, functions and vocabulary), as well as cultural awareness development (Marsh & Lang, 2000), were not further examined.

Regarding content knowledge, nearly half of the groups mentioned not only the topic selected, but also justified how to teach it following a CLIL approach (CLIL C).

> UPN: we have planned 7 lessons, one is going to be an introduction (scaffold-ing) about the topic (5 senses), 5 lessons are destinated to work each senses, and a final lesson in which we are going to check the things we have learnt about them (consolidation).
>
> UPN: we have chosen this topic because we think is something that you can experiment with your hands and learn on your own

Dialogues focused mainly on the different topics and materials, resources and information from different sources that teachers often need to prepare for classes.

Regarding episodes related to technopedagogical knowledge, students showed a positive attitude towards the enhancement of their training with technology (TEL TP) using digital resources, and showed their knowledge of the affordances of some tools to aid their pedagogy.

> CUCC: we use the interactive whiteboard with games
>
> UPN we are going to use a PowerPoint presentation, some videos, pictures and also we are going to use the interactive whiteboard too (G4)

Telecollaboration was also seen as a challenge to enhance CLIL teaching (CLIL TP): "the experience (telecollaboration) has been interesting. We think we have learnt to do all the steps for a lesson plan having in mind the 4cs and also that a CLIL lesson is a whole even when you pretend to define each" (G9).

As stated in OECD (2005, p.11), technological skills are necessary as a basis for understanding options, forming opinions, making decisions, and carrying out informed and responsible actions. However, digital competence requires critical reflection on the nature of information itself –its technical infrastructure and its social context and impact. These aspects were barely discussed during the project.

Regarding other types of knowledge from the TPACK framework, two iso-lated episodes can be related to other kinds of knowledge of the framework: tech-

nological content knowledge (TCK) and pedagogical content knowledge (PCK). In the first episode attention can be drawn on the student's realization of how technology (telecollaboration) can be used in learning by sharing materials, which may lead to a change in lesson planning incorporating peers' observations (CLIL TCK).

> CUCC: we keep your e-mail to send it to you
> UPN: its very interesting to share knowledges!
> CUCC: we hope it would help you
> UPN: if you want we can send our CLIL unit
> CUCC: oh, thanksss (G4)

In the second episode, pre-service teachers remarked on their lack of teaching experience and expressed interest in learning and teaching to use CLIL despite the difficulty of this demanding and innovative didactic approach (CLIL PCK). Thus, attention was focused on the students' reflection on-line about their own process of learning using a specific methodology (CLIL).

> UPN: in this subject we have worked on lots of CLIL resources and we have been making a great effort
> CUCC We think that it is a very demanding subject, do you think the same? (G9).

Finally, considering suggestions for the improvement of the CLIL units that may lead to changes in the units, results indicate that there were few suggestions for improvement of the CLIL units and no actual changes to the CLIL unit were made based on those suggestions.

According to Shulman (1987) teacher self-reflection is an effective means of enhancing teacher development and arriving at new comprehension. This study represents an account of a telecollaboration session as a means to self-reflect on practice, and as such, "is an embodiment of a view of research in which the beliefs, cognitions, attitudes, and decision making processes of student teachers are of primary importance" (Gorsuch & Beglar, 2004). Analyzing students' discussions through the lens of pedagogical reasoning, this study provided us with a limited number of significant insights relevant to SLA methods and processes of teaching or knowledge in classroom management, assessment, lesson plan development and student learning. For example, comprehension of SLA content and theories had little effect on our pre-service teachers course planning or the way of teaching. It was expected that through reflection, all student teachers would develop well

defined strategies for self-directed study and lesson-design-specific thinking to increase knowledge of content specifically for the purpose of teaching it. However, analytical and reflective discussion concerning teacher training was scarce, except for the exchange of teaching strategies and resources.

Type of telecollaboration

Due to the technical problems and time restrictions already mentioned, some groups did not show any real collaboration or episodes of reflection. Many telecollaborations were based on collecting the other group's ratings as quickly as possible and, thus, discussions were rare.

Table 2. Type of telecollaboration: levelled, reflective and collaborative

	Nº Participants	Levelled Yes [1]/no [0])	Reflective (Yes[1]/ no[0])	Collaborative YES [1]/No[0])
G1	7	1	0	0
G2	5	1	1	1
G3	4	1	1	0
G4	5	1	1	1
G5	7	1	0	0
G6	6	1	1	1
G7	4	1	1	0
G8	6	1	1	1
G9	6	1	1	1
G10	5	1	0	0
	55	10%	70%	45%

Telecollaboration involved equal participation of all members who interacted in balanced groups ranging from 3 to 7 students. No members of the groups dominated the conversations. 70% of the groups produced some reflective queries (i.e. "what are the weak points in your project?" (G10)). However, in most instances deliberations were not discussed fully due to communicative delays in writing and new topic interference.

UPN: sorry, do you think it was easy to make the unit?

> UPN: what were the main problems? did you have a good result?
> CUCC: maybe the most difficult thing was to create the activity according to the different communicative skills
> CUCC: yess we have a good mark and the microteaching was great
> UPN: yes I agree

Motivation is a crucial factor for successful language learning, but students are not always internally motivated to communicate. Virtual collaboration represents a current innovative strategy in learning environments (Vinagre, 2010), in which students can develop their foreign language knowledge carrying out interactive tasks engaged in participatory motivating practices such as collaborative content creation or reflective evaluation (O'Dowd, 2007).

Regarding reflection in the telecollaboration session, data analysis revealed that time constrictions (one hour seminar contact time) were considered the main reason why reflective exchanges had not been possible in the groups with no reflection (30%). This shortage of time had limited the telecollaborative task to a mere dictation of data. Some students pointed out this lack of discussion in some of the chats:

> UPN: number 10 never
> CUCC: number 11 always
> UPN: this is not a conversation
> CUCC: yes i know, but our class finish at 1 and we dont have time

Finally, regarding collaboration, results show that nearly half of the ten groups (45%), consisting of a total of 55 participants, showed some traces of collaboration (i.e "how do you work with mindmaps?" (G7) in their exchanges.

The current telecollaboration project shows that these kinds of projects might facilitate dialogic exchanges through the provision of interaction, and provide students with opportunities for learning in meaningful contexts based on negotiation, class discussions, small group collaborative learning with tasks, and might encourage the value of meaningful activity over suitable responses.

Advantages and constraints of the telecollaboration

The constraints of the telecollaboration were apparent. The main complaint was the lack of collaboration and reflection as completing the checklist became the telecollaboration objective in some cases instead of discussing and reflecting on

the statements of the checklist. Tool-related technological problems were the most frequently reported issues as students were forced to use text chat due to technical problems with the sound.

Table 3. **Advantages and constraints of the telecollaboration**

	Telecollaboration		Language	
	Constraints remarked by contestants	Advantages perceived by tutor	Errors	Peer correction
G1	Interferences/ noise		0	0
G2	Interferences/ noise	Intercultural exchange / Reflection	2	0
G3	Noise/No microphone	Intercultural exchange / Reflection	2	2
G4	Noise/lack of visibility	Reflection about own performance	3	1
G5	Interferences/ noise	Reflection about own performance	0	1
G6	Interferences/ noise	Solidarity in data exchange / reflection about the best way of getting information despite TEC problems / development of organizational skills	1	0
G7	Noise/Lack of vision	Solidarity in data exchange / reflection about the best way of getting information despite TEC problems / development of organizational skills	1	1
G8	Noise/Lack of vision	Fun / solidarity in data exchange / development of organizational skills/	1	1
G9	Noise/No camera	Fun / solidarity in data exchange / development of organizational skills	2	0
G10	Noise/No camera		2	0
			12	6

The constraints cited by all the participants were the lack of visibility and problems with the audio. These technical hindrances, however, were seen as learning opportunities by the tutors.

External difficulties obliged learners to develop their organizational skills in order to accomplish their objective, which consisted in exchanging information on CLIL data using alternative media (written chat instead of oral and visual conferencing) in a limited period of time (one hour). By sharing their technological knowledge, participants showed self-confidence in dealing with technical problems together with solidarity in data exchange:

> UPN: we are trying to make it easier for you as we cannot communicate in a different way
>
> CUCC: what do you need for yours?
>
> UPN: we just want to talk about your project and procedure when making a CLIL unit

and intercultural awareness:

> CUCC: sorry we have to go because the class has finished and we have an exam
>
> UPN: bye! good luck in your exam!
>
> CUCC: thank you
>
> UPN: and enjoy your microteaching
>
> CUCC: you too, and enjoy Christmas!

Participating in a chat, pre-service teachers worked in an effective and collabora-tively social way as "it is linked to personal and social well-being. An understanding of codes of conduct and customs in the different environments in which individuals operate is essential" (Ohana & Otten 2009, p.35).

Students understood the complications of technology and the need to care-fully solve all possible deficiencies. Sharing outcomes through telecollaboration allowed participants to be cognitively aware of their own performance (i.e. ["we still have to improve some parts...]" (G6)).

Finally, even though there were some language mistakes in the written tran-scripts, only a few were corrected by virtual peers, so that the exchange can be classified as linguistically poor.

Although contributions were not further argued via VoIP (Voice over Inter-net Protocol) or with further telecollaborative tools such as videoconferencing, it is clear from data examination that online interaction and exchange provide an opportunity for pre-service teachers to identify aspects of their own practice and competence development.

Despite some poor results in some areas and some limited instances of mean-ingful discussion, this study has revealed that telecollaborative sessions based on CLIL and TPACK knowledge can involve a certain level of personal and social maturity that will allow trainers to both manage and master complex tasks suc-cessfully even in complicated technological situations. Being able to constructively deal with differences in time-restricted situations requires role-distance, collabora-tion and tolerance. According to Ohana & Otten (2009, p. 6) these are the main

meta-cognitive and meta-emotional skills to be able to function professionally in a European youth working environment.

Conclusions

The analysis of this first pilot study using telecollaboration for teacher training allows us to draw the following conclusions. First, the task proposed provided enough opportunities for reflection and produced episodes of all the kinds of TPACK aimed at in the study. However, those episodes did not involve deep reflection or any change to the CLIL units. Consequently, in future projects the task should also include a compulsory collaborative part with extended reflection and discussion to maximize learning.

Second, there were technical problems which hindered communications and affected the depth of the reflections. Trials with the technology to be used need to be carried out beforehand to avoid technical problems, even though this will involve investment in digital hardware (headphones, cameras, etc.) and training.

Finally, experiencing problems seems to enhance TPACK knowledge as students use alternative technological tools and solve problems in real-life teaching conditions. More efforts should be aimed at making students aware of the potential and usefulness of experiencing problems.

Future projects will need to include the use of other technological tools, for example Skype, so that students can telecollaborate autonomously at a suitable time out of class. Finally, we strongly recommend that new -and experienced-teachers openly discuss their teaching procedures beyond the geographical limitations and traditional methodologies of the classroom using telecollaborative tools. By getting hands-on experiences with these tools, they will be able to acquire relevant information on the strengths, shortcomings, and developments of content and language integrated learning and teaching in order to enhance their TPACK knowledge and, furthermore, this will equip them to work with emerging methodologies.

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