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CLIL Online: Improving Students' Comprehension and Interaction Skills

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ABSTRACT

This study explores the impact of Content and Language Integrated Learning (CLIL) on English language skills development. It focused on 50 first-semester pre-service teachers enrolled in a TEFL program in an online course at a public university in Ecuador. The research used a mixed-methods approach, combining pre- and post-intervention surveys with rubric-based assessments. This helps evaluate changes in students' motivation, content comprehension, and oral interaction skills. The intervention consisted of a CLIL-based instructional model adapted to the students' beginner-level English proficiency. It was delivered through synchronous and asynchronous activities over a semester. Quantitative data indicated significant improvements in students' vocabulary recognition, reading comprehension, fluency, and clarity of expression. Survey results further revealed enhanced confidence, motivation, and openness toward alternative learning methodologies. Qualitative insights supported these findings. They highlighted increased student engagement and a more positive attitude toward English language learning through contextualized content. The results affirm the pedagogical value of CLIL in virtual learning environments, particularly for enhancing communicative competence and learner autonomy. The study also underscores the importance of teacher scaffolding, digital support tools, and student-centered design in maximizing CLIL's impact. While the findings are promising, the research calls for broader investigations involving more extensive and diverse populations and the development of specialized teacher training in digital CLIL methodologies.

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Keywords: Content and Language Integrated Learning (CLIL); Content Comprehension; EFL Pedagogy; Oral Interaction; Online Learning

1. Introduction

The landscape of higher education has been transformed by the rapid development of digital technologies, and online learning has emerged as a necessary modality to cater to the diverse needs of learners^[1]. Online learning provides increased accessibility and flexibility, and students can engage with learning content and tutors in novel ways. However, the effectiveness of online language instruction can be compromised when traditional classroom methodologies are simply replicated in virtual settings^[2]. As a result, they fail to integrate meaningful content and communication-based strategies^[3]. This limits student interaction and the development of key communicative competencies.

To address these limitations, Content and Language Integrated Learning (CLIL) presents a more dynamic and interactive pedagogical option^[4]. CLIL integrates subject learning with language acquisition through scaffolded and communicative strategies. They support both cognitive development and learner engagement^[5]. Besides, CLIL is anchored in the 4Cs framework—Content, Communication, Cognition, and Culture. It aims to create a more integrated learning experience that promotes higher-order thinking, intercultural awareness, and real-world application of knowledge^[6]. Interaction is a central component of CLIL. Learning is viewed as a social process in which knowledge is co-constructed through engagement with peers and teachers^[7]. This perspective becomes particularly valuable in online environments where interaction must be designed intentionally to support learning^[8]. The integration of scaffolding tools and collaborative digital platforms further enhances students' engagement, comprehension, and autonomy^[9].

This study investigates the effectiveness of CLIL in improving English language skills within an online learning context. Specifically, it seeks to answer the following research questions:

a) How does implementing Content and Language Integrated Learning (CLIL) influence the development of English language skills in EFL adult students within an online

learning environment?

b) What are the effects of CLIL-based strategies on students' comprehension and interaction in online English language learning?

1.1. Digital Transformation in Education

The digital era has introduced transformative possibilities across numerous sectors, including education. Technological advancements, particularly internet connectivity, have redefined access to educational resources. As a result, digitized materials are now instantly accessible^[10]. This shift has accelerated the evolution of education into more dynamic, learner-centered, and accessible modalities. Recent literature supports those digital technologies have enhanced access and created pedagogical changes in instructional delivery^[11–13].

As more institutions integrate virtual classrooms, learning has become more personalized, and students benefit from increased flexibility in scheduling and content engagement^[14]. The COVID-19 pandemic notably intensified this shift, acting as a catalyst for digital adoption^[8, 15]. These environments allow instructors and students to connect through various tools—video lectures, shared documents, and discussion forums—facilitating formal instruction and collaborative interaction^[16].

According to the social constructivist framework, learning occurs most effectively through interaction^[17]. In online education, this is evident in peer-to-peer activities, instructor guidance, and content navigation^[18]. As Dastmalchi and Goli observe^[19], the design of virtual interactions significantly influences learners' cognitive engagement and motivation. Rather than isolating learners, online education, when implemented effectively, supports interaction-driven knowledge construction.

Scaffolding is also vital in digital learning contexts. It ensures that learners facing complex tasks are supported progressively by their instructors^[20]. Educators serve as guides who monitor progress and provide feedback via digital tools, enhancing students' ability to complete cognitively demand-

ing assignments^[21]. Effective digital scaffolding improves students' autonomy while still ensuring structure. Teachers' roles in facilitating such environments are crucial, especially in contexts with limited resources or post-conflict challenges, as Milić and Simeunovic highlighted in comparative research^[22].

1.2. Content and Language Integrated Learning (CLIL)

Content and Language Integrated Learning (CLIL) is a dual-focused educational approach where an additional language is used for the learning and teaching of both content and language^[23]. This framework emphasizes the 4Cs: Content, Communication, Cognition, and Culture, promoting an integrated approach to developing subject knowledge alongside linguistic competence^[24]. The Language Triptych—the language of, for, and through learning—remains central to how teachers guide learners through linguistic demands tied to academic content^[25].

Recent studies have reaffirmed and extended these principles to digital and online environments, where CLIL is a powerful pedagogical tool for enhancing comprehension and interaction among adult EFL learners^[26]. For example, Hemmi and Banegas emphasized how the CLIL model fosters higher-order thinking and intercultural skills in virtual learning spaces, especially when language input is meaningfully linked to real-world content^[27].

In online or hybrid education, integrating CLIL promotes vocabulary acquisition, authentic language use, and learner motivation, particularly in university-level or adult education settings^[28]. Wang demonstrated how EFL learners significantly retained academic vocabulary through CLIL-based digital materials embedded within content-driven tasks^[29]. Similarly, Travica observed that young learners showed better content comprehension and contextual vocabulary use when exposed to CLIL activities focusing on interaction, even in partially online classrooms^[30].

The effectiveness of CLIL in enhancing communication skills is particularly relevant in adult education. A recent study by Malykhin et al. found that soft skills like teamwork, public speaking, and self-expression improved notably among university students using online CLIL platforms^[31]. This aligns with the findings by Kaewkamnerd et al. who identified gains in digital literacy and learner auton-

omy as key outcomes of CLIL-enhanced online learning^[32].

Further, Vraciu and Marsol provide empirical evidence that CLIL's language-specific outcomes—such as clarity in subject-specific discourse and coherent expression—are best achieved when educators adhere closely to the 4Cs and Triptych principles, even in online delivery^[25]. Their research in Catalonia found a statistically significant improvement in content-specific language retention in CLIL-taught primary and secondary learners—highlighting potential scalability for adult EFL settings.

Moreover, the integration of service learning within CLIL, as explored by Hernández García^[33], supports the idea that online CLIL programs can be enriched through experiential learning projects that simulate real-life communication needs. This promotes a stronger link between academic language and authentic use cases.

Despite its promise, challenges persist, such as inadequate teacher preparation for CLIL in virtual contexts, lack of adapted materials, and uneven technological access^[34]. These limitations underscore the need for systemic training in digital pedagogy and inclusive content design.

2. Materials and Methods

2.1. Participants and Context

This case study involved 50 students from a public university in Ecuador. It is a South American country where English instruction is a mandatory component of higher education curricula. Participants were selected through purposive sampling. They were enrolled in an English course aligned with the study's objectives and available to participate in the CLIL-based online intervention.

All participants were first-semester pre-service teachers enrolled in the university's Teaching English as a Foreign Language (TEFL) program. In terms of English language proficiency, they were classified as beginner-level EFL learners. While they were enrolled in the same academic program, this was their first formal experience with a CLIL-based instructional model. All students voluntarily agreed to take part in the research. They provided informed consent prior to the study.

The group had previously acquired basic English knowledge through secondary education or private language institutions. Each participant had access to digital

devices—such as laptops, smartphones, tablets, or desktop computers—and a stable internet connection. Through them, consistent participation was possible in synchronous and asynchronous learning tasks. The students also demonstrated a high level of motivation to improve their English skills. It was driven by academic goals and a positive interest in the CLIL methodology, which was new to them.

It is important to note that this group does not represent the entire population of students enrolled in online English courses or TEFL major at the participating university. Thus, the results and interpretations of this study apply only to the specific group involved. However, the relevance of the topic and the preliminary findings underscore the need for further research on a larger scale. It may help understand better the impact of CLIL in virtual learning contexts across diverse student populations.

2.2. Instruments

This study employed two primary instruments: an assessment performance-based rubric and a student perception survey. Both instruments were administered at two key points—before and after the instructional intervention. It facilitated the assessment of student development and gathering feedback on the methodology, CLIL. Thus, language proficiency development was assessed through self-perception data (via the survey) and a performance-based rubric. The latter focused on reading comprehension and oral interaction before and after the intervention.

2.2.1. Assessment Rubric

A custom-designed rubric was used to evaluate student progress in two core areas: content comprehension and oral interaction. In the content comprehension category, the rubric assessed students' ability to identify main ideas, extract specific details, interpret vocabulary in context, and draw conclusions based on academic texts. The oral interaction component focused on students' participation in discussions, coherence of ideas, and clarity of oral expression.

The rubric was applied individually to each participant at the beginning and end of the intervention. This allowed the researcher to measure students' language performance improvement. Besides, it enables to determine which areas showed the most development over the course of the study.

2.2.2. Survey

The second instrument was a ten-item survey designed to capture students' perspectives on their learning experience using the CLIL methodology in an online environment. The survey was administered before and after the intervention and used a five-point Likert scale with the options: Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree.

The survey allowed participants to express their thoughts on their motivation, confidence, and willingness to engage with an unfamiliar methodology. It also aimed to explore students' openness to alternative approaches for learning English online more meaningfully and engagingly.

2.3. Procedure and Data Analysis

2.3.1. Procedure

The data was collected during a semester in a fully online learning environment. Participation was voluntary, and all students agreed to contribute anonymously.

At the beginning of the study, students completed a pre-survey to express their interest in learning English as a foreign language and their initial perceptions of the CLIL methodology. Shortly after, a baseline performance assessment was conducted using the researcher-designed rubric. This involved evaluating reading comprehension through authentic content-related texts and assessing oral interaction through short individual presentations and group discussions. During this phase, students were grouped into five sets to interactively complete tasks, enabling the researcher to observe comprehension and communication skills.

Following this initial data collection, a CLIL-based instructional program was designed and implemented based on the students' academic context, needs, and language backgrounds. The instructional content, vocabulary, and grammatical patterns were selected from the existing curriculum. Likewise, they were adapted to suit beginner-level learners. All students followed the same instructional sequence. They received the same CLIL-based topics from the institutional English curriculum. These topics were adapted to match beginner-level language proficiency and contextualized to enhance relevance and engagement. Although students came from different academic programs, topic selection was standardized to ensure evaluation and instructional

delivery consistency.

While grammar was not directly assessed, it was crucial in helping students understand the language inductively. The instructional model was designed with the students' motivations and needs in mind. As many participants aimed to enhance their speaking and comprehension for academic and personal use, the intervention emphasized interactive formats, such as digital discussions and real-world communication tasks.

Throughout the semester, students engaged in both synchronous and asynchronous learning activities. Synchronous sessions were instructor-led and interactive, focusing on content-based language learning tasks. Students received support during these sessions to clarify grammatical structures and guide contextual understanding. Asynchronous activities included independent tasks and recorded speaking exercises submitted through the institutional platform. These recordings were compared with students' synchronous performance to monitor individual progress.

At the end of the semester, the rubric was administered again to measure improvements in content comprehension and oral interaction. Students were reassessed in small groups using similar content-based tasks. The post-survey, identical to the initial one, was also distributed to collect final feedback on students' experiences and perceptions of the CLIL methodology. Additionally, informal online conversations were held with some participants to gather deeper qualitative insights into their learning experiences.

2.3.2. Data Analysis

The data collected from the rubric and the survey were analyzed using quantitative and qualitative methods. All quantitative data were processed using the SPSS statistical software. It helped to ensure accuracy and reliability in comparing pre- and post-intervention results.

Rubric scores were examined to measure changes in two core areas: reading comprehension and oral interaction. Descriptive statistics, including means and comparative values, were used to highlight improvements across individual criteria. They were focused on understanding main ideas, recognizing specific details, drawing conclusions, vocabulary in context, participation, fluency, and clarity of expression.

This study did not employ inferential statistical tests, such as t-tests. This decision was aligned with the nature

of the research. Given the limited sample size ($n = 50$) and the context-specific focus, descriptive statistics were considered appropriate for identifying meaningful trends in learners' performance without overgeneralizing the findings. Future studies with broader participant recruitment may incorporate inferential analysis to deepen and validate these results.

Survey data were analyzed by comparing mean responses for each item on the pre-and post-surveys. The Likert-scale results were tabulated to identify shifts in students' perceptions regarding confidence, motivation, comprehension, and openness to alternative learning methodologies. This comparative analysis helped determine how much the CLIL approach impacted students' attitudes and engagement with online English learning.

These insights provided contextual depth to the quantitative findings, revealing students' experiences with the CLIL method, including its challenges and benefits in an online academic setting. This mixed-methods design allowed for a direct comparison between students' self-reported perceptions and their actual performance. Aligning survey results with rubric scores provided a more comprehensive understanding of the relationship between perceived progress and demonstrated language development.

3. Results

3.1. Survey: Perceptions and Motivation

The pre-and post-survey responses analysis revealed a notable improvement in students' perceptions of learning English through the CLIL methodology in an online environment. The survey used a Likert scale and measured students' confidence, motivation, vocabulary recognition, and openness to alternative learning methods.

As shown in **Table 1**, all surveyed criteria demonstrated measurable improvement. For instance, the item "Feel confident learning English as part of my curriculum during my university studies" increased from a mean of 1.02 to 3.01, indicating a significant rise in learner confidence. Similarly, "Recognize some vocabulary words by context while learning English" improved from 0.60 to 1.09, and "Would like to try other methods to learn English while studying online" rose from 2.01 to 3.09.

Table 1. Pre-Survey and Post-Survey.

| Criteria | Pre-Survey Mean | Post-Survey Mean |
|--|-----------------|------------------|
| Feel confident learning English as part of my curriculum during my university studies | 1.02 | 3.01 |
| Recognize some vocabulary words by context while learning English | 0.60 | 1.09 |
| Would like to try other methods to learn English while studying online | 2.01 | 3.09 |
| Realize the importance of content-based learning while studying English as a second language online | 0.46 | 1.08 |
| Feel confident while practicing some exercises online due to the understanding on the language while using the CLIL method | 1.11 | 3.06 |
| Understand when the teacher explains grammatical structures or give commands only using English | 0.51 | 1.07 |
| Need help to work on the asynchronous activities that aims to work on learning English | 1.25 | 2.09 |
| Notice the importance of learning English as a second language due to the content analyzed using the CLIL method | 0.92 | 2.11 |
| Motivate to learn English online using CLIL method or other methods than aim to acquire knowledge while practicing English | 1.61 | 3.42 |

An especially notable change occurred in students' motivation. The item "Motivate to learn English online using the CLIL method or other methods that aim to acquire knowledge while practicing English" increased from a mean of 1.61 to 3.42, demonstrating that the CLIL-based instruction positively affected learner engagement.

Additionally, the survey showed that students became more aware of the value of content-based learning and felt better equipped. Thus, they understood grammatical structures through English-only instruction. These improvements suggest that learners adapted well to the CLIL methodology and were more receptive to learning through contextualized content.

3.2. Rubric: Reading Comprehension and Oral Interaction

The results from the rubric-based assessments also showed substantial improvement in both content comprehension and oral interaction skills. Students were evaluated on two main criteria: Reading Comprehension (Content) and Interaction (Communication).

As indicated in **Table 2**, all subcategories demonstrated growth. Under Reading Comprehension, the ability to understand main ideas improved from a mean of 2.08 to 3.79, while understanding specific details increased from 1.72 to 3.22. Students also progressed in drawing conclusions and interpreting vocabulary in context, with scores rising from 1.03 to 3.12.

Table 2. Assessment Rubric.

| Criteria 1: Reading Comprehension (Content) | Pre-Assessment Mean | Post-Assessment Mean |
|--|---------------------|----------------------|
| Understanding main ideas | 2.08 | 3.79 |
| Understanding specific details | 1.72 | 3.22 |
| Inference and drawing conclusions | 1.03 | 3.12 |
| Criteria 2: Interaction (Communication) | Pre-Assessment Mean | Post-Assessment Mean |
| Participation in debates and discussions | 2.08 | 3.79 |
| Clarity and coherence in oral expression | 1.72 | 3.22 |
| Appropriate use of grammatical structures | 2.15 | 3.58 |
| Fluency | 1.03 | 3.12 |

Similarly, participation in debates and discussions rose from 2.08 to 3.79 within the Interaction category, and clarity and coherence in oral expression improved from 1.72

to 3.22. The appropriate use of grammatical structures advanced from 2.15 to 3.58, and fluency—often the most challenging skill at early stages—showed a substantial increase

from 1.03 to 3.12.

These findings suggest that the CLIL methodology contributed significantly to developing receptive and productive language skills. Integrating subject content with language learning provided a meaningful context that supported comprehension and encouraged communication. This was confirmed by pre- and post-intervention rubric scores. They showed consistent gains in reading comprehension and oral interaction—highlighting the effectiveness of the CLIL approach.

4. Discussion

The results prove that implementing Content and Language Integrated Learning (CLIL) in online learning environments significantly enhances comprehension and interaction skills among adult EFL learners. These findings align with prior research highlighting CLIL's dual role in fostering linguistic and cognitive development^[23, 24, 27]. Specifically, students demonstrated increased motivation, vocabulary acquisition, and oral fluency—all key competencies in second language acquisition.

One of the most encouraging outcomes was the increase in learner motivation and self-confidence. As Wang suggests^[29], contextualized learning materials in CLIL reduce affective barriers to language acquisitions. Students in this study engaged more meaningfully with the content and became more open to alternative learning strategies, as reflected in their post-survey responses.

Improvements in oral interaction skills—such as fluency, grammatical control, and coherence—further support the role of CLIL in strengthening communicative competence. These findings are consistent with outcomes observed by Malykhin et al.^[31], who emphasized developing soft skills through digital CLIL. The combination of synchronous discussions and asynchronous recordings provided a multifaceted platform. As a result, learners could express themselves, mirroring real-world communicative demands and enhancing performance in academic discourse.

The 4Cs framework (Content, Communication, Cognition, Culture) contributed to the positive outcomes. Learners engaged in tasks that fostered critical thinking and cross-cultural awareness—essential components of meaningful language acquisition^[6]. These benefits suggest that CLIL,

when delivered through thoughtful digital pedagogy, can replicate and even extend the advantages seen in traditional classroom contexts^[30].

Scaffolding played a key role in supporting learner development. Initially, some students hesitated to do unfamiliar tasks and use digital tools. However, guided instruction and peer interaction reduced these barriers. This aligns with Ashurova's assertion that digital scaffolding fosters learners' comprehension and autonomy in virtual settings^[21].

While the results are promising, this study's limitations must be acknowledged. The small, homogeneous sample size limits the generalizability of the findings, and the short intervention period prevents conclusions about long-term retention. These issues echo common concerns in CLIL research, which call for broader, longitudinal studies^[34].

Additionally, although all participants had stable internet access in this case, this is not reflective of broader educational settings in Ecuador or other developing regions. Effective implementation of CLIL online requires access to stable technology and trained educators to design and deliver content through integrative frameworks^[8, 32].

Overall, these results support the potential of CLIL as both an instructional strategy and a model for 21st-century education. Beyond improving English proficiency, it promotes learner autonomy, intercultural communication, and digital literacy—skills essential for global academic and professional environments.

5. Conclusions

This study reinforces the potential of CLIL of Content and Language Integrated Learning (CLIL) as a practical methodology for enhancing content comprehension and communicative competence in online English as a Foreign Language (EFL) education. Implemented within an entirely virtual environment, the CLIL-based intervention led to measurable improvements in students' vocabulary recognition, oral fluency, reading comprehension, and learner motivation—underscoring its pedagogical value for adult learners.

The mixed-methods approach employed in this research revealed statistically significant gains in academic performance and a meaningful transformation in learner atti-

tudes toward language acquisition. Through contextualized content, scaffolded instruction, and digital interaction, students engaged more confidently with educational material. This showcased the potential of CLIL to foster both autonomy and active participation in virtual learning contexts.

However, the study also highlights several considerations for broader application. Sustainable implementation of CLIL in digital environments requires targeted teacher training in virtual pedagogy, inclusive material development, and equitable access to technology. The current findings, while promising, derive from a limited sample and a single institutional context. Thus, further longitudinal and large-scale studies are essential to explore the long-term effects and generalizability of CLIL methodologies across diverse educational settings.

Ultimately, CLIL emerges not only as an instructional approach but also as a strategic innovation for modern education. It is capable of aligning language learning with 21st-century competencies such as digital literacy, intercultural communication, and learner-centered autonomy. Its thoughtful integration into online curricula may serve as a blueprint for inclusive and transformative language education in the digital age.

Author Contributions

Conceptualization, V.V.O.J. and F.R.H.; methodology, F.R.H. and S.E.G.; formal analysis, F.R.H.; data curation, D.A.C.V.; writing—original draft preparation, V.V.O.J. and F.R.H.; writing—review and editing, F.R.H., V.V.O.J., and S.E.G.; literature review, V.V.O.J., F.R.H., and S.E.G. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

Ethical review and approval were waived for this study due to its alignment with the university's standard academic activities.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

The authors can provide the data supporting the findings of this study upon reasonable request.

Conflicts of Interest

The authors declare no conflict of interest.

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