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Conceptualization and Navigation of CLIL in a Trilingual Context

Abstract

This study explores how Content and Language Integrated Learning (CLIL) is conceptualized and navigated within Kazakhstan's trilingual education context, specifically in Nazarbayev Intellectual Schools (NIS), focusing on computer science instruction in English as a third language (L3). Utilizing qualitative interviews with 19 teachers and 12 students, alongside document analysis of lesson plans, the research identifies five emergent themes in CLIL conceptualization: defining CLIL as a dual-focused approach, teachers' evolving understanding, CLIL as a catalyst for student-centered learning, instruction through an additional language, and content prioritization. Teachers employ translanguaging to address their own English limitations and ensure student comprehension, particularly given the rigorous curriculum and lower teacher language proficiency. Despite prioritizing content, teachers increasingly emphasize academic language development to meet external assessment demands. The findings underscore the need for equitable access to robust training programs to support effective CLIL adoption and optimize student learning outcomes.

Keywords: English-medium CLIL, trilingual education, scaffolding, translanguaging, Kazakhstan

Content and Language Integrated Learning (CLIL) emerged in Europe during the 1990s and has since gained global recognition. Coined by David Marsh, CLIL is defined as a dual-focused educational approach in which content subjects are taught through an additional language (Marsh, 2002). However, merely changing the medium of instruction does not constitute CLIL. In successful CLIL examples, all teachers feel responsible for language development to a greater or lesser extent (Marsh & Frigols Martín, 2013).

The educational purpose of CLIL is to provide more exposure, authentic use, and interaction in the target language, thereby increasing motivation by making the language essential for academic success (Lo, 2020). This pedagogical approach benefits students by offering substantial language support, enhancing content comprehension, and engaging learners through dynamic activities. As Dalton-Puffer (2011) highlights, CLIL can act as a catalyst for transforming classroom practices, fostering a shift from traditional, teacher-centered methods to more interactive, student-centered learning approaches. Furthermore, research shows that CLIL students often outperform non-CLIL peers in additional language learning without compromising their first language or content mastery (San Isidro & Pérez Cañado, 2023).

Despite its benefits, CLIL implementation poses challenges, particularly in balancing content and language instruction. This tension is evident in the distinction between "hard" (content-driven) and "soft" (language-driven) CLIL. In hard CLIL, subject teachers prioritize content and may lack expertise or interest in language development, whereas soft CLIL uses content as a vehicle within language lessons (Llinares et al., 2024). Content-driven teachers, in particular, may see themselves primarily as subject specialists, making it difficult to adopt language-integrated pedagogy (Villabona & Cenoz, 2021; Kim & Park, 2024).

The success of CLIL is highly context-dependent, influenced by educational systems, school types, and sociocultural factors (Coyle, 2005; Otwinowska & Foryś, 2015; Roiha, 2019). In Kazakhstan, the trilingual education policy—where instruction occurs in Kazakh, Russian, and English—presents unique challenges, especially for content teachers with limited English proficiency. To explore these dynamics, this study investigates how computer science teachers conceptualize and navigate CLIL within Kazakhstan's network of elite schools, contributing to a deeper understanding of CLIL in diverse educational settings.

Literature Review

Content and Language Integrated Learning

Although the term CLIL may imply that content and language are two separate components, each requiring individual attention, it is essential to recognize that they form an inseparable entity. Content inherently involves language, just as language is embedded in content (Ball et al., 2015). As Moate (2010) emphasizes, language serves as the primary tool for constructing knowledge and understanding, playing a vital role in accessing, processing, and demonstrating learning. If language and content are always already integrated, then

what does it mean to integrate content and language learning? As Lin (2016) explains, the key lies in distinguishing between two pedagogical approaches: *using* discipline-specific language to teach content and *teaching* discipline-specific language to discuss content.

In a CLIL environment, as in any other non-CLIL educational setting, subject teachers are responsible for equipping students with the language needed to engage effectively with their discipline, enabling students to articulate subject-specific concepts. A significant challenge in CLIL education, however, is that the language of instruction is a non-native language for students and often also for teachers.

To address these challenges, Coyle (1999) developed the 4Cs framework, a pedagogical model designed to integrate content and language learning effectively.

The Framework starts with *content*, which provides the foundation for learning language and thinking skills and encourages reflection and idea creation, building cognitive skills rather than just knowledge accumulation. Importantly, learning content through a foreign language does not necessitate the simplification of knowledge. On the contrary, students should be appropriately challenged to ensure a deep understanding of the concepts being taught. To achieve this, the *cognition* aspect of the framework advocates progression from lower-order thinking skills (remembering, understanding, and applying) to higher-order skills, including analyzing, evaluating, and creating. CLIL encourages inquiry-based learning, problem-solving, and the application of knowledge in diverse contexts, ensuring that students develop a well-rounded cognitive framework that extends beyond rote memorization.

Communication, the next pillar of the framework, highlights the necessity of acquiring knowledge through interactive engagement with both peers and instructors. Given that students are learning through a language that is not their first, accessibility becomes a key concern. CLIL ensures that students engage not only with general language—Basic Interpersonal Communicative Skills (BICS)—but also, and especially, with subject-specific and academic language–Cognitive Academic Language Proficiency (CALP) (Cummins, 2000). It places particular emphasis on academic language functions such as "defining, comparing, or justifying" (Dalton-Puffer, 2004) to facilitate attention to academic language, and enhance integration. Unlike traditional language learning, which often follows a grammar-based syllabus, CLIL tailors language instruction to the content being studied. For instance, if the content requires the use of the past tense and learners have not studied this, then CLIL lessons will enable learners to access the language needed in the defined context in various ways. This may initially involve using key phrases in the past tense without studying the complete tense formation at this stage (Coyle, 2005). The final aspect of the framework—*culture*—focuses on developing "self" and "other" awareness and

pluricultural understanding. Since language and content are deeply intertwined with cultural and contextual influences, CLIL encourages students to explore and recognize these connections.

Scaffolding in CLIL

CLIL aligns with the concept of the zone of proximal development (ZPD) by providing learners with the appropriate scaffolding to engage with challenging content in a new language, enabling them to advance their understanding and skills through collaborative interactions and guided support. The concept of ZPD was introduced by Soviet psychologist Vygotsky (1978), who emphasized that the skills a person gains through collaboration with others can exceed what they can achieve independently. Fostering language development and content understanding through scaffolding is a key principle of CLIL pedagogy.

In a CLIL setting, scaffolding plays a crucial role in helping students process input (i.e., reading and listening/watching) and develop their productive skills, namely speaking and writing (i.e., output). This support is essential as students must be able to express themselves clearly in order to demonstrate to both themselves and their teachers that they are learning (Ball et al., 2015).

Building on this, Mahan (2022) identified key comprehension and task-solving strategies for scaffolding second language learning. To enhance comprehension, strategies such as activating students' prior knowledge, supporting academic language development (e.g., encouraging students to describe terminology in their own words or providing bilingual translations), and incorporating additional resources (e.g., visual aids, graphic organizers, and body language) can help deepen understanding. In task-solving, strategies such as revoicing (repeating the student's answer in academic language), repetition (echoing a student's response), elaboration (prompting students to justify or expand on their answers), and modelling (demonstrating how to perform a task or solve a problem) are valuable for helping learners develop both effective and respectful approaches to problem-solving.

In CLIL lessons key language items need to be highlighted and made salient and include ample opportunities for students to interact in pairs or groups (Ball et al., 2015). This interactive approach aligns with Llinares et al. (2012), who emphasized the value of peer scaffolding through group work activities that facilitate the co-construction of knowledge.

Another crucial aspect is supporting the students' output, both written and oral. Teachers may use substitution tables or models of written texts or graphic organisers, which can support oral and written production as well as revision (Ball et al., 2015). Additionally, Siepmann et al. (2023) emphasized the importance of providing useful phrases as output scaffolds.

Role of L1 and Translanguaging in CLIL

Mahan (2022, 2023) and Gierlinger (2015) highlighted that L1 is an important source of scaffolding in CLIL. The use of L1 as scaffolding is also supported by other studies (Feller, 2021; Siepmann et al., 2023). Ting (2023) argued that L1 can be a powerful instructional tool when deployed through rigorous translanguaging practices. Translanguaging enables learners to fluidly alternate between languages, drawing on their entire linguistic repertoire to make sense of content, communicate more effectively, and deepen their learning. Butzkamm's (1998) study, as cited in Lasagabaster (2017), examined a history class conducted in English and observed that students frequently requested German translations for challenging English words. Butzkamm argues that code-switching acts as a "necessary conversational lubricant" and "can never be eliminated from the pupils' minds," serving as "a natural shortcut" when applied effectively and systematically (Lasagabaster, 2017, p. 253).

Ting (2020) argued that developing disciplinary literacy represents a significant challenge even in L1 education; thus, we must ensure that using a foreign language to teach content at advanced levels does not turn what is already difficult into the impossible. Research shows that translanguaging can reduce student anxiety, boost engagement, and build practical skills in CLIL settings (Moore, 2024).

Teachers' Conceptualization of CLIL

Teachers play a pivotal role in the success of CLIL, as its effectiveness largely depends on how they conceptualize CLIL and how they perceive their responsibilities in the classroom (Karabassova, 2018; Zhang et al., 2024). Research conducted in various contexts has consistently shown that CLIL teachers often see themselves as content teachers rather than language facilitators and find it challenging to integrate content and language (Bárcena-Toyos, 2020; Karabassova, 2018; McDougald et al., 2023; Skinnari & Bovellan, 2016; Villabona & Cenoz, 2022; Zhang et al., 2024). They prioritize content over language teaching, decline responsibility for explicit language instruction, and demonstrate a low awareness of the pedagogical intentions behind CLIL (Karabassova, 2018).

A key concern among content-driven educators is that incorporating a foreign language into instruction may slow down lesson pacing, limit content coverage, and reduce cognitive demands due to language barriers (Bárcena-Toyos, 2020; Karabassova, 2018; Skinnari & Bovellan, 2016). Consequently, many teachers reject integrated teaching, fearing it may hinder their ability to meet content

learning objectives. They believe that allocating time to language instruction could "jeopardise students' subject matter knowledge" (Karabassova, 2018, p. 5).

Another prevalent belief is that language instruction falls outside their professional responsibilities, which they perceive as the domain of English teachers (Karabassova, 2018; Villabona & Cenoz, 2022). This perspective stems partly from a limited understanding of the pedagogical goals of CLIL. For instance, Lazarević (2019) found that high school teachers in Serbia did not modify their instructional strategies for CLIL classes, using the same pedagogy as they did for teaching in the L1. Similarly, in Kazakhstan's trilingual education context, teachers conceptualized CLIL as merely teaching through another language, without recognizing the dual focus on both content and language (Karabassova, 2018). In Spain, primary school teachers associated language integration exclusively with vocabulary acquisition, neglecting broader linguistic competencies (Bárcena-Toyos, 2020).

Additionally, many educators doubt their ability to integrate content and language effectively due to inadequate training or limited proficiency in the target language (Segura, 2023; Thuy, 2016). As Llinares et al. (2024) highlight, a major obstacle to successful implementation is the lack of familiarity with established frameworks that support content and language integration.

To address these challenges in a unique setting, this study examines how content-driven teachers conceptualize and navigate CLIL within Kazakhstan's trilingual education context, specifically in Nazarbayev Intellectual Schools (NIS). It explores two research questions:

RQ1. How is CLIL conceptualized in the context of teaching and learning computer science in English as a third language in Kazakhstan's trilingual pilot schools?

RQ2. How do teachers and students report navigating CLIL in this context?

Methodology

Research Setting

The research reported here was part of a larger study examining teachers' and students' perceptions and practices in integrating CLIL supported by Information and Communication Technology (ICT) in computer science. The study was conducted within a network of 21 state-funded Nazarbayev Intellectual Schools (NIS) located across 18 major cities in Kazakhstan. The network was established in 2008 to bring radical changes to Kazakhstan's education system by testing international innovative educational programs and the

trilingual educational model (Karabassova, 2018). Admission to these schools is highly competitive, with rigorous selection ensuring top-tier teachers and gifted students.

NIS offers two educational streams based on the language of instruction: Kazakh and Russian. In Grades 7–10, most subjects are taught in students' first language (L1), with a smaller portion in their second language (L2). By Grades 11–12, the curriculum adopts a trilingual approach, incorporating Kazakh, Russian, and English (L3) for separate subjects, with an increasing emphasis on English as the primary language of instruction (Karabassova, 2019).

Graduates of NIS undergo an independent external assessment of their academic achievements. This assessment system was developed collaboratively by the Autonomous Education Organization of Nazarbayev Intellectual Schools (AEO NIS) and the International Examinations Board of the University of Cambridge. Upon completion of high school, the academic performance of NIS students is evaluated based on international standards such as AS-level or A-level qualifications (AEO NIS, 2017). Given its emphasis on internationally benchmarked outcomes, this assessment framework influences teaching and learning practices, including the integration of CLIL.

In support of this internationalized approach, NIS also employs foreign teachers to foster a trilingual environment. Through a team-teaching model, local and international teachers collaborate to co-deliver lessons, enriching the educational experience for students (AEO NIS, 2016).

Participants and Procedure

The study utilized partially purposeful convenience sampling (Dörnyei, 2007). Participants were selected based on availability and willingness, with key criteria including: (1) NIS computer science teachers instructing grades 11 and 12 in English, and (2) students in grades 11 and 12 who chose computer science as their profile subject.

Data collection took place from March to May 2023 and involved interviews and document analysis. In-person interviews were conducted at one NIS school, while online interviews were held via Google Meet for participants from other schools. The sample consisted of 19 teachers, including three international teachers (T5, T10, T13), and 12 students from nine schools. Following the interviews, teachers were asked to provide lesson plans and instructional materials used in their courses for the purpose of document analysis.

The qualitative data were analyzed through content analysis using both deductive and inductive coding to identify and categorize themes. Analysis of background data revealed disparities in English proficiency between teachers and students. While 67% of students demonstrated C1 proficiency according to

the CEFR (Common European Framework of Reference), 25% were at the B2 level. In contrast, only 11% of teachers reported having C1 proficiency, 26% were at B2, and the majority (47%) indicated a B1 level.

The average teaching experience in computer science among the educators in this study was 14.8 years, with an average of 6.57 years of experience using CLIL. A significant majority of teachers reported having attended in-service courses at NIS, though the number of CLIL courses they attended varied, as did the length and types of the courses and workshops. These ranged from short three-day workshops to more comprehensive six-month courses. The teachers identified three primary types of CLIL training they had participated in: courses abroad, domestic courses, and intraschool courses.

Results

CLIL Conceptualization

Data from interviews with teachers and students revealed five interrelated themes of how CLIL is conceptualized and interpreted in this context: (1) defining CLIL as a dual-focused approach; (2) teachers' evolving understanding and confidence in CLIL; (3) CLIL as a catalyst for active and student-centered learning; (4) CLIL as instruction through an additional language; (5) prioritization of content.

Defining CLIL as a Dual-Focused Approach

When asked to define their understanding of CLIL, most teachers emphasized its dual focus, highlighting the integration of subject content and language development. As one teacher put it: "Basically, my understanding of CLIL is to not only focus on the content, but also to carry the language along. Teaching content through language, teaching language through content" (T14).

Several teachers explained that tasks within a CLIL framework are designed not only to deepen students' understanding of the subject matter but also to develop their academic language skills. This dual role was clearly illustrated by one teacher's description of their approach:

> How do I understand [CLIL]? I talk to them regularly, I get them to do written work, I check over their grammar, I try to get them to write more. The more they write, the more they are thinking about what to write. I also give them material to read. So, they learn ways to answer questions, ways to

> technically write the vocabulary words to match the requirements of those questions. It's just continuous practice of language: keep on talking to them, give them written work where they can reflect back on what was taught. (T13)

Educators also emphasized addressing the additional challenges students face when learning in a third language:

> When you teach in English, you also need to consider the language barrier of students. You need to emphasize key words, teach them to express their opinions, and provide arguments in a language that is not their native one. You also need to dedicate time to enhancing the students' language skills. (T17)

From the student perspective, transitioning to learning content in English posed considerable initial difficulties, especially with grasping complex terminology and articulating ideas in academic language. Many students acknowledged that their teachers played a key role in supporting both comprehension and communication.

To aid understanding, teachers often simplified complex concepts using everyday language, offered explanations in students' native languages when needed, and encouraged questions to clarify confusion. Beyond comprehension, teachers also provided targeted support to help students express ideas effectively in English. This included explicit instruction in academic vocabulary, guidance in writing techniques, and strategies for constructing coherent, subject-specific responses. Students appreciated this scaffolding, particularly in the early stages of their CLIL experience. As one student recalled:

> Especially at the beginning, we struggled with terminology and expressing ideas in the right way. But the teachers helped us understand how to use special words. For example, we used to memorize important verbs for describing processes. We learned how and when to use them (S7).

These reflections demonstrate that, within a CLIL framework, teachers focus not only on supporting students' understanding of subject matter but also on equipping them with the linguistic tools needed to communicate their ideas in a non-native language.

Teachers' Evolving Understanding and Confidence in CLIL

Although most teachers defined CLIL as a dual-focused approach, a more nuanced picture emerges when considering the depth of their understanding and varied experiences with CLIL across the sample.

Approximately one-third of teachers acknowledged having a limited grasp of CLIL methodology, often due to insufficient experience or superficial professional development. For instance, one teacher with two years of experience at NIS, who had only been introduced to CLIL through short-term training sessions, shared his limited familiarity with the approach: "Well [sighs], what can I say, CLIL methodology, as the name suggests, is a methodology for teaching a subject integrated with a language. That is all I know" (T2). Similarly, another teacher with nearly a decade of teaching experience at NIS but only three years of subject instruction in English, reflected on the partial and fragmented nature of her knowledge: "I would not say that I have fully acquired CLIL. For instance, I can incorporate 1–2 CLIL methods, but I cannot claim to have completely embraced CLIL, truly and comprehensively mastering it" (T19).

During the early stages of CLIL implementation, many teachers tended to interpret the methodology narrowly, viewing it mainly as a vocabulary acquisition strategy. Instead of understanding CLIL as a holistic approach that integrates both content and language objectives throughout the lesson, they often focused on teaching subject-specific terminology in English. For instance, T11, who has two years of CLIL experience and learned about the methodology through short workshops, stated: "I aim to connect the lesson with the CLIL method so that it is easy for students to memorize terms or commands in different languages."

Several teachers, now confident in their CLIL practice, acknowledged that their initial approach had been similarly limited. They recalled starting by providing vocabulary lists and using a significant amount of learners' first or second language to support understanding. Reflecting on her development, T8 admitted: "Initially, I thought CLIL centred around employing strategies to master key terminology in lessons. My understanding evolved as I engaged in CLIL courses and workshops."

In contrast, approximately two-thirds of the interviewed teachers expressed confidence in implementing CLIL pedagogy. These teachers typically had extensive training and experience in English-medium contexts. Notably, especially those who completed CLIL courses in the UK or a six-month blended course in Astana demonstrated high confidence and deep CLIL knowledge. They emphasized the training's focus on practical application, which included recording their lessons, conducting self-analyses, and engaging in peer reviews and expert feedback. This rigorous process provided detailed observations and targeted suggestions, significantly refining their instructional practices.

Confident CLIL practitioners reported using a diverse range of instructional strategies designed to promote both subject content understanding and language development. They actively incorporate comprehension, speaking, and writing tasks, while adapting scaffolding techniques to meet their students' individual

needs. Rather than being preoccupied with their own language proficiency, these teachers prioritize student communication and engagement.

CLIL as a Catalyst for Active and Student-Centered Learning

Both teachers and students conceptualize CLIL as a dynamic and student-centered approach that contrasts with traditional, teacher-led instruction. Teachers describe CLIL as a framework that transforms their role from knowledge provider to learning facilitator, enabling students to take a more active role in their education. As T1 noted: "CLIL is very interesting for children. This is because the lessons are conducted in a non-standard way. A teacher does not explain in front of the blackboard for 40 minutes, but children work independently."

Teachers frequently reported using group work, peer teaching, and research-based activities to foster engagement and autonomy. The jigsaw method was identified as a common strategy, enabling students to learn specific parts of a topic and then teach them to their peers. According to teachers, this approach promotes active involvement and deeper comprehension. As one teacher noted, "If students can explain the new topic to others, it indicates that they have mastered the lesson" (T14). Teachers viewed peer-led learning as especially effective in diverse classrooms, where it encourages mutual support and accommodates varying language and academic skills.

Students also reported positive perceptions of CLIL's student-centered nature. They expressed appreciation for the autonomy to explore topics independently and to learn from one another. Several students highlighted that self-directed research and peer presentations helped them better understand the material. One student (S8) remarked, "Well, this year I learned the best thing ever: doing self-study [through collaboration] […]. Listening to people who have just learned the material is easier than getting the point from someone who has known it for maybe 30 years."

Despite these evident benefits, teachers acknowledge the challenges of consistently implementing student-centered approaches, particularly when constrained by limited instructional time or complex subject matter. The pressure to cover mandated curricula often forces educators to revert to more traditional, teacher-directed methods to ensure all essential content is delivered. Several teachers reported that group activities can frequently extend beyond their planned duration, partly due to a lack of experience in efficiently managing and facilitating such tasks.

Nevertheless, the CLIL environment encourages a culture of mutual learning and collaboration that transcends traditional roles. Teachers often rely on students for linguistic support, especially when their own command of English is limited. Students step in to correct mistakes or offer translations when

teachers struggle to recall specific terms. Students are often encouraged to explain concepts to one another. Those who complete tasks early frequently assist classmates who may still have questions, helping to identify and correct mistakes. Additionally, peer assessment is practiced, with students evaluating each other's work according to criteria developed collectively by the class.

CLIL as Instruction Through an Additional Language

Teachers reported implementing CLIL not only in the upper secondary grades (Grades 11–12), where computer science is taught in English for six hours per week, but also in the lower secondary grades (Grades 7–10), where the subject is delivered in Russian, the second language of Kazakh-medium students.

While English is the students' third language and would generally be expected to require more targeted language support, approximately one-fourth of the teachers indicated that they made no substantial changes to their instructional approaches when teaching through Russian (L2) or English (L3).

> I would not say there are many differences. All forms of work that I know, I use in both regular classes and those conducted in English. The difference is just the language, I think. During CLIL training, I studied various methods, but I also use them in regular classes. You just need to translate some words, and that is it. (T6)

These teachers emphasized that they consistently apply the same learning strategies and digital platforms regardless of the language of instruction. Teachers from regions such as South Kazakhstan—where Russian is less widely spoken than in the northern and eastern parts of the country—acknowledged that students initially experienced language barriers when studying the subject in Russian. For this reason, they reported using CLIL strategies even in the lower grades.

Although teachers noted that Russian generally poses fewer difficulties due to higher levels of proficiency among both teachers and students, they still perceived minimal differences in their overall methodology between teaching in Russian and in English. This consistency in instructional approach was partly attributed to students' strong language preparation over time. Many teachers believed that most students possessed sufficient linguistic competence to engage meaningfully with subject content in English, which further reduced the need for major instructional adjustments.

Similarly, students themselves perceived minimal differences between learning through Russian or English. Many emphasized that the primary distinction was simply the change in the language of instruction. For instance, when asked

whether studying in English differed from learning in Kazakh or Russian, one student responded:

> Honestly, no. Maybe it is because we have been prepared for this since the 7th grade, and we have developed strong English skills, so studying subjects in English is not challenging for us. Therefore, in higher grades, subjects are taught in English at a similar level to those in Kazakh and Russian. There are no significant differences. (S4)

Prioritization of Content

While many teachers noted that they do pay attention to language support and development, the balance between content and language does not seem equal. Teachers consistently emphasized that they prioritize content goals.

> The primary goal is content, and we must deliver it anyway. Therefore, when students sometimes do not understand in English, we explain in Russian or Kazakh. Yes, we support the use of the English language, but it is crucial not to neglect any aspect of the content. Ultimately, the demand will be for the content itself. (T15)

Students echoed this sentiment, emphasizing comprehension over the medium of instruction. As one student (S1) stated: "For me, the most important thing in these subjects, physics, and computer science, is to understand the material. I do not pay much attention to the language in which I comprehend it."

According to participants, the prioritization of content is necessary due to the rigorous nature of the computer science curriculum at NIS. Both teachers and students highlighted the demanding nature of the program, drawing a contrast with traditional schooling systems. Not only students but even teachers faced challenges due to the complexity and broad scope of the curriculum:

> There has been a significant change in the teaching process since I started working at NIS. When I arrived in 2014, my academic education was not sufficient for the curriculum in this educational system. Creating projects, getting students ready for external summative assessments, and considering university-level curriculum topics were all part of the process here. To be honest, it took us about a year to grasp everything. It felt like going through another round of university education. (T9)

Students also described stark differences between their current computer science classes and those in their previous schools. In contrast to the simpler topics and tasks they experienced before, NIS students engage with more

complex content and undertake various programming projects, such as creating websites, mobile apps, and games. They also noted the intensity of the curriculum: "There are times when we have very limited time for a specific topic, for example, just two lessons for that topic, which can be insufficient" (S5).

Given the technical focus of the program, most time and resources are dedicated to teaching the subject matter itself, which leads to limited opportunities for explicit language instruction. A review of lesson plans and materials confirmed this, revealing that while teachers define language objectives—such as key subject-specific vocabulary and phrases for both communication and writing—these may not always clearly communicated to students. While both subject and language objectives were outlined in the plans, supplementary materials, such as PowerPoint presentations, primarily emphasized content objectives. This suggests that although teachers may inform students about the content goals, language objectives may not be as explicitly addressed in practice.

Navigation of CLIL

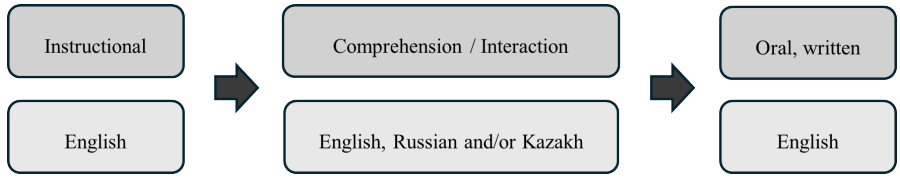
In this section, to answer the second research question, we explore how teachers and students navigate the CLIL approach in a trilingual context, focusing on the use of translanguaging to address teachers' own language limitations and to support student comprehension. Additionally, the section highlights the increasing attention teachers give to academic language development, particularly in response to the requirements of external summative assessments.

Translanguaging

Since content objectives are prioritized, teachers focus on ensuring that students develop a deep understanding of key concepts. To achieve this, a common instructional practice involves preparing all materials and resources in English while using the full linguistic repertoire (English, Russian, or Kazakh) to explain or clarify concepts. However, when it comes to student output, whether spoken or written, teachers consistently require responses to be in English (see Figure 1).

Figure 1

Navigating Language use in CLIL Computer Science Classroom



All teachers and students reported that instructional materials are provided exclusively in English. Teachers explained that these materials are developed collaboratively through a process they call "joint planning" or "horizontal planning." This approach brings together all teachers who teach parallel classes to plan lessons for the upcoming week. During these sessions, they focus on selecting appropriate resources, methodologies, and instructional techniques, resulting in a unified lesson plan. Teachers regard this collaborative planning model as highly effective, noting that it not only streamlines the planning process and saves time but also promotes professional growth through peer collaboration. Additionally, they noted that computer science educators across all 21 Nazarbayev Schools have developed a shared repository of lesson plans and instructional materials. This centralized resource further enhances collaborative learning and the sharing of best practices. As a result, the interviewed teachers reported facing no significant challenges in creating instructional materials in English.

Although instructional materials are provided in English, teachers acknowledged that English is not used exclusively during lessons. While most believe the subject should ideally be taught entirely in English, many admitted that this is currently impractical due to language limitations. International teachers also noted that the use of multiple languages is inevitable in the Kazakhstani context.

The extent of English usage varies among teachers. While many reported using English 70–100% of the time, those with less experience teaching in English and lower proficiency admitted to using it as little as 30% during instruction.

Interviews with teachers and students revealed that translanguaging serves two key functions: it helps teachers navigate their own limitations in English proficiency and ensures that students, especially those with weaker English skills, fully comprehend the material.

Teachers who do not feel confident in their English proficiency admitted that they typically prepare for lessons by planning to explain new topics in English, sometimes even memorizing key points. However, during the actual lesson, unexpected questions may arise. In such moments, teachers may need to switch to Russian or Kazakh to provide clearer explanations, as they may not have been prepared for such inquiries.

> At the beginning of the lesson, we start purely in English: the topic, objectives, and if the topic is not complex, I can explain everything in English, yes. However, if the topic is challenging, I automatically switch... I do not even realize when I switched to Russian or Kazakh. (T6)

Interview data also revealed that some teachers are fluent in English and capable of conducting classes entirely in the language. Several students confirmed that their teachers primarily use English during lessons, with only

occasional shifts to Russian or Kazakh. When asked whether teachers always speak English in class or sometimes switch languages, one student explained:

> No, mostly in English, because our teacher is really fluent in English, and we understand the concepts. Even if we do not understand some words, he can explain them in simple terms. But there might be rare cases when someone makes a joke in another language, and the teacher also jokes in other languages occasionally. Well, that happens. (S12)

Students also shared examples of translanguaging in response to learning challenges. For instance, one student noted, "Generally, the presentation and materials are in English, and the teacher initially explains in English. However, if we encounter difficulties or have many questions, the teacher explains in Kazakh or Russian" (S5).

Despite this flexible approach during instruction, a clear boundary is maintained regarding students' output.

> Once the concept is understood, our next step is to assess whether they can express their ideas. This is where teachers need to put in extra effort, providing support to help students articulate their thoughts in English clearly. (T10)

Students echoed this perspective, describing a natural transition between languages depending on the task. During collaborative activities, students often use multiple languages to discuss and explore ideas. However, when it comes to formal outputs—such as presentations—they adhere to English as the language of delivery. One student articulated this practice as follows: "Actually, it is a mix of all three languages we know, but when presenting, we speak only in English" (S8).

Focus on Language Development

While content often takes precedence due to teachers' roles as subject specialists and the demands of the curriculum, they increasingly recognize language development as a crucial tool for content acquisition and make deliberate efforts to address it. Although it may not receive equal emphasis, responses from both teachers and students indicate that it still receives attention.

Focus on Academic Language and Subject-Specific Terminology. Participants in the study consistently reported that the use of academic language and subject-specific terminology is a central focus in CLIL classrooms. This emphasis is largely driven by the requirements of external summative

assessments, which often include explicit criteria for the use of formal, subject-appropriate vocabulary.

> Many exam questions state "use academic language," and if there are four points for the right answer, three points are for how well you answered the question, and the fourth point is for using academic language. Students must use the correct terminology because it is evaluated with a 1-point score. We often have arguments where students say, "I wrote everything correctly," but they used simple, colloquial words, showing their academic language level is low, so they get lower marks. (T7)

Students indicated that, particularly at the beginning of their CLIL experience, they struggled with articulating their ideas using precise and formal language. They often found it difficult to express themselves clearly and concisely using subject-specific terms. Over time, these skills improved with the support of teachers who provided targeted guidance, clarified assessment criteria, and explicitly taught relevant terminology.

Teachers reported employing a wide range of instructional strategies to develop students' vocabulary knowledge. These included activities such as matching terms with definitions or images, gap-filling exercises, word cloud, mind map creation, and interactive games designed to reinforce terminology in context. Collaborative methods such as peer teaching and group discussions were also frequently used to deepen understanding of key terms. Vocabulary support was further enhanced through visual tools like keyword displays and the use of multilingual approaches to aid comprehension and retention.

Even teachers who have not participated in any long-term CLIL courses mentioned that they pay attention to key words and terminology.

> I have not taken CLIL courses, but what I have learned from the workshops, when our colleagues shared their experiences, is the method of identifying key words or phrases within a given text and effectively working with them. I actively apply this knowledge during my lessons. CLIL offers a variety of methods and numerous strategies for this purpose. (T19)

Lesson planning materials reviewed in the study further supported these claims, showing consistent inclusion of vocabulary-focused tasks designed to introduce and reinforce technical language.

Focus on Developing Language Skills. Teachers noted that external exam questions also require familiarity with different forms of writing and attention to academic language functions.

> Some of those exam questions ask for essay-style answers worth six or eight marks. We go over those questions and explain how to answer them. For example, if the question says "justify" or "explain," we clarify what "justify" and "explain" mean. If it says "identify," we explain what "identify" means. We look at the keywords in the exam questions, break them down, and then explain what is expected. Sometimes we ask them to identify, and other times we ask them to explain with given reasons. (T13)

Teachers routinely incorporate writing tasks modelled on the formats of external Cambridge assessments. These tasks are typically completed by hand within timed conditions to simulate exam settings. Afterward, teachers and students engage in collective review and reflection on the responses.

In addition to assessment-based tasks, writing activities embedded in lesson materials often support students' use of academic structures and technical vocabulary. Scaffolding techniques, such as sentence starters and guided writing frames, are commonly used in lesson plans. For example, in a lesson on the topic "Assembler," students were provided with structured prompts to compare concepts:

> The main difference between … and … is that …
> I can also note the difference in …
> Advantages of … are …
> … has several disadvantages like … (LP 9)

Additionally, substitution tables were incorporated into other lesson plans to assist students with comparative language structures. For example, in LP10 (Topic: Generation of Programming Languages), the following substitution table was provided (see Table 1).

Table 1

The Substitution Table

Lower level languages	**are (not) as X as**	higher/lower level languages
Higher level languages	**are X-er than** / **are more X than**	
Higher/lower **level languages are** X, but/whereas/ higher/lower **level languages are** Y		

Teachers underscored the importance of developing students' reading comprehension, especially when interpreting complex exam questions.

> We advise students to begin by carefully reading the questions. Often, students provide incorrect answers because they have not grasped the questions properly and rush to respond immediately. We emphasize the importance of starting with the questions because sometimes the answer lies within the question itself. (T7)

To foster reading comprehension, many lesson plans incorporate self-reading tasks paired with visual aids such as images, graphs, and diagrams. These multimodal texts are followed by a range of comprehension exercises—including open-ended questions, True/False tasks, table completions, term-sorting based on diagrams, and simulator-based activities—to reinforce understanding and encourage close reading of academic materials.

As mentioned earlier, teachers reported consistently encouraging students to use English during verbal interactions. While translanguaging is permitted during initial stages of concept development, the expectation is that students eventually express their understanding in English. This is achieved through prompts, modelling, and interactive scaffolding. One teacher described a typical classroom interaction: "When students speak in Kazakh or Russian, I say, 'Now, try to say the same thing in English'" (T18). Teachers reported initiating discussions, posing guiding questions, and providing key phrases to support spontaneous and structured speaking tasks. Lesson plans reflect this practice, incorporating dialogues, discussion starters, and peer interaction activities.

Listening activities are supported through the integration of multimedia resources, particularly short educational videos. Teachers reported frequently using videos to explain complex computer science concepts with clear visual and auditory support. Videos are carefully selected to align with specific learning objectives and are typically kept under five minutes to maintain students' attention and maximize instructional value. Many teachers reported employing a pause-and-discuss approach—stopping the video at key points to explain terms, check for understanding, or initiate discussion. In addition, videos are often accompanied by targeted comprehension tasks, such as guided questions.

The deliberate integration of academic language instruction ensures that students not only grasp subject content but also develop the linguistic competence required to interpret and respond effectively to the demands of external examinations.

Discussion and Conclusion

CLIL manifests in diverse contexts, leading specialists to develop varying conceptualizations and implementation strategies (Dale & Mearns, 2023). This study aimed to explore how CLIL is understood within Kazakhstan's trilingual pilot schools, with a particular focus on its application in computer science.

In response to the first research question concerning participants' conceptualizations of CLIL, five key themes emerged: defining CLIL as a dual-focused approach, teachers' evolving understanding, CLIL as a catalyst for student-centered learning, instruction through an additional language, and content prioritization.

Consistent with Karabassova's (2018) findings, most interviewed teachers defined CLIL as an integration of content and language, describing it as a dual-focused approach. However, while this dual-focused nature served as a unifying conceptual anchor among participants, their interpretations of it varied widely. Teachers' interpretations of CLIL ranged from simplistic views, such as treating it as vocabulary instruction or teaching through another language, to more integrated and nuanced approaches.

Notably, teachers who had received more extensive training or had longer exposure to English-medium instruction tended to report higher confidence and described employing a wider range of instructional strategies. In contrast, teachers who were new to CLIL or had limited access to professional development often relied on surface-level strategies, such as providing vocabulary lists or offering translations. While initial misconceptions and limited knowledge pose challenges, sustained professional development and practical experience can enable teachers to adopt a more comprehensive and effective approach to CLIL. However, given the small sample size of 19 teachers, these findings should be interpreted with caution and cannot be generalized beyond the context of this study.

Furthermore, consistent with the observations of Bedeker and Kerimkulova (2023), educators appear to be moving away from traditional knowledge transmission methods toward a more student-centered, active learning approach that emphasizes the co-construction of knowledge. CLIL serves as a transformative force that promotes active engagement, autonomy and collaboration among students, while redefining the role of the teacher as a facilitator rather than simply a transmitter of knowledge. Although challenges remain in realising its full potential, particularly in relation to time management and balancing curriculum demands, the peer learning and student empowerment encouraged by CLIL marks a significant step forward.

The finding that most teachers reported no significant methodological differences when implementing CLIL in L2 (Russian) versus L3 (English) suggests two possible interpretations. On one hand, as Karabassova (2018) and Lazarević

(2019) suggest, some teachers may view CLIL as merely teaching through another language, treating the shift from L2 to L3 as a simple linguistic substitution rather than an opportunity to integrate content and language learning. On the other hand, this finding may also suggest that teachers are consistently applying CLIL approaches across both languages, signaling a deeper alignment with CLIL's pedagogical principles. In this sense, teachers may be using CLIL as a flexible constructivist framework, adapting it to the linguistic proficiencies of their students regardless of whether they are teaching in Russian or English. As Karabassova (2019) notes, "most of the strategies and methods recommended for quality CLIL implementation are common to good teaching practices not necessarily specific to CLIL" (p. 55).

In interviews, both teachers and students highlighted their emphasis on content goals, consistent with prior research indicating challenges in balancing content and language instruction and a tendency to prioritize content (Karabassova, 2018; Lazarević, 2019; McDougald et al., 2023; Villabona & Cenoz, 2021). This reflects the predominant teacher belief that learning content is more important than learning foreign language (Skinnari & Bovellan, 2016).

The second research question, which explores how teachers and students report navigating CLIL in a trilingual educational context, reveals a dynamic interplay between content mastery and language development. Within this context, teachers adopt a flexible yet structured approach to instruction, aiming to meet the demands of both subject learning and language acquisition. All lesson plans, materials, and instructional resources are prepared in English, aligning with the English-medium CLIL framework implemented at NIS. To support student understanding, teachers may use their full linguistic repertoire for explanations or clarifications. However, students are consistently expected to produce output in English, reinforcing the development of academic language skills.

To address the challenges associated with developing English-medium CLIL materials, teachers engage in collaborative lesson planning and utilize a shared repository of resources across the NIS network of computer science teachers. This collaborative model enhances consistency in instructional quality and reduces the burden of individual material creation.

Importantly, when difficulties arise in explaining or understanding content in English, teachers prioritize maintaining the integrity and depth of subject matter. In such cases, they may switch to Kazakh or Russian to preserve the complexity of the material. This approach stands in contrast to findings from other studies, which reported that exclusive use of the target language often led to reduced content delivery or oversimplification (Bárcena-Toyos, 2020; Karabassova, 2018; Morton, 2017; Zanoni, 2021). Given the rigor of the NIS computer science curriculum, reducing or simplifying content is not considered a viable option. Instead, teachers rely on a translanguaging approach to

support students, allowing them to engage with the material while maintaining its complexity.

Translanguaging fulfills two critical functions: it helps teachers navigate their own limitations in English proficiency and ensures that all students can access and understand the material—an observation also noted by Karabassova and Isidro (2020). The CLIL context in Kazakhstan, particularly within NIS, differs significantly from the European model. In Kazakhstan, language proficiency challenges are more commonly observed among STEM teachers. In contrast, European CLIL settings often require educators to meet specific language proficiency standards. For instance, in the Netherlands, CLIL teachers are typically expected to have a CEFR level of C1 (Oattes et al., 2018), while in the Basque Country, the requirement is generally B2 or C1 (Ruiz de Zarobe & Lasagabaster, 2010). In the NIS context, such standards have not yet been implemented due to a shortage of educators who possess both advanced English proficiency and strong subject-matter expertise. Consequently, teachers often engage in open dialogue with students, acknowledging their own linguistic limitations and, at times, seeking students' assistance. This dynamic highlights the continued need for targeted language training among teachers, as emphasized in prior research (Andrew, 2018; Karabassova, 2018; Lazarević, 2019).

Although both teachers and students in present study considered language as a mere tool for content learning (Skinnari & Bovellan, 2016), they also realized that this tool requires continual honing, particularly in light of external examinations that demand proficiency in academic language. Just as a sickle must be sharpened regularly to remain an effective tool for cutting, language—seen as a tool for learning—must also be continually refined. Educators understood that strengthening students' academic language skills is essential, as this directly affects their success in assessments.

This dynamic illustrates a growing understanding among educators that while content delivery remains paramount, sharpening language skills is also important. They are aware that effective communication of content in English can significantly influence student outcomes. Thus, translanguaging may be permitted to aid comprehension; however, teachers consistently require that students produce their written or oral output in English, providing the necessary support to ensure their success.

Teachers place significant emphasis on subject-specific vocabulary to enhance students' understanding of technical terms. While students' general academic language may be adequate, many initially struggle with the specialized terms in computer science. This focus on technical vocabulary enables teachers to bridge the gap, helping students gradually become more comfortable with the language specific to the subject.

Teachers employ a variety of strategies to reinforce key terminology, including interactive exercises, collaborative peer activities, and bilingual or trilingual

approaches. Findings from interviews and lesson plan analyses highlight the diverse scaffolding techniques educators use to enhance comprehension and support task-solving strategies, aligning with established research on effective scaffolding methods (Ball et al., 2015; Mahan, 2022, 2023). These strategies include fostering peer learning opportunities (Llinares et al., 2012), integrating multimodal scaffolding to enhance understanding (Fernández-Fontecha et al., 2020), and supporting students' written and oral output (Ball et al., 2015; Siepmann et al., 2023).

Although the study's findings are contextually bound and limited by the small sample size and convenience sampling, they shed valuable light on how CLIL is conceptualized and enacted in Kazakhstan's trilingual schools. The data highlight key challenges—including inconsistent teacher understanding, linguistic constraints, and curriculum pressures—but also point to promising practices such as translanguaging, scaffolding, and learner-centered approaches. These insights have important implications for teacher training, policy development, and further research on CLIL in multilingual, non-European contexts.

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