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Digital practices in CLIL across Romance- and Germanic-language contexts: a teacher survey with complementary student data

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ABSTRACT

Research on digital practices has grown substantially thanks to recent technological advancements. Using data from the COST Action CA21114 Digital Literacies Teacher Survey (DLTS) and Student Survey (DLSS), where Content and Language Integrated Learning (CLIL) classrooms are focused, this study has a twofold aim: to describe how teachers (from primary to upper-secondary level) in Romance- (Italy and Spain; $n = 92$) and Germanic- (Austria and Sweden; $n = 41$) language contexts report integrating digital technology to develop bi/multilingual disciplinary literacies, and to complement their responses with students' ($n = 309$ and 219, respectively) corresponding self-reported digital activities. The analysis focuses on three key dimensions of the surveys: frequency and purposes of digital technology use, perceived benefits for disciplinary literacy and bi/multilingual development, and teachers' knowledge of students' extramural digital activities. Results showed similar patterns across contexts, with digital technology being widely available but not deeply integrated in teaching, and a gap between teachers' beliefs and students' perceptions of its value for CLIL. The pedagogical implications point to a need to align digital practices more closely with disciplinary goals.

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Introduction

Contemporary societies are increasingly shaped by digitally mediated forms of interaction that influence how knowledge is accessed, produced, and circulated across educational and social domains. Digital practices are defined as habitual ways of engaging with digital technologies for communication, learning, meaning making, and the construction of identities (Lankshear and Knobel 2011). In contemporary digitally mediated learning environments, digital practices are closely connected to the development of disciplinary literacies, defined as 'the set of discipline-specific skills and communication practices that students require to navigate effectively with disciplinary practices' (Dafouz, López Serrano, and Pérez-Paredes 2023, 3).

Hüttner, Llinares, and Nikula (2025) and Nikula et al. (2026) developed a multidimensional framework for understanding Bi-and Multilingual Disciplinary Literacies (BMDL) in educational contexts, which is composed of five dimensions: (i) the bi-, multi- and translingual, (ii) the multi- and transsemiotic, (iii) the functional–textual, (iv) the critical, and (v) the technological–

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digital dimension. Moving beyond skills-based views of literacy, the authors conceptualise disciplinary literacies as dynamic situated practices that integrate knowledge construction, communication, and identity across languages and modes. Content and language integrated learning (CLIL) is presented as a key educational context in which these literacies are enacted, as learners are required to engage with discipline-specific epistemologies while processing learning through one or more additional languages (Coyle, Hood, and Marsh 2010). All five dimensions are relevant to CLIL contexts and, in general, to all educational contexts where content learning and language use are interconnected (Banegas and Zappa-Hollmann 2024). Within the BMDL framework, the technological–digital dimension is seen as central to contemporary disciplinary learning, as digital tools mediate both access to knowledge (Navarro-Pablo, López-Gándara, and García-Jiménez 2019) and the production and representation of disciplinary texts. Therefore, digital literacies can be conceptualised as socially situated practices that are jointly carried out by teachers and students through engagement with digitally mediated tools and texts.

Having taken these elements into consideration, it is possible to argue that teachers' digital practices play a key role in guiding learners' engagement with disciplinary content by selecting, adapting, and integrating digital resources that align with curricular and epistemic goals, helping students connect informal digital engagement with curricular and disciplinary goals. At the same time, students' digital practices reflect varying degrees of autonomy, intentionality, and awareness in how they use digital environments for learning and their engagement with disciplinary knowledge through diverse digital formats, often across formal and informal learning spaces (Pavesi and Bianchi 2024). As Lee (2026) argues, digital technologies increasingly blur the boundaries between formal and informal learning spaces (see also Pavesi and Bianchi 2024; Sundqvist and Sylvén 2016; Zhang and Liu 2025), positioning digital practices as crucial in the development of disciplinary literacies.

Although existing research has highlighted the instructional potential of digital technologies in CLIL settings (Orak, Strati, and Pérez-Fernández 2026; Pérez Cañado 2015) and students' extramural digital practices for CLIL in minoritised language settings (Segura et al. 2026), comparative analyses of how these tools are taken up by teachers and by students remain limited. Extramural digital practices have to do with what students do outside (Latin 'extra') the walls (Latin 'murus') of the classroom (Sundqvist and Sylvén 2016) in the vehicular CLIL language. Research shows that students' informal learning of the target CLIL language can be of greater importance than CLIL instruction per se, at least for English as the target CLIL language (Olsson and Sylvén 2015) since engagement specifically in extramural English activities has a strong relationship with foreign/second language (L2) English proficiency (see section 2.3). Thus, it is highly relevant to examine BMDL practices in the classroom, as reported by CLIL teachers, as well as digital practices outside the classroom, as reported by students. Building on the limited research base that does exist, this study aims to examine the technological dimension in BMLD across in- and out-of-school digital practices in CLIL contexts, simultaneously considering teachers' and students' perspectives. Moreover, in light of recent evidence in Morgana et al. (forthcoming), which highlight differences in *students'* digital practices across Romance- and Germanic-language contexts, it is relevant to compare patterns of digital technology use also among teachers in these settings. This study focuses on how teachers from primary to upper-secondary school level in Romance- and Germanic-language contexts report using digital technologies in CLIL settings. Their reported views are complemented with students' corresponding self-reported digital practices. The target CLIL language is English.

Theoretical framework and background to the study

Theoretical framework

This section outlines three interrelated dimensions central to CLIL: immersion, authenticity, and motivation. Rather than conceptualising these primarily as learner-internal processes, we frame them as pedagogical conditions that teachers actively construct in classroom practice.

CLIL originates in the Canadian French immersion programmes of the 1960s (Swain and Lapkin 1981), where English-speaking students were taught content subjects through French. Immersion in this context did not simply mean exposure to another language, but the systematic use of the target language as the medium of instruction. Crucially, this model depended on bilingual teachers who could sustain instruction in French while understanding students' English. When students reverted to their first language (L1), teachers scaffolded their developing competence through reformulation, modelling, and guided interaction (Hammond 2001). Immersion was thus not an environmental condition alone, but an interactional achievement grounded in teacher expertise.

Authenticity is connected to the use of the target language, but not merely so. Authenticity in CLIL is about embedding it meaningfully within disciplinary practices supported by teacher scaffolding (Pinner 2021). A sociocultural perspective on L2 development (Lantolf 2011) highlights the centrality of authenticity, but also of mediation. Drawing on Vygotsky's (1978) concept of the Zone of Proximal Development, learning occurs through collaborative activity with more knowledgeable others. In CLIL classrooms, teachers mediate both content and language by modelling subject-specific discourse, adjusting linguistic demands, and designing tasks that render the target language functionally necessary.

The third interrelated dimension is motivation. Motivation is often viewed as a key factor in language development and is also shaped by classroom ecology (Dörnyei 1998). In CLIL settings, the target language becomes instrumental for accessing subject knowledge, potentially enhancing engagement. In sum, immersion, authenticity, and motivation are not necessarily inherent properties of CLIL programmes; they are dynamically realised through teachers' professional practices within specific institutional contexts.

CLIL in Romance- and Germanic-language contexts: teacher positioning

This section of the literature review first examines studies on Romance-language contexts and then Germanic ones, focusing on CLIL provision and teacher-related aspects. As the present study encompasses teachers from primary- to upper-secondary education, we include studies addressing teachers across these educational levels. In general, research on CLIL teachers has predominantly focused on their training (Pérez Cañado 2018), and despite focusing on different educational levels, all the reviewed studies consistently highlight a need for more up-to-date forms of professional development, incorporating innovative approaches and materials. In this respect, our focus on digital practices may offer a partial response, providing new opportunities for resource development, pedagogical innovation, and ongoing teacher support.

CLIL in Romance-language contexts

In Romance-language countries, CLIL has often followed the trajectory of moving decisively from bottom-up experimentation toward structured, top-down policy frameworks. Italy represents perhaps the most formalised Romance-language CLIL model, as national legislation mandates CLIL at upper-secondary level in at least one non-linguistic subject (Aiello and Di Martino 2023). Teacher qualification requirements are explicit: C1-level language proficiency and specialised CLIL training are compulsory (Aiello and Di Martino 2023). In Italy, Tommaso (2020) explored secondary-school content teachers' perceptions of a CLIL methodology training course, highlighting generally positive attitudes alongside key challenges such as limited teaching practice, insufficient feedback, and workload pressures. The study suggests that the integration of online environments could extend training opportunities by providing continuous support and access to resources.

Spain, another Romance-language context, is frequently cited as one of the most extensive CLIL adopters in Europe (Pérez Cañado 2015). In a systematic review of 43 selected articles, 18 were either conducted in the Spanish context or authored by Spanish scholars (Kim and Graham 2022). CLIL implementation varies across its 17 autonomous regions, some of which, such as Catalonia and the Basque Country, already operate within bilingual educational systems. Partnerships

with external actors, including the British Council, have further shaped teacher support structures and programme development (Llinares and Dafouz 2010). In this context, teachers often work within clearly articulated regional strategies that frame CLIL as part of broader multilingual education policies. Moreover, previous research has examined the professional identity of primary school CLIL teachers (Bárcena Toyos 2022). This study highlights how these practitioners may be either language specialists or subject teachers. This dual profile introduces a degree of variability in how CLIL teacher identity in the Spanish context is constructed and perceived since '[t]eachers' pedagogical identities in their classrooms were in accordance with their area of knowledge and prevailing non-CLIL teacher identity, i.e. language-teacher or content-teacher' (Bárcena Toyos 2022, 18). Furthermore, based on an online questionnaire administered nationwide, Senra-Silva (2021) carried out a study of secondary CLIL teachers. The study revealed significant challenges in CLIL education, particularly a lack of methodological training and adequate teaching materials. Similar results were obtained in another questionnaire study that included 130 primary and secondary teachers in Andalucia (Pavón Vázquez, Lancaster, and Bretones Callejas 2020). These findings from Spain indirectly point to the potential of digital practices as a way to address some of these challenges, particularly by supporting access to materials and facilitating methodological innovation.

In sum, across Romance-language contexts, CLIL has increasingly been embedded within national or regional policy frameworks. Compared to several Germanic-language contexts, teachers more often operate within clearly defined regulatory systems. This institutionalisation may reduce some of the selection effects associated with decentralised implementation, though it does not eliminate social stratification entirely.

CLIL in Germanic-language contexts

In German-speaking Europe, CLIL has historically emerged through diverse trajectories. In Austria, where digital practices may offer valuable support in addressing some of the structural challenges faced by CLIL teachers, Gruber et al. (2020) investigated the professional wellbeing of primary CLIL teachers. Drawing on interview data, their study shows that CLIL teachers lacked suitable teaching materials, faced a heavy workload, had limited training opportunities, and received low societal appreciation of their profession. At the same time, some factors appeared to support CLIL teachers' wellbeing, particularly positive relationships with students and a strong belief in the educational value of CLIL.

Further north, a pattern of localised implementation is visible in the Nordic countries Denmark, Iceland, Norway, and Sweden, all with Germanic majority languages. In these countries, CLIL has been implemented to varying degrees. National frameworks tend to be limited or absent, particularly in Norway and Sweden, where decisions regarding CLIL implementation are largely delegated to the local level (Lialikhova 2019; Sylvén 2019). In Sweden, regulation primarily concerns the proportion of instruction that may be delivered in another language than Swedish: at most 50 percent of compulsory schooling (grades 1–9) may be conducted through a non-Swedish medium, and schools must obtain approval from the Swedish Schools Inspectorate. Beyond this quantitative restriction, detailed pedagogical guidelines are sparse (Sylvén 2013). Recent inspections have highlighted several shortcomings in CLIL education, including insufficient attention to language-oriented objectives and the employment of teachers with limited knowledge of Swedish in content subjects (Skolinspektionen 2025). These findings underscore tensions between school-level autonomy and the need for coherent national frameworks to support teachers' work.

In sum, CLIL has frequently developed through decentralised or school-based initiatives in Germanic-language contexts. As a consequence, this has often led to variation in teacher preparation, programme quality, and student intake (cf. Sylvén 2013). Research has noted that CLIL programmes in these settings may attract students who already display high motivation and language proficiency, raising questions about selectivity and the potential positioning of CLIL as an elite pathway (Bruton 2013). For teachers, such selection effects can influence classroom dynamics, expectations, and professional identity.

Comparative reflections

Compared, the Romance- and Germanic-language contexts reveal contrasting governance traditions. In Romance-language countries, CLIL frequently operates within structured national or regional frameworks, with explicit teacher qualification requirements and curricular guidelines. In contrast, in Germanic-language contexts, CLIL has typically developed through school-level initiatives and CLIL remains variably regulated, resulting in heterogeneous CLIL teacher preparation and programme designs.

Clearly, these differences have implications for teachers' professional positioning. In decentralised Germanic systems, CLIL teachers may enjoy greater autonomy, but they also bear greater responsibility for programme coherence and language integration. In highly regulated Romance systems, teachers may benefit from clearer expectations and training pathways, but with seemingly less local flexibility.

Against this backdrop, examining how teachers in these distinct contexts integrate digital technology in the vehicular language, both within and beyond the classroom, provides insight into how institutional conditions shape pedagogical BMDL practices in CLIL environments. In addition, this study highlights the value of complementing teachers' perspectives with those of students, to obtain a more comprehensive understanding of these practices.

Extramural English from a Romance versus Germanic perspective

As mentioned in the introduction, it is common that young people today engage in digital practices extramurally. Due to its status as a global language, English is frequently encountered digitally and for this reason, students of all ages – from the first grade in primary school to the last grade in upper-secondary school – learn a great deal of English informally (for an overview, see chapter 5; Sundqvist and Sylvén 2016). It can be mentioned that several different terms have been used to describe how learners pick up English informally. Here we use extramural English (EE), defined as 'English that learners come in contact with or are involved in outside the walls of the classroom' (Sundqvist and Sylvén 2016, 6). This involvement is voluntary and typically learner-initiated out of interest, and often digital (but not always). Whereas incidental learning is most common, intentional learning of English is part of the concept. In a large scoping review, it is concluded that EE has remained relatively stable for a long time (Kusyk et al. 2025). In the same review, Sweden and France are mentioned as two important countries for this line of research, as many empirical EE studies stem from these settings. France represents a country with a Romance majority language (French), whereas Sweden represents a country with a Germanic (Swedish). In our review of the literature that follows, we will therefore draw on recent studies of digital practices and supplement these with studies from other countries in which Romance and Germanic languages are spoken, to arrive at a comprehensive account. In the next two sections, we first report on EE studies involving primary- and secondary-school learners, and then on studies involving teachers.

EE studies focusing on primary- and secondary-school learners

A substantial body of European research has investigated the influence of EE on language learning. Such studies commonly relate self-reported extent and type of EE engagement to various measures of L2 proficiency. However, the level of detail concerning the specific digital EE practices under investigation varies markedly, as does the degree to which the digital devices employed are clearly described (Sundqvist and Uztosun 2024). Despite these methodological differences, research from both Romance and Germanic regions consistently indicates that young people acquire English through a range of digital EE activities.

For learners with Romance L1s, a series of studies from Spain reveal positive relationships between engagement in EE and various aspects of L2 English proficiency for primary-school learners, such as for their vocabulary knowledge (Cadierno et al. 2022; Muñoz, Cadierno, and Casas 2018; Soto-Corominas et al. 2025), speaking and reading and listening comprehension (Lázaro-Ibarrola 2024a,

2024b), and grammar knowledge (Cadierno et al. 2022; Muñoz, Cadierno, and Casas 2018). Interestingly, it ought to be mentioned that some of these studies focused on participants who were in CLIL programmes and, among other things, Lázaro-Ibarrola (2024b, 2024a) found that the intensity of CLIL played an important role too, for learning; that is, not only EE did. Positive connections between EE and proficiency have been found also among Spanish secondary-school learners (see, e.g. Alonso and Fernández-Dobao 2025; Muñoz 2020). While all the mentioned studies from Spain are quantitative, a case study from Romania by Prosic-Santovac (2017) reports on a very young learner who picked up L2 English vocabulary from watching the cartoon Peppa Pig. A larger Romanian study found positive relations between EE and vocabulary, listening, and speaking confidence (Meștereagă and Dejica 2025). Although not the focus here as they involve adults, similar positive findings from engagement in EE have been found in Italy (e.g. Aiello 2018; Ghia 2024; Pavesi and Bianchi 2024) and France (e.g. Kusyk 2017; Sockett and Toffoli 2012), two additional Romance countries.

Studies pointing in the same positive direction have been reported also for learners speaking Germanic languages. In Austria, for example, positive relations between EE and vocabulary knowledge have been reported amongst secondary-school learners (Ghamarian-Krenn and Schwarz 2023), and a recent interview study with learners aged 11–14 demonstrated that emotional engagement contributed to behavioural engagement with EE, from which the participants reported learning gains (Sulis and Mercer 2026). In Denmark, Hannibal Jensen (2024) clearly demonstrates how primary-school learners who played digital games in English extramurally benefited from that in terms of vocabulary knowledge, corroborating findings from an early Swedish study that had found the same relationship between extramural gaming and vocabulary knowledge (also found for listening and reading comprehension, Sylvén and Sundqvist 2012). Even primary-aged learners who have never received any formal English instruction in school show impressive levels of L2 English proficiency, as described in several studies from Flanders, the Dutch-speaking part of Belgium, where everything has been learned outside the classroom (e.g. De Wilde, Brysbaert, and Eyckmans 2020; Puimège and Peters 2019). Similarly, research from Norway shows that 6-year-olds at the onset of formal education enter school with extensive knowledge of English vocabulary picked up extramurally, but it is worth noting that individual variation was large (Gyllstad et al. 2025). Finally, secondary-level studies from Germany (e.g. Arndt and Woore 2018, on written and video blogs, and vocabulary) and Sweden (e.g. Kaatari et al. 2023, EE and writing) report similar positive relationships.

Taken together, studies of digital EE practices convey a broadly similar picture irrespective of whether learners speak a Romance or a Germanic language. It is clear that engagement in receptive digital activities outweighs participation in productive ones. Audiovisual content is particularly prominent, especially viewing YouTube videos and streamed TV series. For instance, one Italian study reports that English subtitles are preferred when streaming media (Ghia 2024, tertiary level, though), and automatically generated subtitles, such as those on YouTube, are frequently also in English. Moreover, when different EE activities are compared, listening to music typically emerges as the most common activity, both among speakers of Romance languages (Muñoz 2020) and Germanic (De Wilde 2026). With regard to YouTube, this popular medium has developed into a distinct EE activity in its own right. Its role in young people's everyday lives is substantial, as shown in several national media reports (e.g. Norwegian Media Authority 2024). YouTube certainly impacts language learning, but also other skills thanks to the prevalence of various kinds of informative tutorials.

Regarding more productive digital EE practices, such as online multiplayer gaming, some differences have been observed between Romance- and Germanic-language speakers. While gaming has not emerged as an important factor in L2 English learning among learners with Romance language repertoires, the opposite has been observed among Germanic youth, particularly in northern Europe (including speakers of Danish, Dutch, Icelandic, Norwegian, and Swedish), whereas this pattern has not been replicated in Spain (see, e.g. Muñoz 2020; Sylvén and Sundqvist 2012). Findings in relation to gaming are therefore not entirely consistent. Nonetheless, across first-language backgrounds, EE research repeatedly shows that male students engage in gaming significantly more than female students, and this holds across age groups.

In conclusion, although there is currently a larger number of studies on digital EE practices from regions where Germanic languages are spoken, the overall results are largely comparable across Romance- and Germanic-language contexts. At the same time, large-scale international comparative investigations remain scarce. The present study thus represents a valuable contribution, offering new insights into extramural digital practices in diverse linguacultural European settings.

Studies focusing on teachers' beliefs about the role of EE for learning

To date, some questionnaire studies have examined in-service English teachers' views on students' use of EE and its impact on teaching and learning. A first study was carried out amongst secondary-school English teachers in four countries: Austria, Finland, France, and Sweden (Schurz and Sundqvist 2022). As linguistic distance of learners' L1 may influence their level of engagement in EE activities, these countries were purposefully selected; Germanic languages (German in Austria and Swedish in Sweden) are more closely related to English (also a Germanic language), compared with French (a Romance language) and Finnish (a Finno-Ugric language, i.e. the most distant to English of the four languages). At the same time, people in Finland and Sweden have a longer tradition of EE, not least because foreign-language media is subtitled there, while dubbing is used in Austria and France. The findings revealed that teachers' beliefs were that students' total EE use was lower in Austria and especially France compared to Finland and Sweden. French teachers were least likely to report that EE had an effect on students' learning. Moreover, in comparison, Finnish and Swedish teachers reported greater agreement with statements about willingness to differentiate instruction to what is (not) learned extramurally. A follow-up study by the same authors investigated ways to connect EE and English language teaching by analysing the teachers' answers to an open-ended question about providing examples of 'an activity that you would do with a group of students that uses a lot of spare time English' (Schurz and Sundqvist 2025, 6). The results revealed that Austrian and French teachers tended to describe activities based on authentic material, while Finnish and Swedish teachers more frequently described activities for raising learners' register awareness. A third study was carried out among primary school English teachers in Sweden, also exploring teacher views on their students' EE, and how EE influences teaching (Casale and Olsson 2025). They found that teachers see possibilities of drawing on students' EE in classroom instruction, but that teaching is challenging due to a widening proficiency gap caused by varying learner engagement in EE.

Altogether, it is not possible to detect any clear patterns or differences relating to Romance and Germanic-language teachers in these three studies, in particular since there is very little evidence overall from Romance-language teachers. However, regardless of whether Romance or Germanic, the participating teachers' reported views are clearly influenced by their perceptions and/or knowledge of their students' use of EE.

Research questions

The research questions (RQs) of this paper are:

RQ1 How do teachers from primary to upper-secondary levels of schooling in Romance- and Germanic-language contexts claim to integrate digital technology to develop bi/multilingual disciplinary literacies in CLIL?

RQ2 How do these claims complement students' self-perceptions of digital practices in and out of school?

Methods

The study

The study employed a quantitative research design. We used two questionnaires (for teachers and students, respectively). The use of parallel questionnaires allowed for the collection of some comparable data and recruiting relatively many participants. By including both groups, the study

triangulated perspectives, thereby enhancing the reliability of the findings. The questionnaires consisted primarily of closed-ended items, allowing for statistical analysis of trends, correlations, and differences across groups.

The COST action

The present study was carried out within the CLILNetLE COST Action (CA21114) and forms part of the activities of Working Group 4, which focused on the relationship between digital technologies, literacies, and language and content learning in multilingual education. This study drew on survey data collected from both teachers and learners, with the aim of examining their digital practices and the ways in which these practices are connected to learning.

Ethics

All questionnaire responses were collected anonymously, the data were stored and processed confidentially, being used exclusively for research purposes. Prior to participation in the questionnaires, all respondents were informed about the aims of the study, the voluntary nature of their involvement, and the procedures adopted for data handling. Students aged 18 years and above and teachers provided informed consent digitally through the survey platform (Qualtrics), while for participants under the age of 18, written parental or guardian consent was obtained in accordance with national regulations in each participating country. Ethical management and approval of the study was coordinated by the University of Vienna, in line with the requirements of the CLILNetLE COST Action.

Participants and sampling

Participant selection combined elements of convenience and purposeful sampling (Dörnyei 2007). COST Action members from each participating country contacted schools and/or individual teachers to introduce the questionnaire and administer it to teachers and students. As the survey was distributed at the national level, detailed information on the specific schools involved (e.g. the number and types of institutions) is not available, and it is not possible to determine whether the participating teachers and students were drawn from the same educational settings. The study sample comprised in total 661participants: 133 were teachers (92 belonging to the Romance group, 41 to the Germanic) and 528 were students aged 18 or under (309 in the Romance group, 219 in the Germanic). The imbalance between groups reflects differing levels of participation across countries within the COST network and is consistent with the voluntary nature of large-scale cross-national survey research.

Instruments

Two complementary online survey instruments were developed: the Digital Literacies Teacher Survey (DLTS) and the Digital Literacies Student Survey (DLSS). Both questionnaires were designed for digital practices in and out of the classroom. The DLTS focused on teachers' use of digital technologies, examining the types of tools and resources employed, their patterns of use across different subject areas, and teachers' beliefs about the role of digital technologies in bi-/multilingual disciplinary literacies (see Appendix 1A for selected questions). The DLSS explored learners' engagement with digital practices, how these tools are used, and their purposes, and students' perceptions of the learning potential (see Appendix 1B for selected questions).

The instruments were piloted in Albania with 68 teachers and 138 students across six CLIL schools. The results highlighted high dropout rates (around 65% for students and 40% for teachers) and long completion times (over 45 minutes), indicating excessive length and complexity. Consequently, the questionnaires were streamlined, for instance by moving less essential biographical items to later sections. A think-aloud protocol further revealed issues related to ambiguous wording, unclear concepts, and cognitive load. Prior to piloting, both instruments had undergone

multiple rounds ($n = 13$) of blind peer and expert review within the COST Action. The surveys used in the study are the versions revised after the pilot study.

Data collection and analysis

Both questionnaires were distributed digitally using Qualtrics, with data being collected from February to May 2024. They were available in all majority languages. Upon completion of the data collection, the dataset was extracted into Excel files and prepared for analysis. All Excel data were transferred on the statistical software Jamovi, which was used for data analysis and presentation.

The statistical analysis was organised in three main steps, moving from a descriptive comparison to a cross-context analysis. First, a description of the teacher sample was provided, including inferential statistical tests to examine whether Romance and Germanic groups differed on key background variables (e.g. years of teaching experience, CLIL orientation, and subjects taught in CLIL). Second, the relationship between these background characteristics and teachers' reported digital practices across the three main dimensions of the survey was examined. Third, teachers' results were compared with the corresponding student survey data to assess whether teachers' perceptions of digital practices were consistent with students' self-reported experiences. For both questionnaires, independent samples *t*-tests were used for continuous variables, with Welch's correction applied when variances were unequal. Mann–Whitney *U* tests were used for ordinal variables that did not meet parametric assumptions. Categorical variables were analysed using chi-square tests of independence, and Fisher's exact test was used when group sizes were small. Effect sizes (Cohen's *d*, Cramer's *V*, and *r*) were reported to show the strength of differences between contexts. This analytical approach ensured consistency across stages and reduced the risk that observed differences in digital practices could be attributed to differences between the groups.

Results

Teacher group comparability

Before presenting the results to RQ1 (sections 5.2–5.4) and RQ2 (section 5.5), the comparability between Romance- and Germanic-language contexts was assessed for the teacher sample by analysing years of teaching experience, CLIL orientation, and subject distribution. Teachers in Romance-language contexts reported more years of teaching experience ($M = 16.6$, $SD = 10.5$) than teachers in Germanic-language contexts ($M = 13.4$, $SD = 9.02$). However, this difference was not statistically significant (Welch's $t(97) = -1.78$, $p = .079$), and the effect size was small ($d = -0.32$). This result indicates that the two groups can be considered broadly comparable in terms of professional experience.

CLIL orientation was measured using a slider ranging from language-focused (0%) to content-focused (100%). Descriptive statistics showed a strong content orientation in both groups, with a median of 77 in Romance-language contexts and 79 in Germanic-language contexts. No statistically significant difference emerged between the two groups ($U = 1585$, $p = .555$, $r = -.066$), and the *t*-test confirmed this result: $t(124) = 0.520$, $p = .604$, $d = 0.10$. These findings suggest that teachers in both contexts conceptualise CLIL objectives in very similar ways, with a clear preference for content-focused instruction.

For subjects taught in CLIL, the proportions of teachers teaching each subject were compared across the two contexts using contingency tables (see Appendix 2). Overall, the distribution of CLIL subjects was largely similar across contexts. The only statistically significant difference concerned Geography, which was more frequently taught in CLIL in Germanic-language contexts (25.2%) than in Romance-language contexts (5.4%), $\chi^2(1) = 10.2$, $p < .001$, $V = .27$, indicating a medium effect size. No statistically significant differences were found for the other subjects considered (e.g. Language and Communication, History, Mathematics, Science, and Arts). No systematic

differences between contexts were observed with regard to the age groups taught (9–12, 13–16, 17–21), although this variable was not analysed inferentially due to the distribution of responses.

Overall, the two groups were structurally similar in terms of experience, CLIL orientation, and subject distribution, supporting the interpretation that differences in digital practices are more likely related to contextual factors than to teacher background.

Dimension 1 (RQ1): frequency and purposes of digital technology use

This section, together with sections 5.3 and 5.4, addresses RQ1 by examining how teachers in Romance- and Germanic-language contexts report using digital technologies in CLIL.

Device use

Dimension 1 examined the frequency and purposes of digital technology use in CLIL contexts and was based primarily on nominal variables. The first question included three categories of device use (personal use, teaching use, both).

Contingency tables were generated to compare patterns of device use across Romance- and Germanic-language contexts (see Appendix 3). Descriptively, laptops and mobile phones emerged as the most consistently integrated devices in both settings. In both groups, the majority of teachers reported using these devices for both personal and teaching purposes. Tablets and desktop computers also showed substantial levels of dual use, although teachers in Romance-language contexts reported slightly higher levels of teaching-only use for these devices. Inferential tests confirmed that most contextual differences were not statistically significant. For tablets, no significant association was found between context and type of use, $\chi^2(2) = 3.28$, $p = .194$, Fisher's exact $p = .208$, $V = .186$ ($n = 95$). A similar non-significant pattern emerged for desktops, $\chi^2(2) = 4.25$, $p = .120$, Fisher's exact $p = .153$, $V = .215$ ($n = 92$). A statistically significant association was identified only for laptops, $\chi^2(2) = 6.15$, $p = .046$, Fisher's exact $p = .027$, $V = .218$ ($n = 129$). While dual use predominated in both contexts, teachers in Romance-language settings were more likely to report teaching-only use compared to their Germanic counterparts. The effect size indicated a small-to-moderate association. The remaining devices – consoles, smartwatches, e-book readers, smart TVs, and smart home technologies – were reported primarily for personal use in both contexts, with minimal pedagogical integration and no meaningful contextual differences. This suggests that differences between contexts lie less in access to devices and more in how they are pedagogically integrated.

Specific digital tools across learner age groups

The analysis focused on reported use of specific digital platforms and applications across learner age groups (i.e. students aged 9–12 years, 13–16 year, and 17–21 years). While these groups represent different educational levels, the relatively small number of responses in some categories did not allow for inferential comparisons across age groups. Therefore, the analysis remains descriptive, and age-related differences should be interpreted with caution. Across all three age groups, the dominant pattern in both Romance- and Germanic-language contexts was non-use of the listed tools, including social media, multiplayer games, instant messaging, video streaming, online research tools, VR/AR applications, and online shopping platforms. For younger learners (9–12 years), nearly all teachers in both contexts reported not using tools such as social media, multiplayer games, instant messaging, video streaming, online research platforms, or VR/AR applications. A similar pattern was observed for teachers of learners aged 13–16, with only isolated instances of use. For teachers of learners aged 17–21, slightly more variation emerged; a small number of teachers in Germanic-language contexts reported using AI tools, mobile photography, VR/AR, or digital storytelling, while teachers in Romance-language contexts occasionally reported online video sharing or e-textbooks. However, frequencies remained very low across contexts. This indicates that the pedagogical integration of digital tools remains limited across learner age groups, regardless of context, particularly for younger learners.

Teachers' digital feedback competence

Finally, teachers' self-reported competence in providing digital feedback was measured on a four-point ordinal scale (1 = 'never heard of this'; 4 = 'expert'). Mann–Whitney U tests were conducted to compare Romance- and Germanic-language contexts across seven statements. For six of the seven items, no statistically significant differences were found (all $p > .05$), and effect sizes were small (r ranging from .04 to .09). In both contexts, median responses clustered around the 'average' level, indicating broadly comparable perceptions of teachers' digital feedback competence. However, a statistically significant difference emerged for a statement concerning the adaptation of digital technologies to ensure inclusive learning experiences, $U = 976$, $p = .006$, $r = .30$. Teachers in Romance-language contexts reported higher levels of competence ($M = 3.15$) than those in Germanic-language contexts ($M = 2.57$), with a moderate effect size.

Overall, the findings for this dimension suggest that device access and core digital practices are largely comparable across contexts, while the pedagogical integration of specialised digital tools remains limited and contextual differences are generally small.

Dimension 2 (RQ1): teachers' knowledge of students' extramural digital activities

Teachers' perceived benefits of extramural digital activities

Teachers were asked to rate how beneficial students' out-of-school digital activities are for different school subjects on a five-point scale. In both contexts, ICT and language-related subjects were rated as benefiting the most, while Physical Education was rated the lowest, suggesting that teachers associate digital activities mainly with subjects that involve thinking and language, rather than more practical subjects.

For STEM subjects, small differences appeared. Teachers in Romance-language contexts rated Biology and Chemistry slightly more positively, while teachers in Germanic-language contexts rated Physics somewhat more positively. However, these differences were not statistically significant. When all STEM subjects were combined into a single index, no contextual differences emerged, showing that teachers in both contexts have similar views about how extramural digital activities support STEM learning.

Teachers' awareness of students' extramural digital practices

Teachers were also asked which digital tools they know students use outside school in the CLIL language. Reported awareness was generally low in both contexts. For most tools, fewer than 20% of teachers indicated that students used them.

In Romance-language contexts, the most frequently mentioned tools were video streaming (9.8%) and online video sharing (6.5%). In Germanic-language contexts, the most frequently reported tools were video streaming (19.5%), social media (14.6%), and online gaming (14.6%). Some values approached 20%, although overall awareness remained low.

Some contextual differences were observed. Teachers in Germanic-language contexts reported slightly higher awareness of mobile apps (9.8% vs. 3.6%) and online gaming (17% vs. 14.6%), but only the difference for mobile apps was statistically significant. Social media showed a similar tendency. No significant differences were found for video streaming or music streaming.

Inferential tests showed a statistically significant association for mobile apps, $\chi^2(1) = 4.66$, $p = .031$, Fisher's exact $p = .044$, indicating that teachers in Germanic-language contexts (9.8%) were more likely than those in Romance-language contexts (2.2%) to report awareness of students' mobile app use outside school in the CLIL language. No statistically significant difference was found for online gaming, $\chi^2(1) = 3.16$, $p = .075$, Fisher's exact $p = .093$, although descriptively higher values were observed in Germanic-language contexts (14.6%) than in Romance-language contexts (5.4%). No statistically significant differences were found for social media or other tools.

In general, teachers in both contexts reported limited awareness of students' extramural digital engagement in the CLIL language. Awareness was slightly higher in Germanic-language contexts

for some entertainment-related tools. Addressing RQ2, these findings suggest a potential gap between students' actual digital practices and teachers' awareness of them, which may limit opportunities to connect in-school and out-of-school learning.

Dimension 3 (RQ1): teachers' perceived benefits of digital technology use for disciplinary literacy and multilingual development

This dimension addresses RQ1 by examining teachers' perceptions of the benefits of digital technology use for disciplinary literacy and multilingual development, as well as the extent to which these perceptions translate into pedagogical action. This section includes Likert-scale items, a frequency measure, and a slider variable. Depending on the scale properties and distribution of the data, independent samples *t*-tests or Welch's *t*-tests were conducted to compare Romance- and Germanic-language contexts.

Teachers' perceived educational benefits

Three Likert-scale statements (1 = 'strongly disagree'; 5 = 'strongly agree') were combined into a composite index by averaging the items to obtain an overall measure of teachers' perceived educational benefit. The analysis revealed a statistically significant difference between contexts, $t(49.4) = -2.64$, $p = .011$, with a medium effect size (Cohen's $d = -0.58$). Teachers in Romance-language contexts reported significantly greater agreement with the perceived educational benefits of students' extramural digital engagement than teachers in Germanic-language contexts, indicating stronger positive beliefs in this group.

Teachers' pedagogical guidance

Teachers were asked how often they provide specific guidance to students on how to use digital technology outside school to improve their CLIL language. An independent samples *t*-test was conducted to compare the two contexts. Although teachers in Romance-language contexts reported slightly higher levels of guidance ($M = 2.90$, $SD = 1.06$) than teachers in Germanic-language contexts ($M = 2.42$, $SD = 1.03$), the difference was statistically significant, Welch's $t(61.4) = -2.21$, $p = .031$, and the effect size was small-to-medium (Cohen's $d = -0.45$). In both groups, mean scores fell between 'rarely' and 'sometimes'.

Teachers' perceived type of benefits

This item explored how teachers understood the benefits students gain from digital practices outside school. The item used a slider from 0 (benefits mainly language skills) to 100 (benefits mainly disciplinary literacy skills). Both groups showed only a slight tendency toward disciplinary literacy, with values close to the midpoint. Teachers in Germanic-language contexts reported a mean of 54.9 ($SD = 29.6$), while teachers in Romance-language contexts reported a mean of 51.8 ($SD = 26.4$). Although Germanic teachers appeared somewhat more oriented toward disciplinary literacy, the difference was not statistically significant, Welch's $t(43) = 0.449$, $p = .656$, and the effect size was very small ($d = 0.108$). This suggested that teachers in both contexts have a similar understanding of the type of benefit, with no clear preference for either language or disciplinary outcomes.

Overall, this dimension shows a balanced pattern. Teachers in Romance-language contexts report stronger overall beliefs about the benefits of digital technology. However, both groups report similarly low levels of guidance, highlighting a gap between teachers' beliefs and their reported practice, in line with RQ1.

Teacher–Student comparison of digital practices (RQ2)

This section addresses RQ2 by comparing teachers' and students' responses on selected items to identify similarities and differences in their views of CLIL and digital practices. Only two pairs

of questions were included, as these were the only ones that were directly comparable across the two surveys. Although the items were not identical and used different scales, they reflect the same general ideas (e.g. perceptions of CLIL aims and perceived educational value of digital practices). The comparison focuses on general patterns rather than exact values.

Comparison between teachers' and students' conceptualisation of CLIL objectives

A two-way ANOVA was carried out to examine differences between teachers and students in Romance- and Germanic-language contexts in how they positioned CLIL lessons on the language–content continuum (0–100 slider scale). Higher scores indicate a stronger focus on content.

The analysis showed a significant main effect of Group, $F(1, 619) = 52.04$, $p < .001$, $\eta^2p = .077$, pointing to a moderate difference between teachers and students. In both contexts, teachers described CLIL as clearly more content-focused (Romance: $M = 70.7$, $SD = 25.1$; Germanic: $M = 73.5$, $SD = 23.7$) than students did (Romance: $M = 43.8$, $SD = 30.5$; Germanic: $M = 54.3$, $SD = 32.8$). This indicates a gap between teachers' intended aims and students' perceptions.

A small but statistically significant main effect of Context was also found, $F(1, 619) = 4.42$, $p = .036$, $\eta^2p = .007$. Students in Germanic-language contexts viewed CLIL as more content-oriented than students in Romance-language contexts, while teachers' responses were very similar across the two contexts. The interaction between Group and Context was not significant, $F(1, 619) = 1.47$, $p = .226$, $\eta^2p = .002$. This means that the difference between teachers and students was similar in both language contexts. Students' answers were more spread out than teachers', as indicated by the higher standard deviations, suggesting that learners have more varied views about the aims of CLIL.

Alignment in perceived educational value of digital technology

A descriptive comparison was conducted to examine general patterns in teachers' and students' perceptions of the educational value of digital technologies for CLIL. The comparison should be interpreted with caution because the two surveys measured related but not identical constructs and employed different response scales. Teachers' responses were based on a three-item composite index measured on a 1–5 Likert scale (1 = 'strongly disagree'; 5 = 'strongly agree'). Students' responses were based on the mean importance assigned to spare-time digital activities for developing CLIL skills, measured on a 1–3 scale (1 = 'not important'; 3 = 'important'). Consequently, the results are interpreted descriptively rather than as directly comparable scores.

Among students who reported engaging in daily digital activities in their CLIL language, responses clustered around the middle of the 1–3 scale (*Romance:* $M = 1.60$, $SD = 0.49$, $n = 187$; *Germanic*: $M = 1.54$, $SD = 0.49$, $n = 201$),indicating that students viewed these activities as moderately important for supporting their CLIL development.

Teachers also expressed a generally positive view about the role of digital technologies in CLIL learning. On the 1–5 scale, teachers in Romance-language contexts reported a mean of 3.63 ($SD = 0.64$), whereas teachers in Germanic-language contexts reported a mean of 3.28 ($SD = 0.85$). Despite the different response scales, the overall pattern suggests that teachers viewed digital technologies more positively than students viewed their own digital practices.

Discussion

This study explored how teachers in Romance- and Germanic-language contexts reported integrating digital technology in CLIL classrooms and how these perspectives can be complemented with students' self-reported digital practices. The analysis focused on three interconnected dimensions: (1) frequency and purposes of digital technology use, (2) teachers' knowledge of students' extramural digital activities, and (3) perceived benefits of digital technology for disciplinary literacy and multilingual development.

Across these dimensions, three key patterns could be identified. First, teachers in Romance- and Germanic-language contexts displayed considerable convergence in their professional profiles and in their general orientation towards CLIL and digital technology. Second, although digital resources were reported to be widely accessible, their pedagogical integration appeared relatively limited. Third, there was a clear gap between teachers' reported positive beliefs about digital technologies and students' more moderate views of their impact.

The two teacher groups (Romance and Germanic) proved comparable in terms of teaching experience and CLIL objectives. In both contexts, CLIL was positioned as strongly content-oriented, with median values above 70% on the slider scale. This is important because the two contexts have different policy traditions (Morgana et al. forthcoming). In many Romance-language countries, CLIL is more strongly regulated at national or regional level (e.g. Aiello and Di Martino 2023), whereas in several Germanic countries, CLIL is more decentralised and school-based (Lialikhova 2019; Sylvén 2019). Despite these differences, teachers described their aims in very similar ways. However, when teachers' responses were compared with students' perceptions, a statistically significant gap became evident. The contrast between teachers' and students' views observed here is consistent with previous CLIL research (Bauer-Marschallinger et al. 2023; Siepmann et al. 2023) where comparable differences have emerged. Teachers tended to frame CLIL as clearly content-oriented, whereas students perceived it as less so. This suggests that the intended integration of content and language may not always be equally visible to learners, an issue linked to the enactment of disciplinary literacies in multilingual settings (Nikula et al. 2026).

As for Dimension 1, in both contexts, laptops and mobile phones were the most frequently used devices. Most teachers reported using them both for personal and teaching purposes. Only one significant contextual difference was found (for laptops), and even here the effect size was small to moderate. Overall, access to devices and basic use appeared similar across contexts.

When looking at specific digital tools used with different age groups, a different picture emerged. For younger learners (9–12 and 13–16 years), most teachers reported not using tools such as social media, multiplayer games, VR/AR applications, or AI tools. Even for older learners (17–21), use of these tools remained limited. This suggests that digital technology in CLIL classrooms is mainly used at a basic level. While digital technology supports presentation, communication, and access to information, it is not often used in more innovative or interactive ways.

Teachers in both contexts generally rated their digital feedback competence as 'average' or higher. Only one significant difference emerged: Romance-language teachers reported higher competence in adapting digital technology for inclusive learning. Still, overall patterns were similar. Teachers reported feeling reasonably confident in using digital technology, but this confidence did not necessarily translate into frequent use of more advanced technologies. From the perspective of the technological–digital dimension of BMDL, this is important. Digital tools are central in many real-world disciplinary practices. Yet in CLIL classrooms, their integration appears cautious and limited.

Dimension 2 focused on teachers' knowledge of students' digital practices outside school. The results showed that awareness was generally low in both contexts. For most tools, fewer than 20% of teachers reported knowing that students use them in the CLIL language outside school. Some significant differences were found, though. Teachers in Germanic-language contexts reported higher awareness of mobile app use and online gaming. However, even in these cases, percentages remained relatively low. This finding is important considering EE-research, which shows that many students regularly engage in digital activities such as streaming, gaming, and listening to music in English (e.g. Alonso and Fernández-Dobao 2025; De Wilde 2026; De Wilde, Brysbaert, and Eyckmans 2020; Pavesi and Bianchi 2024; Sylvén and Sundqvist 2012). If teachers are not fully aware of these EE-practices, it becomes more difficult to connect informal learning with classroom activities. Although EE-research that focuses on teachers is scarce, it does show that teachers hold beliefs about the relevance of student engagement in EE activities for learning, and such beliefs appear stronger in Germanic-language contexts than in Romance (Casale and Olsson 2025; Schurz and

Sundqvist 2022, 2025). Clearly, in CLIL contexts, it is particularly important for teachers to connect informal out-of-school learning with formal in-school learning, as authenticity and meaningful target language use are central pedagogical aims for developing digital literacies. Students' digital environments could offer valuable entry points for such connections, yet our data suggested that these links are not systematically developed, leaving room for improvement.

In Dimension 3, teachers were asked about the perceived benefits of digital technologies for disciplinary literacy and multilingual development. Teachers in Romance-language contexts reported significantly stronger agreement with positive statements about digital benefits than teachers in Germanic-language contexts.

When teachers' answers were compared with students' responses, different patterns emerged. Students rated spare-time digital activities as only moderately important for developing CLIL skills. Teachers, on the other hand, generally reported positive views of the educational value of digital technologies. Although these findings should be interpreted with caution because the two surveys capture slightly different aspects of digital learning, the overall pattern suggests that teachers viewed digital technologies more positively than students. This pattern was consistent across both contexts. However, teachers also reported low levels of explicit guidance. On average, they reported providing guidance on how to use digital technology outside school only 'rarely' or 'sometimes'. This suggests a gap between beliefs and practices. Teachers believe that digital technologies can support learning, but they do not often provide structured advice on how students can use them more effectively outside school (see also Casale and Olsson 2025). Both teacher groups leaned slightly towards viewing digital engagement as beneficial for disciplinary literacy rather than only for language skills.

Altogether, the findings revealed more similarities than differences between teachers in Romance- and Germanic-language contexts: they had comparable levels of experience, similar CLIL orientations, and similar patterns of digital technology use.

Conclusions

By means of questionnaires and statistical analysis, this study examined how teachers and students across Romance- and Germanic-language contexts perceive and enact digital practices in CLIL classrooms, with particular attention to the role in supporting BMDL and the technological–digital dimension of learning.

The findings appear to indicate that the central pattern emerging from the data may not necessarily lie in a Romance–Germanic-language contexts contrast but rather in differences between teachers' beliefs and students' perceptions. At the same time, this interpretation warrants caution since discrepancies between teacher and student perspectives have also been identified in earlier CLIL studies, suggesting that such results may not be uncommon within CLIL research (Bauer-Marschallinger et al. 2023; Siepmann et al. 2023). While teachers tended to frame CLIL as predominantly content-oriented and regarded digital technologies as advantageous, students experienced CLIL as less content-focused and assigned only moderate importance to digital activities in their learning. This points to a situation in which the role of digital technologies in fostering BMDL is acknowledged in principle but remains only partially enacted in classroom practices. For digital tools to enhance authenticity and sustain motivation in CLIL, their use needs to be more deliberately aligned with both disciplinary objectives and students' existing digital practices. Supporting teachers in linking students' informal digital engagement to formal curricular aims may help bridge the gap between instructional intentions and learner experiences (cf. Casale and Olsson 2025; Schurz and Sundqvist 2022, 2025).

This study has several limitations. First, it relies on self-reported survey data and a cross-sectional design, which do not allow for insights into classroom reality over time. Therefore, future research could explore how these dynamics unfold in practice through classroom-based longitudinal investigations, further examining how the integration of digital practices into CLIL may contribute to the development of BMDL across diverse contexts. Second, the comparison between

teachers' and students' responses should be interpreted with caution, as the two datasets were not matched at the classroom or school level. Consequently, the observed differences do not necessarily reflect teacher–student mismatches within the same CLIL settings but rather indicate broader differences between the two participant groups. A further limitation concerns the unequal sample sizes across the two groups. The smaller number of teachers from Germanic-language contexts may have reduced the statistical power to detect between-group differences, and the findings should therefore be interpreted with appropriate caution.

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Appendices

Appendix 1A

Europe-wide survey of CLIL teachers - selected questions for analysis

Project: COST Action 21114
Digital tools/resources to develop multilingual literacies.
Funded by COST (European Cooperation in Science and Technology)

Teachers' profile
Q4.1 Where is your school located?
Q3.7 Which of these subjects do you teach in a CLIL context?

	I teach this subject in a CLIL context
Languages and communication	☐
Mathematics	☐
Society and environment: Geography	☐
Society and environment (e.g. sociology, economics, psychology)	☐
History	☐
Arts (drama, music, art)	☐
Technology and ICT	☐
Physical Education, Sports and Health	☐
Natural Sciences: Biology	☐
Natural Sciences: Chemistry	☐
Natural Sciences: Physics	☐
Tourism and Hospitality	☐
Health and Healthcare	☐
Philosophy, Ethics or Religion	☐

Q3.14 How would you describe the objectives of your CLIL teaching and learning in your classroom?

To teach language	To teach content
0%	100%

Q3.16 How many years of teaching experience do you have?
Dimension 1: Frequency and Purposes of Technology Use
Q5.1 Which of the following devices do you use regularly?

Mobile Phone	For personal use
Tablet	
Computer (laptop)	
Computer (desktop)	For teaching
Games Console/player	
Smartwatch	
E-book reader	

(*Continued*)

Continued.

Mobile Phone	For personal use
Smart TV	For both personal use and workt
Smart home technologies (e.g. intelligent speaker, Alexa or Google Home, robot hoover, lawnmower)	

Q6.4 Which of these technologies do you use generally when teaching with 9-12 year olds?
Q6.5 Which of these technologies do you use generally when teaching with 13-16 year olds?
Q6.6 Which of these technologies do you use generally when teaching with 17-21 year olds?
Q6.11 Which digital tools or strategies do you use to provide feedback to your students?

1. I integrate effectively technology into my teaching and learning including videos, images, interactive elements.	I have never heard of this
2. I select digital resources, tools or platforms appropriately.	
3. I align my use of digital tools and resources with specific learning objectives.	Beginner
4. I encourage and facilitate communication and collaboration between students using digital technologies.	
5. I assess students and provide feedback to students using digital tools.	Average
6. I evaluate my own digital strengths and weaknesses easily.	
7. I adapt teaching, learning and assessment using digital technologies to ensure that learning experiences are inclusive.	Expert

Dimension 2: Teachers' Knowledge of Students' Extramural Digital Activities
Q8.3 Some subjects probably benefit more from students' extra-curricular digital experiences. Below is a list of school subjects.
How much do you think digital technology benefits, or not, each of these subjects?
(a drag & drop question)

Language and communication (language, literature and foreign languages)	Significant benefit
Mathematics	
Biology	Some benefit
Chemistry	
Physics	Hard to tell
Society and environment (social sciences like sociology, psychology and geography)	
History	Very little benefit
Arts (drama, music, art)	
Technology and ICT	No benefit whatsoever
Physical Education, Sports and Health	

	Language Q3.4
Social media platforms (e.g. Facebook, Instagram, Snapchat, TikTok)	☐
Multiplayer Online gaming (e.g. Fortnite, Minecraft, Roblox)	☐
Instant messaging apps (e.g. WhatsApp, Messenger, Discord)	☐
Video streaming services (e.g. Netflix)	☐
Mobile Phone-based applications (e.g. WhatsApp, Snapchat, Spotify)	☐
Online video sharing and consumption (e.g. YouTube, Vimeo)	☐
Online research and virtual learning platforms (e.g. Google Classroom, Khan Academy, Seesaw)	☐
Virtual reality (VR) and augmented reality (AR) experiences	☐
Online shopping and e-commerce platforms	☐
Mobile photography and image editing apps (e.g. Instagram, Snapchat)	☐
Digital storytelling and content creation tools (e.g. blogs, podcasts, vlogs)	☐
Online forums and discussion boards (e.g. Reddit)	☐
Free Educational apps and games (e.g. Kahoot, Blooket)	☐
Paid educational apps and games	☐
Online music streaming and downloading services (e.g. Spotify, Apple Music)	☐
E-book readers and digital book platforms	☐
AI-based technologies such as chatbots (e.g. ChaptGPT)	☐
E-textbooks	☐

(*Continued*)

Continued.

	Language Q3.4
Digital projectors and interactive whiteboards or SmartBoards	☐
Single-player Online gaming (e.g. Fifa, The Witcher 3, Elden Ring, SimCity)	☐
Online courses or platforms (e.g. Coursera, Udemy, Khan Academy)	☐
Digital reading devices (e.g. e-book readers and digital book platforms, Kindle, Goodreads)	☐
Online shopping (e.g. E-commerce platforms like Amazon, eBay, and various websites)	☐

Q8.7 Of the tools that you selected, which of these do you know that students use outside of school in *your main CLIL language?*

Dimension 3: Perceived Benefits of Technology Use for Disciplinary Literacy and Multilingual Development

Q7.1 Select the appropriate description for each of the following statements.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
1. Students' disciplinary literacy skills improve when incorporates technology into CLIL learning.	○	○	○	○	○
2. Using technology encourages students to be more multilingual in their learning.	○	○	○	○	○
3. Students are inherently more motivated to use language and content in an integrated way (i.e. project work) when a digital tool or technology is required to complete it.	○	○	○	○	○

Q8.9 Do you ever provide specific guidance or suggestions to students on how to utilise technology outside of school to improve their CLIL languages?

Q8.11 We would like to know about your students' use of technology outside the classroom. Do you think that their use of technology is more beneficial for developing disciplinary literacy skills or simply language skills?

Appendix 1B

Europe-wide survey of CLIL students - selected questions for analysis

Project: COST Action 21114

Digital tools/resources to develop multilingual literacies.

Funded by COST (European Cooperz

Q15.1 We'd now like to return to talking generally about your CLIL lessons at school.

The main aim of my CLIL lessons is …

Move the slider to indicate whether you think your CLIL lessons are more about language learning or more about subject content learning.

To learn the language — To learn subject content

Q6.1 Think about the digital activities that you do in your free time (almost) daily. They are listed below.

1. Decide how important or not you think digital activities are for developing your skills in CLIL subjects in your CLIL language 1.
2. Once you have sorted them, rank them again from the most to the least important within each box.

	Important
Social media platforms (e.g. Facebook, Instagram, Snapchat, TikTok)	
Multiplayer Online gaming (e.g. Fortnite, Minecraft, Roblox)	
Instant messaging apps (e.g. WhatsApp, Messenger, Discord)	
Video streaming services (e.g. Netflix)	
Mobile Phone-based applications (e.g. WhatsApp, Snapchat, Spotify)	
Online video sharing and consumption (e.g. YouTube, Vimeo)	

Online research and virtual learning platforms (e.g. Google Classroom, Khan Academy, Seesaw)	
Virtual reality (VR) and augmented reality (AR) experiences	Moderately important
Online shopping and e-commerce platforms	
Mobile photography and image editing apps (e.g. Instagram, Snapchat)	
Digital storytelling and content creation tools (e.g. blogs, podcasts, vlogs)	
Online forums and discussion boards (e.g. Reddit)	
Free Educational apps and games (e.g. Kahoot, Blooket)	Not important
Paid educational apps and games	
Online music streaming and downloading services (e.g. Spotify, Apple Music)	
E-book readers and digital book platforms	
AI-based technologies such as chatbots (e.g. ChaptGPT)	
E-textbooks	
Digital projectors and interactive whiteboards or SmartBoards	
Single-player Online gaming (e.g. Fifa, The Witcher 3, Elden Ring, SimCity)	
Online courses or platforms (e.g. Coursera, Udemy, Khan Academy)	
Digital reading devices (e.g. e-book readers and digital book platforms, Kindle, Goodreads)	
Online shopping (e.g. E-commerce platforms like Amazon, eBay, and various websites)	

Appendix 2

Contingency tables for selected subjects

Language and communication

Contingency Tables

	Context		
Q3.7_1_CLIL_Lg+Comm	Germanic	Romance	Total
No	31	78	109
Yes	10	14	24
Total	41	92	133

χ^2 Tests

	Value	*df*	*p*
χ^2	1.61	1	.204
N	133		

Math

Contingency Tables

	Context		
Q3.7_2_CLILMath	Germanic	Romance	Total
No	36	81	117
Yes	5	11	16
Total	41	92	133

χ^2 Tests

	Value	*df*	*p*
χ^2	0.00153	1	.969
N	133		

Geography

Contingency Tables

	Context		
Q3.7_3_CLILGeography	Germanic	Romance	Total
No	31	87	118
Yes	10	5	15
Total	41	92	133

χ^2 Tests			
	Value	*df*	*p*
χ^2	10.2	1	.001
N	133		

History

Contingency Tables			
	Context		
Q3.7_5_CLILHist	Germanic	Romance	Total
No	34	80	114
Yes	7	12	19
Total	41	92	133

χ^2 Tests			
	Value	*df*	*p*
χ^2	0.376	1	.540
N	133		

Biology

Contingency Tables			
	Context		
Q3.7_9_CLILBio	Germanic	Romance	Total
No	38	73	111
Yes	3	19	22
Total	41	92	133

χ^2 Tests			
	Value	*df*	*p*
χ^2	3.65	1	.056
N	133		

Arts

Contingency Tables			
	Context		
Q3.7_6_CLILArts	Germanic	Romance	Total
No	36	76	112
Yes	5	16	21
Total	41	92	133

χ^2 Tests			
	Value	*df*	*p*
χ^2	0.576	1	.448
N	133		

Appendix 3

Contingency tables for selected devices

Tablet

Contingency Tables

Q5.1_2_RegularUseHomeSchool_Tablet		Context		
		Germanic	Romance	Total
Personal use	Observed	10	16	26
	% within row	38.5%	61.5%	100.0%
both	Observed	15	38	53
	% within row	28.3%	71.7%	100.0%
for teaching	Observed	2	14	16
	% within row	12.5%	87.5%	100.0%
Total	Observed	27	68	95
	% within row	28.4%	71.6%	100.0%

χ^2 Tests

	Value	*df*	*p*
χ^2	3.28	2	.194
Fisher's exact test			.208
N	95		

Laptop

Contingency Tables

Q5.1_3_RegularUseHomeSchool_Laptop		Context		
		Germanic	Romance	Total
Personal use	Observed	2	5	7
	% within row	28.6%	71.4%	100.0%
both	Observed	36	68	104
	% within row	34.6%	65.4%	100.0%
for teaching	Observed	1	17	18
	% within row	5.6%	94.4%	100.0%
Total	Observed	39	90	129
	% within row	30.2%	69.8%	100.0%

χ^2 Tests

	Value	*df*	*p*
χ^2	6.15	2	.046
Fisher's exact test			.027
N	129		

Desktop

Contingency Tables

Q5.1_4_RegularUseHomeSchool_Desktop		Context		
		Germanic	Romance	Total
Personal use	Observed	1	6	7
	% within row	14.3%	85.7%	100.0%
both	Observed	23	32	55
	% within row	41.8%	58.2%	100.0%
for teaching	Observed	7	23	30
	% within row	23.3%	76.7%	100.0%
Total	Observed	31	61	92
	% within row	33.7%	66.3%	100.0%

χ^2 Tests			
	Value	*df*	*p*
χ^2	4.25	2	.120
Fisher's exact test			.153
N	92		