

Students' and Teachers' Digital Practices In and out of the CLIL Classroom in Slovakia

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Abstract

This study examines and compares the digital literacy practices of students and teachers engaged in Content and Language Integrated Learning (CLIL) in Slovakia. Drawing upon data from two national-level surveys—the Digital Literacies Student Survey (DLSS) and the Digital Literacies Teacher Survey (DLTS)—the research investigates the ways in which both cohorts access, utilise, and perceive digital technologies both within and beyond the classroom environment. Quantitative data derived from 38 student respondents and four in-service CLIL teachers revealed notable discrepancies in digital engagement, tool usage, and perceived competence. Whilst students reported high levels of informal digital activity—predominantly via mobile devices and social media platforms—teachers exhibited a more cautious and moderately integrated approach towards the use of digital instruments within CLIL lessons. The findings highlight a generational and pedagogical gap in digital literacy application, with implications for teacher training, curriculum design, and strategic policy development. Recommendations emphasize the need for enhanced professional development and the alignment of instructional practices with students' existing digital competencies to support effective bilingual education.

Keywords: Digital Literacy, Bilingual Education, Extramural Practices

1 Introduction

Digital technologies have fundamentally transformed the mechanisms through which young people communicate, learn, and engage with society, engendering complex multilingual and multimodal networks that extend beyond the institutional confines of the school. Students

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routinely navigate digital practices such as gaming, social networking, and online content creation across various languages and platforms. These extramural practices – activities occurring outside formal education – offer authentic language exposure and foster informal learning processes (Sundqvist & Sylvén, 2016; Benson, 2021).

For learners in bilingual and Content and Language Integrated Learning (CLIL) environments, such experiences often provide their most sustained interaction with the target language. However, teachers' understanding of how these digital engagements connect to classroom learning remains limited. Research in applied linguistics and educational technology increasingly highlights the linguistic potential of these out-of-school practices. Studies demonstrate that online gaming, social media, and creative digital production can enhance vocabulary, pragmatics, and motivation (Reinhardt, 2019; Sauro & Zourou, 2019; Lee & Dressman, 2018).

Yet, teachers frequently perceive these activities as recreational rather than education (Henry et al., 2018; Brevik, 2020), leading to a misalignment between students' lived experiences and classroom practices in CLIL contexts – where content and language objectives are intertwined – this gap limits teachers' ability to connect students' informal linguistic resources to formal curricular goals (Vnučko & Klimova, 2023; Vnučko et al., 2024). The growing presence of artificial intelligence (AI) in students' daily routines introduces further complexity. Learners increasingly interact with translation tools, chatbots, recommendation systems, and generative AI platforms that support creativity, problem-solving, and information retrieval in multiple languages (Ammar et al., 2023; Lin & Warchauer, 2023).

However, many teachers remain uncertain about how to meaningfully incorporate AI into their instruction, reflecting broader tensions between technological innovation and pedagogical awareness (Reinhardt, 2020). In CLIL this is particularly significant because AI can serve as both a linguistic and cognitive scaffold, supporting disciplinary discourse and multimodal meaning-making.

These developments intersect with the concept of Critical Digital Literacies (CDLs) – the ability to evaluate, interpret, and produce digital content with an understanding of its ethical, social, and epistemological implications (Hobbs, 2017; Pangrazio, 2019; Godhe, 2019). CDLs extend beyond functional digital skills to include critical awareness of bias, authorship, and information construction. For CLIL educators, this is especially relevant because developing bilingual disciplinary literacies requires not only language proficiency but also critical engagement with how knowledge is represented in digital media (Hüttner et al., 2025).

Yet, empirical studies show that most teachers continue to approach digital technologies instrumentally, focusing on technical operation rather than reflective or critical engagement (Calvani et al., 2012; Tour, 2017). The extent to which CLIL teachers recognize and integrate students' everyday digital and AI practices remain underexplored.

Recent European research has begun to document this gap between students' digital lives and classroom practice (Brevik, 2020; Llinares & Morton, 2023). However, few studies have compared teacher perceptions with student self-reports, particularly regarding AI-mediated

literacies. Understanding this relationship is essential for developing pedagogies that align with learners' authentic linguistic environments and for preparing teachers to integrate digital and AI literacies into CLIL instruction. Accordingly, this study investigates how CLIL teachers perceive students' extramural digital and AI-mediated practices, how these perceptions align with students' self-reported experiences, and how such practices inform instructional design.

1.1 CLIL and Disciplinary Literacy

CLIL integrates subject and language learning, promoting both linguistic and cognitive development (Coyle et al., 2010). The field has evolved from emphasizing methodology to focusing on disciplinary literacies—the ways in which language and multimodal resources construct knowledge within subject areas (Llinares & Morton, 2023; Morton, 2020). Research indicates that bilingual classroom discourse supports disciplinary reasoning when teachers explicitly scaffold how students use language to build conceptual understanding (Nikula, 2017; Llinares & Morton, 2023). The Bilingual and Multilingual Disciplinary Literacies (BMDL) framework (Hüttner et al., 2025) further situates CLIL at the intersection of content, language and mediational resources, positioning digital tools as central to meaning making. Nevertheless, most empirical studies focus on classroom discourse rather than how digital mediation or out-of-school practices influence disciplinary learning.

1.2 Teacher Cognition and Technology Integration

Teachers' beliefs, experiences, and institutional contexts critically shape how technology is used in classrooms (Ertmer & Ottenbreit-Leftwich, 2010; Tour, 2017). Despite positive attitudes, teachers often employ digital tools in limited, presentation-focused ways (Prestridge, 2012; Petko, 2012). In CLIL, such patterns affect the balance between content and language, as many teachers still prioritize content delivery over linguistic mediation (Llinares & Morton, 2023). Moreover, teachers often underestimate students' extramural learning and fail to link informal practices to curricular objectives (Brevik, 2020). This disconnect can lead to the exclusion of authentic digital experiences that could enrich disciplinary engagement. Extramural digital learning—learners' voluntary engagement with digital media outside formal instruction—has been shown to enhance linguistic and motivational outcomes (Sundqvist & Sylvén, 2016).

Participation in gaming, social networking, and online creative communities supports communicative competence and confidence (Henry et al., 2018; Lee & Dressman, 2018). Studies also link digital gaming to positive attitudes toward English and increased lexical use (Vnučko et al., 2023, 2024).

However, connections to academic achievement remain unclear. Such informal experiences often shape linguistic identity and self-directed learning (Sockett & Toffoli, 2012; Benson, 2021), yet they are rarely recognized in classroom discourse (Lai & Gu, 2011).

For CLIL, leveraging these authentic digital practices could enhance motivation and disciplinary learning, provided teachers have the awareness and pedagogical tools to do so. Integrating critical digital literacies within CLIL can strengthen both linguistic and disciplinary learning by promoting analytical engagement with digital sources. However, empirical work exploring this intersection remains scarce. Technology adoption is mediated by teacher confidence, institutional support, and beliefs (Inan & Lowther, 2010) which may explain why AI tools are still rarely embedded in CLIL practice despite students' growing familiarity. Recent frameworks, propose broadening CLIL to encompass digital and multimodal literacies (Llinares & Morton, 2023; Hüttner et al., 2025).

As students increasingly construct knowledge within multilingual and AI-mediated environments, CLIL educators must expand their literacy repertoires to encompass critical, digital, and AI-mediated forms of meaning-making. This study addresses this emerging pedagogical necessity by analysing how teachers perceive and integrate students' digital and AI-mediated practices, thereby bridging the conceptual and practical dimensions of CLIL in the digital age.

2 Slovak Context

This paper presents the national findings for Slovakia from the pan-European study conducted by CLILNetLe Working Group 4 (WG4). The overarching goal of the CLILNetLE Action (CA21114) is to investigate bi/multilingual disciplinary literacies (BMDLs) in Content and Language Integrated Learning (CLIL) contexts. The WG4 study focused specifically on digital practices that CLIL learners and teachers engage in both during lessons and in their spare time, and the influence these activities have on students' bi/multilingual disciplinary literacies. The Slovak report aims to provide a detailed and nuanced picture of students' digital literacies, their CLIL experiences, and the factors influencing their engagement with digital technologies. In Slovakia, CLIL, which stands for Content and Language Integrated Learning, has been promoted since 2001. However, there is no specific educational strategy or formal regulation from Slovak educational authorities to support its implementation. Consequently, CLIL is implemented voluntarily by school management or individual teachers, leading to an unclear count of schools suggesting that CLIL learners developed better linguistic communicative skills compared to non-CLIL peers, though content knowledge was not assessed, and the project was not continued.

The implementation of CLIL in Slovakia relies heavily on the capacities of school management and the availability of competent teachers. While educational authorities promote and support CLIL, mainly at the lower-secondary and secondary levels, they offer no direct support or regulation in the didactic and professional preparedness of teachers for CLIL. Therefore, pre-service teacher training for CLIL is gradually anchored into the curricula of four Slovak universities (Nitra, Bratislava, Trnava, and Prešov), and in-service teachers usually develop their didactic skills based on personal or professional interest. Given this context, the Slovak

investigation sought to capture comprehensive data on students' digital literacy skills, practices, and experiences, as well as teachers' engagement with digital tools for developing disciplinary literacies.

2.1 Methodology

This study utilized two complementary instruments developed by CLILNetLe WG4: the Digital Literacies Student Survey (DLSS) and the Digital Literacies Teachers Survey (DLTS) (Ghamarian, Neville, Segura, Smit, 2024). The DLSS aimed to investigate digital practices CLIL learners engage in outside education in English or other CLIL target languages. The DLTS aimed to investigate digital practices and resources used in school-based CLIL teaching. Both surveys were administered online via the Qualtrics platform, which facilitated multilingual distribution. The DLSS was administered in Slovakia between March and April 2024. The target participants were students aged 10-19. Data collection focused on bilingual schools and schools providing CLIL education at lower secondary and secondary levels in several locations, including Nitra, Bratislava, Sučany, Martin, and Prievidza. Participants were recruited through teacher training school networks, social media outreach, and collaboration with educational institutions. A total of 38 student participants responded to the survey. The DLTS was undertaken between February and April 2024. The target group for the DLTS survey were CLIL teachers working with learners aged 11 to 21. Schools were selected based on availability and willingness to cooperate, often utilizing existing networks of teacher trainers who work with pre-service and in-service teachers. Challenges in gathering data included participants' reluctance to take part due to limited time capacity. Only four valid responses were collected from Slovak teacher participants.

3 Results

The Slovak report presents the results of this national dataset (Kovacikova, Bagalova, 2024). The results section is structured based on the findings from both the DLSS (students) and DLTS (teachers) datasets for Slovakia. The results section is structured based on the findings from both the DLSS (students) and DLTS (teachers) datasets for Slovakia.

3.1 Digital Literacies Student Survey (DLSS) Findings

The DLSS captured participants across a diverse age range, with the largest group of respondents aged 9–10 and 11–13 years old. Most respondents were female (68%). A majority of students reported having parents/carers with a master's degree (N=15), followed by upper secondary (N=9) and post-secondary levels (N=7), with no respondents claiming primary level education for their parents. Students reflected Slovakia's multilingual environment, reporting the use of multiple languages at home, primarily Slovak (N=35), followed by English (N=6),

Czech, and Hungarian (N=5). The **main language of schooling was Slovak** (N=21), followed by English (N=14) and Hungarian (N=3). **English was overwhelmingly identified as the main CLIL language** (N=35), followed by Hungarian (N=2) and German (N=1). The most common CLIL subjects were Natural Sciences (N=12) and Social Sciences (N=11), followed by Arts, Languages, and Philosophy (N=8). Regarding CLIL instruction objectives, the average student perspective suggested a tendency towards "**language and subject contents**," with the mean score being 60.38% (on a 0-100 scale where 100% is entirely content-related), indicating that lessons were **balanced towards both language and content learning**. Moreover, the average scale for the extent of CLIL language use was 88.63%, suggesting that lessons were significantly oriented towards multilingual use.

3.2 Digital Literacies Teacher Survey (DLTS) Findings

The DLTS involved four teacher respondents (N=4). The majority were female (N=3), with one choosing the 'other' option. In terms of language background, 3 respondents identified as monolingual and 1 as bilingual. The teachers reported an **average teaching experience of 16 years** (ranging from 5 to 26 years) and an average of **4.75 years of CLIL teaching experience**. Three of the four respondents claimed to have received training in CLIL, primarily through specialized courses within a larger program, followed by professional development. The main CLIL languages taught were English (N=3) and German (N=1). Two respondents taught Language and Communication in CLIL, while one taught Arts and one taught Health Care.

Teachers' perceptions of CLIL lesson objectives varied, with the mean rating (48.5%) suggesting that objectives leaned towards **language and content integration**. Regarding language use in CLIL lessons, the average score was 63.25% (on a 1-100 scale where 100% is solely CLIL language). Two teachers claimed they mostly used the CLIL language (88% and 91%), while two claimed their lessons were more multilingual (35% and 39%).

Teachers reported that they spent an average of **17.5 minutes per lesson** using digital technologies (ranging from 15 to 20 minutes).

3.3 Use of Digital Tools and Perceptions (DLTS)

The teacher's responses indicated a significant reliance on certain digital tools in their main CLIL language practices, such as **social media, instant messaging, video streaming, and online research platforms**. This indicates these tools were integral for CLIL teaching. Tools like **multiplayer games and VR & AR technologies** showed lower usage frequencies. Regarding technology relevance, all respondents tended to think that using technology outside the classroom was beneficial for developing bilingual and multilingual disciplinary literacy skills. This is reflected in a high mean score of **79** (on a scale where 100 meant the highest benefit for developing disciplinary literacy skills). For the statement, 'Students' disciplinary literacy skills improve when incorporating technology into CLIL teaching,' all three respondents who

answered somewhat agreed. Most teachers perceived the use of technology by students as **'Quite important'** or **'Moderately important'** for CLIL lesson planning.

3.4 Critical Digital Literacies at Teachers and Students

Students highly valued spare-time activities that supported CLIL learning. Most activities were perceived as either 'Important' or 'Moderately Important'. Specifically, activities related to digital engagement, such as **using educational apps, watching educational videos, and participating in online forums**, were frequently marked as 'Important' for enhancing language and content learning. Most respondents (N=33) claimed to access the internet daily. Students reported facing challenges, including those related to limited internet access at school and potential issues with teachers' digital technology skills. For example, 7 students reported problems with **parents and limited internet access at school**, and 5 students identified teachers as being sometimes problematic within digital technology skills. Regarding Critical Digital Literacies (CDLs), three out of four teacher respondents were **aware of the concept**. Of those aware, reported frequency of use of CDLs in CLIL teaching varied, with one valid response ranging from 'slightly less frequent' to 'often' across the mentioned CDL strategies. The findings highlight that CLIL teachers in Slovakia generally view technology as critical for pedagogical strategies and believe it supports students' disciplinary literacy development, despite varying levels of adoption of newer or student-centred technologies like VR/AR.

4 Conclusion

The findings of this study reveal a clear generational and pedagogical divide in how students and teachers in Slovak CLIL contexts engage with digital technologies and develop digital literacies. While students demonstrate high levels of digital fluency and regularly engage in diverse extramural practices, such as social networking, gaming, and online content creation- teachers tend to adopt a more cautious, instrumentally oriented approach within formal CLIL classrooms. This discrepancy suggests that students' informal digital competencies remain an underutilized resource in bilingual education, limiting opportunities to connect their authentic linguistic and multimodal experiences to curricular learning.

The results also underscore that, although teachers recognize the potential of digital tools to support disciplinary literacies, their implementation remains fragmented and often dependent on individual initiative rather than systematic support. The low integration of advanced or student-driven technologies such as virtual and augmented reality indicates that digital practices are still largely confined to traditional, presentation-based formats. Furthermore, while awareness of Critical digital literacies (CDLs) and AI-mediated learning is emerging, these concepts have yet to be embedded into classroom routines or teacher training frameworks in Slovakia. To bridge the existing gap, teacher education programs should prioritize the development of critical and pedagogical digital literacies, equipping

educators with both theoretical understanding and practical competence to integrate students' everyday digital experiences into CLIL instruction. Institutional policies and national strategies are also needed to provide structured professional development and sustained support for technology-enhanced bilingual education. By aligning teaching practices with students' evolving digital realities, CLIL can more effectively foster bilingual disciplinary literacies that prepare learners to navigate multilingual, multimodal, and AI-mediated environments.

Ultimately, this study highlights that the future of CLIL in Slovakia, and more broadly across Europe, depends on rethinking the digital dimension of bilingual education. Integrating informal digital practices, fostering critical awareness, and embracing innovation are key to ensuring that CLIL pedagogy remains responsive to the complex literacies that define contemporary learning.

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