

The Forging Links project: Knowledge transference using pre-service teachers' CLIL units with ICT integration

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ABSTRACT: Knowledge about CLIL teaching approaches and the effective integration of ICT into learning processes seem paramount to the success of CLIL in different contexts. Nevertheless, research has shown that pre-service and in-service teachers feel unprepared for effective CLIL programme implementation. Recent research has pointed out that material design might be a successful way of improving knowledge and an aid to help teachers realise effective ICT integration efforts. This study reports on the results of a project which through the creation of specific materials for schools explores CLIL knowledge and ICT integration together with students' perceptions in a pre-service teachers training programme. The instruments used were a survey and the didactic units created by students, which were analysed for the inclusion of all CLIL stages, ICT use and the dimensions of content targeted. Results indicate awareness of the stages needed to develop CLIL appropriately, and capacity to use ICT in all the stages and to integrate various dimensions of knowledge together with very positive perceptions, which support learning outcomes and point to increased motivation. Nevertheless, the tasks showed ample room for improvement, especially regarding the integration of language and more innovative uses of ICT.

Key words: CLIL training, ICT integration, pre-service teachers, hands-on training, materials design

El proyecto Forging Links: Transferencia de conocimiento utilizando unidades AICLE con integración de las TIC creadas por profesorado en formación

RESUMEN: La metodología AICLE y la integración efectiva de las TIC son conocimientos esenciales para el éxito de los programas AICLE. No obstante, se ha demostrado que tanto los profesores en formación como los que están en activo se sienten poco preparados para implementar con éxito estos programas. Investigaciones recientes han señalado al diseño de materiales como un método fructífero para aprender y para crear tareas que integren efectivamente las TIC. Este estudio muestra los resultados de un proyecto integrado en un programa de formación de maestros en el que a través de la creación de materiales se explora el conocimiento de los estudiantes sobre AICLE y la integración de las TIC, así como sus percepciones, y está basado en el análisis de una encuesta y de las unidades didácticas creadas. Los resultados mostraron consciencia de

los diferentes estadios necesarios para un desarrollo AICLE apropiado, capacidad para usar las TIC en todos los estadios integrando varias dimensiones del conocimiento y percepciones muy positivas que respaldan los resultados de aprendizaje e indican un incremento en la motivación. Por otro lado, las tareas propuestas muestran grandes posibilidades de mejora, especialmente respecto a la integración de la lengua y usos más innovadores de las TIC.

Palabras clave: formación AICLE, integración de las TIC, profesores en formación, formación práctica, diseño de materiales

1. INTRODUCTION

Both a lack of appropriate quality CLIL resources (Ball et al., 2015; Banegas, 2016; Lasagabaster & Doiz, 2016) and insufficient knowledge to integrate ICT in teaching and learning processes to promote enhanced learning experiences (Blackwell et al., 2014) have consistently been reported as major obstacles for effective CLIL programme implementation. Furthermore, a reported shortage of meaningful and practical professional development for pre-service teachers (Bueno-Alastuey & Villarreal, 2021; Gil-Flores et al., 2017) has contributed to aggravating this situation.

While in training, pre-service teachers should be provided with authentic hands-on experiences to have the opportunity to apply the knowledge and skills acquired in CLIL and instructional technology courses to tasks implemented in real contexts (Bueno-Alastuey & Villarreal, 2021; Banegas, 2016, 2020). This transference of knowledge is precisely the type of practice and resources that schools are demanding when they complain about the lack of appropriate and situated training both for pre-service and in-service teachers (Ball et al., 2015). To be able to meet the curriculum at the expected level, schools should also have quality materials, however, they neither have the time, due to teacher shortage and heavy workloads (Pérez Cañado, 2018), nor the training (Banegas et al., 2020) to create them.

This case study aims to put forward a proposal that might contribute to solving both the lack of authentic hands-on experiences of pre-service teachers and the shortage of quality materials at schools through an ongoing collaborative project, called Forging Links, between a training institution and two schools. This article analyzes its results by combining evidence of the development of CLIL skills and ICT integration, extracted from the pre-service students' CLIL materials, and their perceptions of the project.

2. LITERATURE REVIEW

While future teachers are at university, they usually have courses on CLIL theory and practice and, at some universities, they might also have instructional technology courses to deal with ICT integration into didactic materials to enhance learning processes such as those of CLIL. Currently, CLIL is seen as a means to competence-based education and pluriliteracies (Ball et al., 2015; Ball, 2016; Meyer et al., 2015), but the necessary methodological adjustments to benefit from teaching through an FL seem not to have fully entered the classroom arena (San Isidro & Lasagabaster, 2019a).

In most CLIL contexts (Hemmi & Banegas, 2021; Marsh, 2002; Ortega-Martín et al., 2018; Pérez Cañado, 2018), the implementation of CLIL programmes have preceded sufficient teacher training and, most often than not, CLIL training has been left to teachers' discretion (Gutiérrez-Gamboa & Custodio Espinar, 2021), with the required FL proficiency level being the only official requisite to fulfil. In-service CLIL teachers have reported to be poorly prepared to teach through CLIL, and poor pre-service teaching programmes (Gutiérrez-Gamboa & Custodio Espinar, 2021) or insufficient in-service development programmes (Pérez Cañado, 2018) that do not support the transference from theoretical knowledge to practical knowledge and implementation (Pena Díaz & Porto Requejo, 2008) are some of the reasons teachers raise to justify that they feel ill-prepared to integrate content and language (Azparren, 2020), or to use active methodologies (Pérez Cañado, 2018).

The scant existing research that has focused on the impact of CLIL specific and situated training endeavours has highlighted the positive impact of training on CLIL teaching skills (Banegas et al., 2020; Gutiérrez-Gamboa & Custodio Espinar, 2021; Pavón Vázquez et al., 2015; Pérez-Cañado, 2016, 2018; San Isidro & Lasagabaster, 2019b; Villarreal, 2020) and cognitions (Azparren, 2020; Breeze & Azparren, 2021; Pérez Cañado, 2016). In particular, designing materials has been shown as an effective way to improve teachers' disciplinary knowledge, and their subject literacy (Banegas et al., 2020). Consequently, promoting such training initiatives would seem to kill two birds with one stone as CLIL teachers often have to create their own materials due to the inappropriateness (Lasagabaster & Doiz, 2016) or shortcomings (Romeu Peyró et al., 2020) of existing resources (Morton, 2013), which often lack sound pedagogical bases in which the curricular subject and students' developing linguistic competence will thrive (Dale et al., 2011; Morton, 2013). Additionally, in accordance with a society fraught with technology, these materials should consider technological affordances that promote student-centred methodologies (Pérez Cañado, 2018; Roig-Vila et al., 2015), increase motivation, promote interaction and develop multiliteracies by including media which promotes "modes of understanding and production [...] that were unimaginable in education, until quite recently" (Ball, 2018, p. 228), an integration which teachers seem to be underprepared for (Albion & Tondeur, 2018; Dooly, 2009).

In fact, and despite being widely available, ICT seem not to be used as often and extensively as it was expected (European Commission, 2019), even though ICT use has increased because the lockdown and the compulsory use of online learning had teachers rushed into its use to teach online (König et al., 2020). The use of ICT is crucial to develop the digital competences, one of the key competences students should develop in the education system (European Commission, 2018), and the literature shows that their adoption offers "wider authentic learning scenarios, inclusive and various, for all and each student, which foster their acquirement of XXI century skills" (Porcedda, 2021, p. 81). However, pre-service teachers have been reported to have problems integrating ICT to enhance language learning processes (Dooly, 2009; Porcedda & Gonzalez-Martinez, 2020), and as for CLIL, both in-service and pre-service teachers have justified their minimal and traditional use of ICT on the grounds of insufficient and/or ineffective training to foster ICT integration (Albion & Tondeur, 2018; Blackwell et al., 2014; Liu et al., 2014). As some studies have already shown, teachers' technological pedagogical and content knowledge (TPACK) (Mishra & Koehler, 2006) is not properly developed and, even though most teachers are well-prepared on some aspects of the framework, most of the focus of training programmes

and tasks within those programmes is directed to developing students' pedagogical content knowledge and their technological knowledge without integrating both (Bueno-Alastuey et al., 2018). Consequently, ICT are mainly used for passive reception of knowledge and, sometimes, as add-ons, without pedagogical purposes in mind (Navarro-Pablo et al., 2019) as evidenced by the scarcity of ICT tools included in the various pedagogical CLIL stages (Dale et al., 2011) with the exception of the providing input stage. Similar to what has been reported for CLIL, to thrive in technological integration, the most effective training seems to include hands-on experiences and opportunities to “bridge the gap between the training offered and the realities of the actual classroom environments” (Kuru Gönen, 2019, p. 168) within situated learning contexts together with reflective practices (Dooly, 2009; Guo et al., 2019; Hong, 2010) often based on the creation of materials for specific classrooms (Aydin, 2017; Kuru Gönen, 2019; Sert & Li, 2017).

As the few reported experiences of meaningful situated professional development focused on material design among pre-service teachers have been shown to be successful (Banegas et al., 2020; Bueno-Alastuey & Villarreal, 2021; Gil-Flores et al., 2017; Kuru Gönen, 2019) Banegas et al., 2020; Gil-Flores et al., 2017; Kuru Gönen, 2019), this case study explores whether combining university training with material design and real-life practices can help foster CLIL skills and ICT integration at the same time.

3. THE STUDY

The present study was set as a pilot case study to offer more appropriate and authentic hands-on training to pre-service teachers at university (Gil-Flores et al., 2017) as well as more “context-responsive materials” (Banegas, 2014, p. 348) to schools. The following research questions guided it:

1. Do the CLIL projects show evidence of high-quality CLIL and ICT use?
2. What are students' perceptions regarding the value and effectiveness of the project?

4. METHODOLOGY

4.1. Context

This study was carried out in Navarre (Northern Spain), where both Basque and Spanish are official languages in (parts of) the community. To conform to the European norms of teaching at least two foreign languages in addition to the mother tongue and/or a regional language (European Commission, 2003) from an early age, Foreign Language Teaching Programmes are offered in French, German and English. The most widespread type is the English Learning Programme (Programa de Aprendizaje de Inglés or PAI for short).

In this programme, Spanish-medium schools can teach up to 12 weekly sessions in English, while Basque-medium schools can teach up to 9 sessions (BON, 147/2016; see Lázaro-Ibarrola, 2018 for more details). 87 state schools, including the two Spanish-medium schools from this study and 31 charter schools across Navarre offer PAI (Department of Education, 2021).

4.2. Participants.

Thirty-eight students in their last year of a four-year degree in Early Childhood (n=11) or Primary (n=27) education participated in the study. They were doing the English specialization track and had two subjects from the study track: a six ECTS course on CLIL and a three ECTS course in instructional technology. The aim of the CLIL course was to provide prospective teachers with a set of knowledge, understandings, skills, and tools to plan, design, and implement courses that by placing language at the heart of the process will foster deeper learning and promote the development of transferable 21st century knowledge and skills (Ball et al., 2015; Coyle et al., 2010; Ecmlat, 2019; Llinares et al., 2012; Meyer et al., 2015). The aim of the instructional technology course, on the other hand, was to provide students with a repertoire of technological tools they could use to make their teaching more effective and to be able to integrate ICT successfully in teaching and learning processes. The project Forging Links was designed to try to overcome the lack of integration that had been observed by carrying out a task that would compel students to use and discuss the knowledge and competences of both subjects.

4.3. Instruments

A survey and the didactic units created by the students were the two instruments used to collect the data. The survey had 21 questions: ten 5-point Likert-scale questions tapped into the integration of the ICT and the CLIL courses, students' enjoyment and their perception of improvement of their knowledge of CLIL and ICT, their training, and their teaching preparedness. Three closed-response items asked about what students had liked the most and the least (among seven tasks undertaken in class), and whether they knew how to improve the project. An open-ended question followed each of the closed-response questions so that students could explain their answers. Another closed-question enquired about whether students felt prepared to use ICT in conventional, collaborative or both ways. And finally, there were four further open-ended questions to list three things learnt through the project that would contribute to students' prospective career as teachers, to elicit students' opinions on what they would change from the course and on whether they would like to have more similar courses, and to provide examples of two effective uses of technology.

The second instrument was the six tailor-made 10-hour CLIL units, which were developed upon the information about the target students' profiles and curriculum needs delivered by the specific schools taking part in the project. Two were for Early Childhood education classes, and were related to castles and the Middle Ages. The remaining four units were designed for primary students. *Urban Explorers*, *What's the matter with matter?*, *Little Engineers* and *Our Planet, Our Future*. All the units consisted of a mind-map of the contents covered, lesson plans, teaching notes, students' worksheets, supplementary material, as well as a reference booklet. Only the teaching notes and the students' worksheets were scrutinized for evidence of CLIL and ICT use.

4.4. Procedure

Students created the projects during the courses. Before being submitted to the schools, the projects went through a group feedback process in which students revised a peer group project and provided their peers with feedback and suggestions for improvement. The updated version of the project was then submitted to the teacher who provided them with further feedback and improvement proposals. Based upon the feedback, students modified and improved their project for the third time and resubmitted it. The final revision only focused on formal issues, which included ensuring that booklets were printing-friendly or met referencing requirements.

Upon completion of the course, each participant was asked to complete the Google Forms survey to collect their opinions and perceptions about the project at home.

4.5. Data analysis

Framed as a case study, a mixed-methods research design was used, which had ecological validity (Banegas et al., 2020; Edwards & Burns, 2016), as data were collected in the natural micro-context under investigation (the course) and through the final assignment students had to submit in the course: the projects. Quantitative data were collected from the analysis of the students' projects considering the CLIL stages (Dale et al., 2011), the number of (ICT) tasks per stage and the dimensions of content targeted per task (Ball et al., 2015), and the ten 5 Likert-scale items of the questionnaire, while qualitative data came from the open-ended survey questions. For all the data, both raw numbers of occurrences and percentages were obtained to allow for comparability across categories.

Regarding the projects, first, each task in the project was classified according to the CLIL stage it addressed. Five stages were established: (i) activation for CLIL, which included tasks that triggered "the many different kinds of knowledge, experiences and language that ... [students] already possess[ed] and then use[d] these to build on" (Dale et al., 2011, p. 26); (ii) providing lesson input for CLIL, which comprised tasks "that helped learners understand ideas and construct meaning" (Dale et al., 2011, p. 37) through multimodal resources; (iii) guiding understanding for CLIL, which included tasks that fostered active interaction with the input that lead to the processing of the input; (iv) encouraging speaking and writing in CLIL, which consisted of tasks to promote language and conceptual development; and finally (v) assessing learning and giving feedback for CLIL, which comprised tasks that were designed to give students feedback on their achievements.

Then, each task was further divided into the type of content it emphasized because the dimensions that were made salient will reflect teachers' priorities and teaching effectiveness (Ball et al., 2015). Unlike in the initial conceptualizations of CLIL (e.g., Coyle et al., 2010; Marsh, 2002), content was conceived as a three-dimensional composite (Ball et al., 2015), which was formed by conceptual, linguistic and procedural contents that can be selectively attuned to teachers' aims and students' needs. Finally, all the tasks that included an ICT tool were counted, noting the stage they were included in and the content dimensions covered. The projects were analysed by the first author. The second author analysed one of the projects at random and a good interrater reliability of between 80% and 100% was reached (Miles & Huberman, 1994). Regarding the ten 5-level Likert-scale items, responses were grouped

into three categories: neutral, positive and negative. The positive and negative categories were calculated by adding up the responses where students had selected strongly agree or agree and strongly disagree or disagree, respectively.

Students' responses to the open-ended questions were analysed using thematic analysis (Guest et al., 2012). The responses were coded by theme and then the number of occurrences was computed.

5. RESULTS AND DISCUSSION

5.1. Evidence of CLIL and ICT use

The projects included 221 tasks, which were quite evenly distributed over the various stages (see Fig.1). The tasks aimed to guide students' understanding were the most frequent (62 tasks, 28.1%), while the tasks designed to introduce new content, or to assess or give feedback were the least frequent ones (36, 16.3% and 37, 16.7%, respectively). Both activation tasks and encouraging speaking and writing tasks had similar values (41, 18.6% and 45, 20.4% respectively). These results confirm the success of the course in making students aware of the need to include all the different stages of CLIL in order to contribute to students' knowledge in line with the principles of CLIL. The inclusion of all the stages is a first step towards the implementation of effective CLIL methodologies (Dale & Tanner, 2012; Villarreal, 2020).

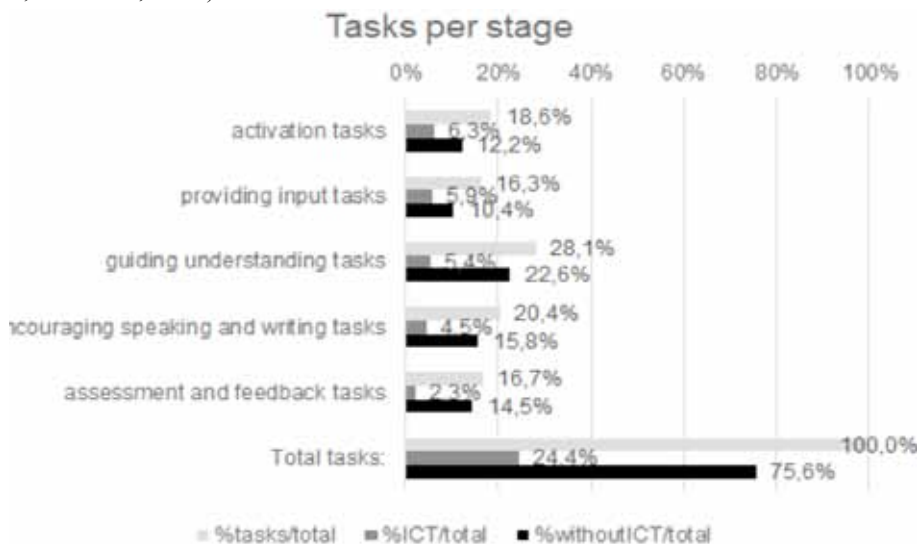


Figure 1. Percentage of tasks with and without ICT use per stage.

Regarding ICT use, only about a quarter of the tasks proposed included some sort of technology (54, 24.4%). As for their distribution, ICT were similarly used for activating, providing input, or guiding understanding (about 6%), while they were slightly less common

for encouraging students' output (10, 4.5%) and rare as part of assessment practices (5, 2.3%). Moreover, as previously reported (Bueno-Alastuey & Villarreal, 2021; García-Varcárcel et al., 2014), ICT were mostly used conventionally for presentation purposes and as information tools. Projecting videos (22, 40.7%), *PowerPoint* slides or presentations (10, 18.5%) or any other type of document with a beamer or an IWB (6, 11.11%) made up for 70% of the total ICT included in the tasks. Although these results indicate that ICT are not extensively used, ICT were present in all the stages and evenly distributed in three of them, which illustrates students' awareness of the pedagogical uses of ICT tools. Nevertheless, the fact that their usage was restricted to conventional practices might indicate that the course was too short to develop teachers' TPACK and/or to thrive in the design of ICT-enriched CLIL teaching practices and materials. As defended by Azparren (2020) for CLIL, our pre-service teachers seem to have very little training on digital teaching competence or TPACK, and, furthermore, they lack role models, references or teaching practices which help develop that knowledge (Bueno-Alastuey & Villarreal, 2021; García-Esteban et al., 2019). Our results point to the need to provide them with enhanced interdisciplinary integration opportunities in which the learning outcomes and curriculum is shared, not just complementary. Furthermore, these results point to the need to introduce more reflection about the different uses of ICT and about how to implement them in all stages, in line with previous studies indicating the need to introduce reflective practice when creating materials (Aydin, 2017) and the convenience of being able to implement them and to reflect on such implementation (Kuru Gönen, 2019; Sert & Li, 2017).

As for the content focus of the tasks, all the three dimensions of content were addressed in 40.3% of the occasions (see Table 1) and were evenly distributed among all the stages (from 5.4% Providing input to 10.9% Encouraging Output). Students demonstrated being able to integrate and support the three essential dimensions of knowledge as understood by Ball et al. (2015) to some extent. As an example, a task focusing on the three dimensions was an adaptation of the game *Who is who?* included in one of the projects as an encouraging output task. In pairs, students were instructed to take turns to guess the jobs hiding in the flashcards by using the help of language frames provided to scaffold the language of questions and answers, e.g. Are you a ...; I am a ... Nevertheless, over half of the tasks targeted just two dimensions (content and cognition 27.1%) or they just addressed content (28.1%). Pavón Vázquez et al. (2015) also reported difficulties in designing activities that integrated different types of content among in-service teachers. The authors concluded that these difficulties might reflect problems to apply more student-centred teaching paradigms, placing the pedagogical dimension at the heart of the difficulty. The few examples of tasks for language integrated teaching (below 4%) showed that students seemed to face pedagogical challenges in integrating language systematically, which is key in CLIL (Hemmi & Banegas, 2021). This difficulty might reflect limitations to map out the language elements bound to the target content and skills (Dalton-Puffer, 2016; Hemmi & Banegas, 2021), a confusion with their role in the CLIL classroom or teacher identity (Azparren, 2020; Banegas et al., 2020; Breeze & Azparren, 2021), poor preparation (Gutiérrez-Gamboa & Custodio Espinar, 2021) or a failure to recognize the crucial role language plays in learning (Llinares et al., 2011).

Table 1. Occurrences of content dimension combinations (Conceptual -Con-, Cognitive-Cog-, and Language, -Lang-) by stage.

STAGES	CON-COG-LANG	CON-COG	CON-LANG	COG-LAN	CON	COG	LAN
ACTIVATING	14 (6.3%)	7 (17.1%)	1 (0.5%)	0	19 (8.6%)	0	0
PROVIDING	12 (5.4%)	10 (4.5%)	2 (0.9%)	0	11 (5%)	0	1 (0.5%)
GUIDING	23 (10.4%)	20 (9%)	2 (0.9%)	0	17 (7.7%)	0	0
ENCOURAGING	24 (10.9%)	9 (4.1%)	3 (1.4%)	0	9 (4.1%)	0	0
ASSESSMENT	16 (8%)	14 (6.3%)	0	0	6 (4.1%)	1 (0.5%)	0
ALL STAGES	89 (40.3%)	60 (27.1%)	8 (3.6%)	0	62 (28.1%)	1 (0.5%)	1 (0.5%)

When analysing the content dimensions that were targeted by the ICT tools used (see Table 2), we observed that ICT were used to target all dimensions of content (36.1%), equally distributed among all the stages. The fact that the students were able to address the three content dimensions is quite encouraging and shows students could accommodate ICT into their CLIL teaching practices. ICT were also used to target the conceptual and cognitive dimensions (30.6%) together as well as the conceptual dimension separately (27.8%), but not in the assessment stage. The conceptual and the language dimensions and the cognitive and language dimensions were scarcely addressed (2.8% each), while exclusively cognition or language were not targeted at any stage. The results might be considered encouraging as ICT were used mainly to develop all content dimensions. However, the scarcity of attention given to the dimension of language (combined or isolated) confirms students' lack of awareness of the essential role language plays in learning (Gibbons, 2014; Llinares et al., 2011) and evidences that our students pay more attention to the conceptual dimension of content (Dalton-Puffer, 2016; Hemmi & Banegas, 2021; Llinares et al., 2011). More emphasis on the importance of language should be exerted in CLIL and ICT training courses to make students aware of the importance of language for progressing in knowledge construction and meaning-making (Meyer et al., 2015).

Table 2. Content dimensions (Conceptual -Con-, Cognitive -Cog-, and Linguistic, -Lang-) addressed with ICT by stage.

STAGES	CON-COG-LANG	CON-COG	CON-LANG	COG-LAN	CON	COG	LAN
ACTIVATING	3 (8.3%)	2 (5.6%)	0	0	2 (5.6%)	0	0
PROVIDING	3 (8.3%)	3 (8.3%)	1 (2.8%)	0	3 (8.3%)	0	0

GUIDING	2 (5.6%)	3 (8.3%)	1 (2.8%)	0	4 (11.1%)	0	0
ENCOURAGING	3 (8.3%)	0	0	0	1 (2.8%)	0	0
ASSESSMENT	2 (5.6%)	3 (8.3%)	0	0	0	0	0
ALL STAGES	13 (36.1%)	11 (30.6%)	2 (5.6%)	0	10 (27.8%)	0	0

Our results confirm the convenience of integrating CLIL and ICT courses to create joint projects, which might improve the effectiveness of training and teaching skills (Banegas, 2020; Bueno-Alastuey & Villarreal, 2021; Gutiérrez Gamboa & Custodio Espinar, 2021). Building upon Banegas' (2020) findings for language-driven in-service CLIL development, we suggest that receiving structured training through an interdisciplinary project at pre-service level can help prospective teachers to “understand and enact [CLIL and ICT knowledge and competences] in a way that is context-responsive and aligned with learners' needs in meaningful opportunities for learning” (Banegas, 2020, p. 257). The high number of tasks addressing the intersection of the three dimensions of content observed in the CLIL tasks and the ICT used are encouraging, although creating tasks that address two dimensions, especially with language appears as the most problematic, as it has been pointed out for the intersecting TPACK skills (Bueno-Alastuey et al., 2018). These results indicate that further work on integrating ICT and the content dimensions is needed by carrying out more projects, which should be tried out in specific classrooms and reflected upon afterwards (Bueno-Alastuey & Villarreal, 2021; Kuru Gönen, 2019), especially as it regards the introduction of language into the tasks, as well as observing successful integration of ICT examples both at university and at schools.

5.2. Students' perceptions

The second research question looked into the pre-service teachers' perceptions about the value of the project *Forging Links*. Overall, students' responses were positive and supportive of the experience (see Table 3). Sixty-three point fifteen percent of the students believed there had been integration between both courses, above 85% of the students considered that the project had been useful for their training and 52.63% had enjoyed it. Neutral opinions were clearly lower (from 44.73% to 10.52%) and negative opinions almost marginal (from 10.52% to 2.63%). Furthermore, 35 students (92.1%) stated in the open-ended questions of the survey that they would like to have more subjects of this type, which confirms students' positive perceptions.

Table 3. Students' perceptions about the project *Forging Links*

	POSITIVE	NEUTRAL	NEGATIVE
Integration of CLIL and ICT courses	24 (63.15%)	10 (26.31%)	4 (10.52%)
Useful for my training	33 (86.84%)	4 (10.52%)	1 (2.63%)
Enjoyed the project	20 (52.63%)	17 (44.73%)	1 (2.63%)

Regarding what they had liked the most and the least (see Table 4) from the CLIL course, creating a unit for a real class was the most widely selected option (26, 68.42%), followed at a considerable distance by visiting the class they were creating the unit for (5, 13.15%) and working in groups (4, 10.52%), which also ranked second (10, 26.31%), after the peer revision task (17, 44.73%), among the tasks students had liked the least. Unexpectedly, 6 students (6, 15.78%) selected the creation of the project as the activity they had disliked the most. The overwhelmingly positive results, however, emphasised the positive perceptions students had about the project and supported the previously reported need to enrich students' training opportunities by including more classroom-based authentic tasks. Connecting academic programmes to current education demands, moreover, would notably reduce investment in training courses for in-service teachers (Banegas, 2014; Madrid & Madrid, 2014). Our initiative can serve to bridge this gap as pre-service teachers have also been shown to be able to provide situated training for in-service teachers (Bueno-Alastuey & Villarreal, 2021).

Table 4. What students had liked the most and the least within the project

	LIKED THE MOST	LIKED THE LEAST
To create a unit	26 (68.42%)	6 (15.78%)
To visit a school	5 (13.15%)	0 (0.00%)
To revise a unit	2 (5.26%)	17 (44.73%)
To work in groups	4 (10.52%)	10 (26.31%)
Coordination between courses	1 (2.63%)	1 (2.63%)
Other	0 (0.00%)	4 (10.52%)

Reasons given by students to have chosen creating the unit as their favourite task included the real context, the authenticity it provided (18, 47.4%) and because it was going to be implemented (20, 52.6%), which made it more motivating (6, 15.78%), challenging (3, 8.33%), and had made them increased their effort and the responsibility they had felt (3, 8.33%). For example, a student reported "The fact that our project will be used in a real class makes the creation of it meaningful and more challenging, as we must apply our knowledge taking into account the characteristics of the target group, timing etc.". Furthermore, students mentioned it had also increased their attention and their awareness of the real conditions and resources in classrooms (6, 15.78%). They also stated they had valued visiting the class where the unit will be implemented and working in groups (2 students each, 5.55%). Finally, 4 students (10.5%) mentioned positively that they had been able to integrate CLIL and ICT.

As regards what they had liked the least (see Table 4), students emphasised working in big groups and correcting other people's work (9 students each, 23.7%), and aspects related to group work such as being dependant on other people (3, 8.33%) or people who did not care or did not work enough (5, 13.15%). One of the tasks related to ICT use (creating an animation about CLIL) was also identified as a drawback (7, 18.4%), as well as time management issues such as the lack of enough time (7, 18.4%) to develop the project. For example, one student mentioned "we started thinking about a model of a machine and ended up with a model of a mechanism, which is less real and in my opinion less engaging

for the students. On the other hand, I understand there is not enough time to enlarge the project". Nevertheless, it should be pointed out that only a minority of the students pointed out negative aspects, which provides support for the general positive perception reported and confirms that students valued the contribution of the project to their training.

When asked about suggestions to improve the project, the majority of the students (31, 81.57%) had suggestions, while a minority (5, 13.35%) did not know how to improve it, and (2) 5.26% felt there was no need to improve anything. The improvements the students suggested included better coordination within groups (6, 16.78%), more time devoted to the project, as they felt they had not had enough time (7, 18.42%), smaller groups (4, 10.52%), and changing the process of review (6, 16.78%). For example, a student suggested "It would be a good idea to organise groups with fewer members (5 should be the maximum). We need more working time during the classes so that we can solve doubts with the teacher, and the teacher would know more or less who is and who is not working well, because the non-implication of some members is highly frustrating for the ones who really do" and another "Review the different parts of the unit and taking into account the feedback of our classmates and put more work on it". Four students mentioned that nothing should be changed.

Regarding students' perceptions about the learning attained in the course, most students regarded their learning in the project highly (see Table 5). Nearly all the students (37, 97.36%) knew what CLIL was and most (32, 84.2%) thought they could design a CLIL project. The majority (34, 89.47%) also perceived training on CLIL was fundamental and considered the subjects had made them better teachers (35, 95.1%) and better at teaching a foreign language (36, 94.73%). Moreover, students recognized it was necessary to incorporate ICT to CLIL units (31, 81.57%) and thought they had incorporated them effectively (30, 78.94%). In fact, most students considered they were able to use technology in both conventional and collaborative ways (35, 95.1%), just two students considered they only knew how to use ICT conventionally and another two only collaboratively. However, when reporting on examples of collaborative uses only 13 students (34.2%) mentioned some collaborative use of ICT. The rest of the students held neutral opinions (from 8 students to 1 student), while no student expressed negative opinions about any of the items.

Table 5. Students' perceptions about the learning attained in the CLIL and ICT courses

	POSITIVE	NEUTRAL	NEGATIVE
I know what CLIL is	37 (97.36%)	1 (2.63%)	0 (0%)
To design a CLIL project	32 (84.20%)	6 (15.78%)	0 (0%)
Training on CLIL is fundamental	34 (89.47%)	4 (10.52%)	0 (0%)
To incorporate effective technological resources to the CLIL unit I have created	30 (78.94%)	8 (21.05%)	0 (0%)
Necessary to incorporate technological resources to CLIL units.	31 (81.57%)	7 (18.42%)	0 (0%)
Make me a better teacher	35 (95.10%)	3 (7.89%)	0 (0%)
Make me better at teaching in a foreign language	36 (94.73%)	2 (5.26%)	0 (0%)

As can be seen in Table 6, among the three things they felt they had improved the most with the project, being able to create multimodal material was the most appreciated (17, 22.07%) followed by learning how to provide scaffolding (13, 16.88%) and learning about the three dimensions of content (12, 15.58%). Students also praised how they had learnt to plan “backwards” (10, 12.98%), how to work in class and how to provide assessment (8 each, 10.38%). Only 2 students (2.59%) mentioned being able to help with understanding and feedback processes or some aspects of the unit as the aspects they had improved.

Table 6. Perceived skills improvements

Multimodal material	17 (22.07%)
Scaffolding	13 (16.88%)
Three dimensions of content	12 (15.58%)
Backward design	10 (12.98%)
Assessment	8 (10.38%)
How to work in class	8 (10.38%)
Understanding and feedback	2 (2.59%)
Unit aspects	2 (2.59%)

As the results show, pre-service teachers realised and were aware mainly of the positive aspects of this project related to their pedagogical skills development, which has already been pointed out by previous research (Bueno-Alastuey et al., 2018). Nevertheless, students also mentioned some aspects related to content and more importantly, they also mentioned TPACK as they referred to their capacity to combine the three realms of knowledge (technology, pedagogy and content) so that their teaching would become more effective. These are promising findings as what they mention are not class-bound aspects, but transferable skills which emphasise the far-reaching impact of the project, which can be considered as an instance of context-responsive training (Banegas, 2020; Pérez Cañado, 2018) built upon fundamental CLIL concepts such as scaffolding, content dimensions, or multimodality. The positive perceptions reported by the students emphasize their awareness regarding their future needs, and the fact that the enrichment and the improved training such projects provide are appreciated by the students. The bidirectional transference of knowledge, both from the university to the community and from the community to the university, and the provision of tailor-made materials to the schools makes this project a service-learning deed and enhances the social role and impact of the university in its community (Marullo & Edwards, 2000).

6. CONCLUSION

This study set out to explore the effect creating CLIL materials with ICT tools integration had on students’ CLIL knowledge and their digital competence as it regards their competence to integrate ICT effectively.

The results of the study evidenced learning, which showed in both the pre-service teachers’ materials and their perceptions of an integrated ICT and CLIL project, Forging Links. The materials created showed awareness of the stages needed to develop CLIL appropriately, and capacity to use ICT in all the stages and to integrate various dimensions

of knowledge. This is a positive finding as ICT integration and the creation of appropriate CLIL material have shown to be challenging for teachers but very demanded by schools. Students also reported very positive perceptions, which support their learning outcomes and point to increased motivation, also important in all learning processes. Nevertheless, their tasks showed ample room for improvement, especially regarding the integration of language and more innovative uses of ICT, which emphasize creativity, exploration and interaction, central to learning in the early years (Plowman, 2016). These aspects should be addressed in future projects, which should include the implementation of the unit and a reflection about it. Future research should also explore the evolution of students' CLIL and ICT competences throughout the course (Villarreal, 2020) as well as taking a closer look at the type of activities proposed. All of those can be considered limitations and deserve further research on the topic. Furthermore, the material created should be compared to the material created in further editions of the project so that what has been learnt by the teachers is applied effectively in the classroom. A further avenue for research can be to modify the materials created according to the results of their implementation so that a repository of created and tried material is created to be used by other teachers in other schools to test their suitability across contexts.

The positive findings regarding CLIL learning and ICT integration capacity, an example of effective TPACK knowledge highlight the importance of engaging pre-service teachers in material design to enhance their preparedness for their future job (Azparren, 2020; Banegas, 2016; Banegas et al., 2020 and Morton, 2013 for in-service) and its positive contribution as “it guides and trains PSTs [pre-service teachers] to take active roles for effective integration of technology during their teaching experiences” (Kuru Gonen, 2019, p. 183).

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