



## Exploring Student Engagement in AI-Assisted CLIL for Global Citizenship and Competence in EFL Higher Education\*

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### ABSTRACT

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This study investigates the impact of an AI-assisted Content and Language Integrated Learning (CLIL) model, designed around Global Citizenship and Competence (GCC), on EFL tertiary students' motivation and self-efficacy, utilizing goal self-concordance as a key measure of engagement. A 15-week longitudinal study involved 154 South Korean undergraduates enrolled in a required general education course. The course integrated generative AI tools (ChatGPT and DeepL) as translanguaging scaffolds to facilitate engagement with complex global content. Self-efficacy in Language Skills (LS) and GCC were measured pre- and post-course, alongside engagement variables (self-concordance, effort, and perceived outcome) tracked at three time points. Results showed significant increases in self-efficacy for both LS (Hedges'  $g = 1.21$ ) and GCC ( $g = 1.27$ ). Engagement, particularly self-concordance in GCC and digital literacy, also significantly increased. Hierarchical regression analyses revealed that post-course LS self-efficacy was significantly predicted by perceived outcome in digital literacy in GCC and effort in GCC as well as engagement variables in language learning. Post-course GCC self-efficacy was strongly predicted by self-concordance, effort, and perceived outcome specific to the GCC domain. These findings support the premise that AI-assisted CLIL cultivates self-efficacy by fostering engagement in higher-order learning processes, highlighting the reciprocal nature of language and content engagement within this inclusive pedagogical framework.

### KEYWORDS

AI-assisted CLIL, global citizenship and competence, goal self-concordance, translanguaging, self-efficacy, higher education

## 1. Introduction

The widespread availability of generative artificial intelligence (AI) tools, such as ChatGPT, is reshaping student engagement in language learning by positioning these technologies as integral components of both autonomous and instructed language education (Godwin-Jones 2024). As AI tools increasingly mediate how learners access, process, and produce language, they raise critical questions regarding the content, structure, and pedagogy of 21st-century language courses. This shift is particularly salient in EFL contexts, where AI has significantly lowered linguistic barriers to authentic English-language resources and complex disciplinary content.

Among the emerging applications of AI in language education, these tools hold particular promise for Content and Language Integrated Learning (CLIL), a pedagogical approach aimed at the simultaneous development of language proficiency and content knowledge. A persistent challenge in CLIL implementation is the linguistic–cognitive gap, whereby cognitively demanding content is often conveyed through linguistically complex language that exceeds learners’ proficiency levels (Coyle et al. 2010). This gap can hinder both comprehension and sustained engagement, particularly in EFL settings.

Translanguaging—the strategic use of multiple languages for meaning-making—has been widely recognized as an effective scaffolding approach for addressing this challenge, especially in Asian educational contexts (Tai et al. 2025, Tsou and Baker 2021). Originally conceptualized as a pedagogical strategy that leverages learners’ stronger language to support the development of a weaker one, translanguaging has gained renewed relevance in AI-mediated learning environments. AI tools increasingly blur the boundaries between learners’ first language (L1) and English by enabling real-time translation, paraphrasing, and content modification (Voss 2024), thereby creating new opportunities for enhancing comprehension and supporting the simultaneous acquisition of language and content in CLIL classrooms.

Recent studies have begun to elucidate the role of digital tools in facilitating multimodal translanguaging and meaning-making in CLIL contexts. For instance, Tai (2024) investigated how mobile technologies, such as iPads, create a translanguaging space to support interactional competence and content learning in secondary mathematics classrooms. Similarly, Ding and Cha (2024) examined the impact of Virtual Reality (VR)-mediated multimodal meaning-making on knowledge acquisition and disciplinary literacy in science education. While these studies highlight the pedagogical benefits of multimodal technologies, they have primarily focused on non-generative tools or secondary school settings. There remains a significant paucity of research specifically investigating the impact of AI-mediated translanguaging—utilizing generative tools like ChatGPT and DeepL—on the development of Global Citizenship and Competence (GCC) and learner engagement within the context of EFL higher education.

Building on these developments, the present study explores an alternative model of AI-assisted CLIL that does not require exclusive use of the target language for instruction in order to foster meaningful language engagement. As Marsh (2006) emphasizes, successful CLIL depends not only on teacher language but also on the amount, quality, and richness of input. In this study, AI-calibrated materials are tailored to students’ language proficiency levels, with L1 functioning as both the primary medium of instruction and a scaffold for content knowledge construction. Through this approach, AI serves as a translanguaging infrastructure that enables learners to engage with cognitively complex content while maintaining sustained participation in English-mediated learning activities.

Within EFL higher education, CLIL courses centered on global citizenship and competence are particularly relevant. As global challenges such as climate change, inequality, and geopolitical conflict intensify, the development of global competence has emerged as a key educational priority (APCEIU 2021, OECD 2018).

Higher education institutions are increasingly expected to cultivate learners' capacity to understand global issues, evaluate diverse perspectives, and act responsibly as global citizens (Black et al. 2023, Borkovic et al. 2020). AI-assisted CLIL offers a pedagogically promising context in which language learning, global issue exploration, critical literacy, and AI literacy can be integrated.

To examine the effectiveness of this instructional model, the present study investigates student engagement in an AI-assisted CLIL course focused on global citizenship and competence in an EFL tertiary context. Engagement is conceptualized through the lens of goal self-concordance, a motivational construct that reflects the extent to which learners' goals align with their personal values and interests (Sheldon and Elliot 1998, 1999). Empirical research has shown that learners with higher goal self-concordance demonstrate greater sustained engagement, effort, and perceived progress over time in a language learning context (Henry et al. 2023).

In the context of AI-assisted CLIL, sustained engagement is expected to manifest in higher levels of goal self-concordance across language learning, content acquisition, and AI literacy, resulting in increased effort and stronger perceived learning outcomes. This, in turn, is hypothesized to enhance students' self-efficacy in both language skills and global citizenship and competence by the end of the course. Building on this theoretical framework, the present study empirically examines the relationships among AI-assisted CLIL, student engagement, and self-efficacy outcomes in an EFL tertiary context. Accordingly, the following research questions guide the investigation:

- 1) How does AI-assisted CLIL for global citizenship and competence influence student engagement in learning experiences?
- 2) How does student engagement in AI-assisted CLIL influence self-efficacy in language learning as an indicator of educational attainment?
- 3) How does student engagement in AI-assisted CLIL influence self-efficacy in global citizenship and competence as an indicator of educational attainment?

## 2. Theoretical Framework

### 2.1 CLIL in Tertiary Education

To contextualize the role of CLIL in higher education, it is useful to examine how it relates to other content-based instructional models such as English-Medium Instruction (EMI) and English for Academic Purposes (EAP). While EMI, EAP, and CLIL share the goal of integrating language and content learning, they differ in emphasis and pedagogical orientation (Airey 2016). EMI primarily focuses on delivering disciplinary content in English, with language development viewed as a secondary or incidental outcome. In contrast, EAP emphasizes explicit instruction in academic language skills, often offered as separate courses designed to support students' success in content learning. CLIL, situated between these two models, seeks to integrate the aims of both by fostering simultaneous development of disciplinary knowledge and language competence. Positioned along a continuum, EAP emphasizes linguistic outcomes, EMI prioritizes content mastery, and CLIL aims to balance both, thereby supporting multilingualism, intercultural awareness, and global competencies (Airey 2016).

In tertiary education, EMI has become a major strategy for internationalization, particularly in non-English-dominant contexts across Asia. However, research indicates that achieving dual outcomes in both content and language learning is not always guaranteed. These outcomes depend on a range of contextual factors, including

macro-level policy, institutional pedagogy, teacher expertise, and the quality of classroom interaction (Fenton-Smith et al. 2017). Although EMI can enhance receptive skills such as reading and vocabulary, students frequently struggle with productive skills like writing and speaking (Kamaşak et al. 2021, Yang 2015, Zhou et al. 2021). Differences across disciplines further shape learning outcomes: fields such as science and medicine often yield better results due to their formulaic discourse patterns (Peng and Xie 2021), whereas humanities students encounter greater challenges because of the analytical and interpretive demands of their studies (Hadingham 2024).

Socioeconomic and institutional factors also influence EMI effectiveness. Students from higher socioeconomic backgrounds often perform better initially due to greater prior exposure to English, though structured EMI programs can help narrow this gap over time (Nguyen 2023). Limited access to discipline-specific language support and insufficient collaboration between language and content specialists further constrain students' success (Galloway and Ruegg 2022). Moreover, EMI implementation has often excluded language educators, as courses are typically taught by content specialists proficient in English. Studies from China and Japan reveal that English proficiency is a major criterion for faculty recruitment and that a shortage of qualified and willing instructors remains a persistent challenge (Galloway and Ruegg 2022).

Against this backdrop, CLIL in tertiary education represents a more balanced and pedagogically grounded alternative. It explicitly integrates linguistic and disciplinary objectives, promoting active learning, critical thinking, and intercultural communication (Hemmi 2024). CLIL implementation is often led by language educators who adapt disciplinary content to support both conceptual understanding and language development. Unlike EMI, which has been primarily driven by top-down policy initiatives, CLIL has evolved more organically through grassroots innovation, grounded in theoretical models that link content learning to communicative language use (Hemmi 2024). Within this evolving landscape, AI-assisted CLIL for global citizenship and competence extends the CLIL paradigm by embedding digital literacy, ethical awareness, and global understanding into interdisciplinary learning. This approach aligns with the broader goals of tertiary education to cultivate globally competent, multilingual learners who can think critically and act responsibly in an AI-driven world (James et al. 2025).

## 2.2 AI Use as Translanguaging in CLIL

Translanguaging has been increasingly recognized as an essential scaffolding strategy in CLIL, enabling multilingual learners to draw upon their full linguistic repertoires to construct meaning. Within CLIL classrooms, translanguaging is often characterized by two pedagogical dispositions: a strong disposition, involving the proactive and planned alternation between L1 and the target language, and a weak disposition, where L1 use emerges spontaneously as a resource for meaning-making (Nikula and Moore 2019). The rapid advancement of large language models (LLMs) such as Google Translate and ChatGPT has opened new possibilities for integrating both dispositions into CLIL pedagogy, allowing instructors to design proactive, planned translanguaging tasks while maintaining learner agency in spontaneous language use. However, research on AI-mediated translanguaging within CLIL remains limited.

Recent studies have begun to explore how digital tools can facilitate multimodal translanguaging and meaning-making in CLIL contexts. Tai (2024) investigated the use of iPads as multimodal tools in Hong Kong high school CLIL mathematics classes, where teachers integrated English explanations with visual and gestural resources—such as highlighting, zooming, and color drawing—to support comprehension among linguistically diverse learners. Similarly, Ding and Cha (2024) examined Virtual Reality (VR)-mediated multimodal translanguaging in science education, demonstrating that immersive VR environments significantly enhanced both disciplinary

literacy and content knowledge. Their findings suggest that multimodal and embodied digital environments can serve as powerful translanguaging spaces, particularly for multilingual learners, by offering visual, auditory, and gestural scaffolds that reinforce conceptual understanding.

Building on these multimodal approaches, Oh and colleagues have advanced the notion of AI-mediated translanguaging through the integration of machine translation (MT) and ChatGPT in CLIL courses at South Korean universities (Kim and Oh 2023, Oh 2022, 2025, Oh and Ahn 2025). In these studies, MT inherently functioned as a translanguaging tool, bridging linguistic and cognitive gaps and allowing students to leverage both L1 and English for deeper engagement with complex global issues such as climate justice, AI bias, online privacy, and doping in international sports. ChatGPT, in particular, served as an adaptive scaffold that supported bilingual learners' interaction with authentic materials and guided them toward producing written and oral outputs in English. This process enhanced students' access to comprehensible input and promoted meaningful content engagement, leading to measurable gains in self-efficacy related to global competence and English communication.

Beyond classroom applications, Oh et al. (2023) extended AI-assisted CLIL into an online community of practice for college students, where MT and ChatGPT were employed to facilitate collaborative discussions and project-based learning around contemporary global challenges. Through reading, writing, and dialogue in both L1 and English with AI use, participants demonstrated the capacity to manage and sustain intercultural communication autonomously. The study underscores the potential of AI tools as translanguaging mediators that not only scaffold bilingual meaning-making but also foster learner autonomy, digital literacy, and global citizenship within the CLIL framework.

### 2.3 CLIL for Global Citizenship and Competence

Research on integrating global citizenship and competence within CLIL remains limited, yet emerging evidence highlights its transformative potential. Through its dual focus on language and content, CLIL for GCC fosters intercultural awareness, critical thinking, and global competencies essential for addressing contemporary global challenges. Early theoretical frameworks, such as Byram's (2008) intercultural citizenship model, emphasize the integration of language education with intercultural and democratic objectives. Within this framework, CLIL is positioned as an effective vehicle for promoting these goals, particularly when interactive and dialogic learning approaches are employed (Coyle et al. 2010).

Empirical studies further demonstrate how CLIL can cultivate learners' linguistic proficiency alongside their global and intercultural awareness. Porto (2019, 2024) illustrates the dual potential of CLIL to enhance language learning while nurturing civic and ecological consciousness. In her 2019 study, collaborative and multimodal projects addressing historical and human rights issues fostered students' civic engagement and the formation of shared global identities. Expanding on this work, Porto (2024) explored the development of ecological citizenship through arts-based and translanguaging pedagogies that encouraged critical reflection on environmental issues aligned with the UN Sustainable Development Goals (SDGs). These pedagogies promoted empathy, ecological responsibility, and ethical awareness—core dimensions of global competence. Collectively, such studies underscore how CLIL connects language education with real-world global concerns, empowering learners to apply linguistic and cognitive skills to civic and ecological action.

Recent research has continued to reconceptualize CLIL as a platform for global citizenship education. Xu and Knijnik (2024) demonstrated that shifting from grammar-focused instruction to dialogic and critical pedagogies within CLIL contexts can enhance intercultural awareness and global consciousness. Their findings suggest that dialogic engagement, grounded in Freire's critical pedagogy, enables students to question global inequalities and

collaboratively explore sustainable solutions. Through reflective and interactive learning, learners develop not only linguistic competence but also agency as emerging global citizens.

Despite these promising developments, the research base remains nascent. Few empirical studies have systematically examined the intersection of CLIL, global citizenship, and global competence, particularly in technologically mediated contexts. Existing evidence suggests that CLIL holds substantial promise for integrating language learning with global issues; however, further investigation is needed to refine pedagogical strategies and assess their impact on learners' global awareness and communicative competence—especially in the evolving context of AI-assisted CLIL for global citizenship and competence.

## 2.4 Goal Self-Concordance as a Measure of Engagement in Language Learning Experience

Motivation in language learning has been widely explored through the Second Language (L2) Motivational Self System framework. As proposed by Dörnyei (2009), this framework comprises three interconnected components: the Ideal L2 Self, the Ought-to L2 Self, and L2 Learning Experiences (LLE). The Ideal L2 Self represents the learner's aspirational vision of themselves as proficient users of the target language, while the Ought-to L2 Self reflects external pressures and societal expectations regarding language proficiency. In contrast, LLE pertains to the learner's direct engagement with the learning process, encompassing factors such as classroom interactions, curriculum design, and personal experiences. Unlike the first two components, which are rooted in self-perceptions and external influences, LLE is embedded within the learner's immediate educational context, making it a strong predictor of motivation (Dörnyei and Ryan 2015).

While tangible improvements in L2 proficiency often serve as direct indicators of program success, the enhancement of motivation for language learning is equally critical. A pivotal construct in assessing motivation within the learning process is goal self-concordance, defined as the alignment between an individual's goals and their personal values and intrinsic interests (Sheldon and Elliot 1998, 1999). Originated from and predominantly utilized in applied psychology, this construct is central to process-oriented motivation research, elucidating why certain individuals persist in their efforts whereas others withdraw when confronted with challenges. Goal self-concordance distinguishes between sustained, high-quality motivation and transient, extrinsically driven efforts, rendering it a valuable framework for comprehending long-term academic engagement or burnout among adolescents (Vasalampi et al. 2009).

Empirical studies substantiate the role of self-concordance in fostering engagement and resilience in language learning contexts. For instance, Henry et al. (2023) explored the impact of goal self-concordance on learner engagement and resilience, providing empirical evidence of its beneficial effects. Their research indicates that learners who commence an L2 program with self-concordant goals—those aligned with their personal values and interests—exhibit heightened engagement and increased resilience over time. Moreover, the study reveals that self-concordance affects engagement and resilience indirectly through mediators such as goal effort and goal progress. Specifically, learners with self-concordant goals invested greater effort in their studies, leading to perceived goal progress, which, in turn, enhanced overall engagement.

Crucially, this theoretical link between self-concordance and sustained effort provides the essential rationale for selecting Digital Literacy and GCC as key engagement variables in this study. In the cognitively demanding context of AI-assisted CLIL, Digital Literacy is not merely a technical skill but a requisite modal competence for accessing complex global content. Drawing on the Self-Concordance Model, I posit that learners who internalize the value of Global Citizenship (high self-concordance in GCC) are more likely to mobilize sustained effort to master the necessary tools—in this case, AI-mediated digital literacy—to achieve that goal. This goal-directed

effort facilitates successful task completion (Perceived Outcome), which serves as a mastery experience that ultimately enhances Self-Efficacy. Therefore, this study operationalizes self-concordance not just as a motivational state, but as the causal antecedent that drives the specific behavioral investments required to navigate the linguistic and technological challenges of AI-assisted CLIL.

In the context of AI-assisted CLIL aimed at promoting GCC, a pertinent hypothesis emerges. Exposure to authentic English materials addressing complex global issues, rendered comprehensible through AI integration, may enable students to cultivate global citizenship as a facet of their identity. This development, in turn, may enrich the Ideal L2 Self by broadening the learner's perception of their future linguistic role within global societies. An Ideal L2 Self that embodies global citizenship is expected to foster greater goal self-concordance in both language and content learning, as well as in the utilization of AI tools, which serve as enablers of this learning process. Consequently, this alignment is expected to positively influence the ultimate outcomes of language and content acquisition by the conclusion of the course. Students who integrate global citizenship and competence into their personal values and interests are more inclined to exert increased effort in learning the language and content through AI tools, thereby generating a synergistic effect that enhances both language and content mastery.

Building upon this rationale, it is of particular interest to investigate how AI-assisted CLIL designed for global citizenship and competence influences students' motivation development, as reflected in their goal self-concordance. Furthermore, it is essential to investigate how this self-concordance contributes to educational attainment, specifically in terms of self-efficacy in language learning and in the development of global citizenship and competence. Understanding these interrelationships can offer valuable guidance for the design and implementation of educational programs that not only advance linguistic proficiency but also cultivate a robust sense of global responsibility and personal agency in utilizing AI tools for language and content learning among students.

### **3. Method**

#### **3.1 Participants**

The study involved undergraduate students enrolled in Global Citizenship and English I, a two-credit, required general education course at a private Christian university in South Korea. A total of 154 students from three proficiency levels participated, comprising 101 (65.6%) females and 53 (34.4%) males. Students were assigned to proficiency levels based on diagnostic test results administered during the first week of the semester. Detailed demographic information, including proficiency levels, TOEIC score ranges, and major breakdowns by section, is summarized in Table 1.

Classes for Sections A, B, and D were held on Tuesdays, and for Sections C and E on Fridays, each lasting 100 minutes. The available data for analysis ranged from 121 to 143 students, depending on the measure, due to occasional missing responses. Missing data were handled using listwise deletion for each analysis; that is, only cases with complete responses for the variables included in a given analysis were retained. As a result, sample sizes varied across analyses, while all reported results are based on complete-case data for the relevant measures.

**Table 1. Participant Demographics (N = 154)**

Proficiency level (section)	TOEIC score range	Major breakdown (n / %)
High (Section A) (n = 19)	500 – 785	Nursing: 12 (63.2%); social welfare: 3 (15.8%); theology: 2 (10.5%); early childhood Edu: 1 (5.3%); computer software: 1 (5.3%)
Intermediate (Sections B, C) (n = 68)	300 – 495	Nursing: 24 (35.3%); computer software: 14 (20.6%); theology: 11 (16.2%); social welfare: 11 (16.2%); early childhood Edu: 8 (11.8%)
Low (Sections D, E) (n = 67)	230 – 295	Theology: 23 (34.3%); computer software: 12 (17.9%); early childhood Edu: 11 (16.4%); nursing: 11 (16.4%); social welfare: 10 (14.9%)

*Note.* Data adapted from participants' diagnostic test results and enrollment records.

### 3.2 Research Context

The study was situated within a 15-week undergraduate English course designed to integrate GCED principles into CLIL for students in an EFL context. The course, Global Citizenship and English I, formed part of the institution's AI-Assisted CLIL curriculum, designed to enhance students' global competence, English proficiency, and digital literacy. The pedagogical framework combined CLIL with GCED principles to foster global awareness, critical thinking, and global responsibility. This approach positioned English learning as both a linguistic and cognitive process, where translanguaging and AI functioned as complementary scaffolds, facilitating meaning-making across languages and modalities and enabling students to analyze, discuss, and respond to global issues from informed perspectives.

To achieve these aims, an AI-Assisted CLIL Model for GCC was developed (Oh 2022, 2025). The model follows the backward design framework (Wiggins and McTighe 1998) and aligns with UNESCO's GCED and OECD-PISA's Global Competence frameworks. Artificial intelligence tools, including ChatGPT and DeepL, were incorporated to scaffold comprehension, vocabulary development, writing, and critical analysis of global issues, allowing students to engage interactively with global topics through AI mediation. These tools served as scaffolding resources that supported both language learning and the cultivation of global awareness.

The first two stages of the backward design—identifying desired results and determining acceptable evidence—are summarized in Table 2, which presents the learning goals, assessment evidence, and AI integration within the instructional framework. The third stage, planning learning experiences and instruction, is elaborated in the following section on Instructional Design and Implementation.

**Table 2. AI-Assisted CLIL Model for Global Citizenship and Competence Based on the Backward Design**

Learning goal	Acceptable evidence	AI integration
Develop global citizenship & competence (GCC)	<ul style="list-style-type: none"> <li>• Personal response essays from a global citizen perspective</li> <li>• Analysis of global issues through GCED themes</li> <li>• Critical engagement with multiple perspectives</li> <li>• Oral presentations on global issues</li> </ul>	<ul style="list-style-type: none"> <li>• ChatGPT-assisted analysis of GCED themes and multiple perspectives for presentation tasks</li> <li>• ChatGPT-supported drafting and revision of personal response essays</li> </ul>
Enhance English proficiency	<ul style="list-style-type: none"> <li>• Collaborative reading activities</li> <li>• Reading comprehension exercises</li> <li>• Application of think-aloud reading strategies in AI-assisted independent reading</li> <li>• Maintenance of vocabulary logs</li> <li>• Personal response essays from a global citizen perspective</li> </ul>	<ul style="list-style-type: none"> <li>• DeepL-assisted think-aloud reading of adjusted texts as a metacognitive learning strategy</li> <li>• ChatGPT-supported generation and organization of vocabulary logs</li> <li>• ChatGPT-supported process writing in Korean, unassisted writing and AI- assisted revision</li> </ul>
Build AI literacy	<ul style="list-style-type: none"> <li>• AI-assisted reading and writing tasks</li> <li>• AI-supported vocabulary learning</li> <li>• Application of AI tools for GCED theme and multi-perspective analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Use of AI tools to translate authentic media texts for content comprehension</li> <li>• Integrated use of ChatGPT and DeepL across vocabulary learning, reading, writing, and presentation tasks</li> </ul>

*Note.* Formative assessment included the successful completion of instructor-guided comprehension checks, cooperative reading tasks, AI-supported vocabulary logs, and oral presentations on student-selected global issues. Summative assessment consisted of midterm and final examinations assessing vocabulary knowledge, independent and AI-assisted reading comprehension, and AI-integrated essay writing.

### 3.3 Instruction Design and Implementation

The AI-Assisted CLIL course was structured around interactive, collaborative, and technology-enhanced learning experiences that connected language learning with global issue exploration. Activities were designed to promote both content mastery and language development, reflecting CLIL's dual focus. The key activities are summarized in Table 3.

#### *Course Implementation Procedure*

The course was delivered in four structured phases, as follows:

##### *Phase 1: Placement and Orientation (Weeks 1–2)*

The initial phase focused on student placement and orientation to the AI-assisted learning environment. In Week 1, students completed a diagnostic proficiency test, which was used to determine section placement based on language ability. In Week 2, students were introduced to AI tools—ChatGPT and DeepL—as learning supports for language development and cognitive scaffolding, and they received explicit guidance on how these tools would be used throughout the course. Instruction on specific AI prompts was introduced later, as relevant tasks were implemented.

AI use for language learning included the creation of vocabulary logs identifying unknown words and their contextual meanings, AI-assisted independent reading using DeepL in a think-aloud format, and support for writing personal response essays. AI use for cognitive scaffolding involved translating authentic texts into Korean, analyzing student-selected global issue articles in terms of GCED themes and multiple perspectives, and producing

bilingual presentation slides. These presentations included students' rationales for article selection, summaries of the seed article and related articles shared within home groups, critical literacy analyses of GCED themes and stakeholder perspectives, and discussion questions.

Basic training in parsing and comprehension strategies was provided to familiarize students with the use of AI for language support, ensuring a consistent baseline for tool integration and metacognitive awareness across all proficiency levels.

**Table 3. Overview of Learning Activities in the AI-Assisted CLIL Course**

Learning activity	Description	Purpose / learning focus
AI-translated reading	Students read AI-generated translations of authentic media articles to build schema and background knowledge about global issues before collaborative reading.	To scaffold comprehension and support access to authentic global content through AI translation
AI-assisted think-aloud reading	Students read sentences of adjusted text aloud, translated them into Korean independently, and then verified their translations using DeepL.	To support metacognitive reading and comprehension through AI-assisted translanguaging
Collaborative reading	Students first conducted independent AI-assisted reading and then engaged in collaborative reading activities through peer teaching in small groups to co-construct meaning.	To foster collaborative meaning-making and critically engaged participation with texts
Comprehension exercises	Students completed multiple-choice reading comprehension questions after each collaborative reading activity.	To ensure students' comprehension of core content and monitor their understanding
Previewing *seed articles	Students engaged in previewing activities in which they predicted the seed article content based on titles, subheadings, images, and captions.	To introduce global issues through GCED themes To develop students' previewing skills for selecting articles for independent reading and article presentations
Critical literacy instruction	Students analyzed GCED themes (human rights, sustainability, respect for diversity, peacebuilding, and globalization and social justice) and stakeholder perspectives in the seed articles using ChatGPT.	To promote critical engagement with global issues through analysis of GCED themes and diverse stakeholder perspectives
Collaborative jigsaw presentations	Students first selected one of four seed articles and searched for a related article on the same topic. In preparation for the jigsaw presentation, students met in expert groups to collaboratively analyze a specific seed article and its related text and to prepare the presentation. Students then returned to their home groups, where each member shared what they had studied from a different seed article.	To promote collaborative knowledge construction and multi-perspective understanding of global issues To enhance productive skills and presentation competence within GCED themes using AI To develop AI literacy
Vocabulary logs and personal response essays	Vocabulary logs were maintained with AI-generated CEFR A1–B1 texts. Personal response essays were written in three versions, Korean, unaided English, and AI-assisted English.	To enhance language skills using AI To develop AI literacy

*Note.* Seed articles refer to instructor-selected, high-quality authentic media articles that serve as initial input for the exploration of global issues. The seed articles included: *How “Modern-Day Slavery” in the Congo Powers the Rechargeable Battery Economy* (NPR); *How the UN Plastics Treaty Aims to Tackle the Pollution Crisis* (ABC News); *Is TikTok Really a Danger to the West?* (BBC News); and *Where Do We Draw the Line on Using AI in TV and Film?* (The Guardian).

*Phase 2: Global Citizenship and Language Skills Development (Weeks 3–8)*

The second phase emphasized AI-assisted CLIL activities based on core themes from GCED. The GCED course materials were drawn from UNESCO's GCED101 curriculum (<https://www.gcedonlinecampus.org/>) and included *The World We Live In 1–2*, *Who Is a Global Citizen?*, and *Thematic Areas of GCED*, which provided contextualized input for exploring global interdependence and civic responsibility. Students first read translated video scripts to establish baseline content understanding. They then engaged in AI-supported vocabulary logging and independent AI-assisted reading using language-level-adjusted texts provided by the instructor. This was followed by collaborative reading activities in small groups, in which students engaged in peer teaching. The midterm examination in Week 8 assessed students' vocabulary knowledge, reading comprehension, and AI-assisted essay writing on selected GCED topics.

*Phase 3: Critical Literacy–Based Exploration of Global Issues (Weeks 9–14)*

In the third phase, students engaged with authentic global issues through four *seed articles*, defined as instructor-selected, high-quality authentic media texts that served as initial input for global issue exploration. Under the instructor's guidance, students first participated in previewing activities for the seed articles and completed comprehension and language-focused activities for their selected seed article, similar to those implemented in the first half of the semester.

Building on this foundation, students received explicit instruction in critical literacy, with a focus on analyzing Global Citizenship Education (GCED) themes—human rights, sustainability, globalization and social justice, respect for diversity, and peacebuilding—as well as multiple stakeholder perspectives. The instructor modeled the use of AI prompts to support GCED theme and stakeholder analyses. Students then applied AI tools to search for related authentic global issue articles and to analyze these texts in relation to GCED themes and perspectives. Using ChatGPT and DeepL as scaffolding tools, students engaged in AI-assisted reading activities designed to support deeper comprehension and critical analysis of authentic texts.

Based on their selected seed articles, students then conducted collaborative jigsaw presentations on global issues. Preparation took place in expert groups, where students analyzed a shared seed article and related texts of their choice, while presentation and knowledge sharing occurred in home groups, in which each member contributed insights from a different article. These activities were designed to deepen critical engagement, foster comparative reasoning, and strengthen the integration of language learning with global citizenship development, while also promoting AI literacy for language learning, content comprehension, and critical thinking. The jigsaw presentations functioned as both formative and performance-based assessments, evaluating students' analytical skills, collaborative learning, and effective use of AI-mediated content and language support.

*Phase 4: Final Assessment and Reflection (Week 15)*

In the final phase, students consolidated and reflected on learning outcomes related to language development, global citizenship and competence, and AI literacy. To support this process, students completed a final examination consisting of a vocabulary assessment, independent reading comprehension based on the seed article studied in home group, AI-supported reading comprehension involving one of the seed articles examined in the expert group, and a personal response essay addressing a global issue of individual interest. This phase emphasized the integration of content knowledge, language proficiency, and AI literacy, reinforcing the course's overarching goal of nurturing globally competent and reflective English communicators.

### 3.4 Data Collection

The study employed three primary instruments: self-efficacy surveys in language skills (LS) and global citizenship and competence (GCC) and an engagement survey. The first two instruments were administered at Week 3 and Week 14 as pre- and post-tests, while the engagement survey was conducted at three points throughout the semester: W3, W9, and W14.

#### 3.4.1 Self-efficacy in language skills

Self-efficacy in LS, which serves as an indicator of English proficiency, was assessed through a survey measuring students' confidence in reading, listening, writing, and speaking. Participants rated their confidence levels on a seven-point Likert scale (1 = very low, 7 = very high). The reliability of this measure, as indicated by Cronbach's alpha, was .839 for the pre-test and .917 for the post-test, demonstrating strong internal consistency.

#### 3.4.2 Self-efficacy in global citizenship and competence

Self-efficacy in GCC was assessed using ten constructs from the PISA Global Competence Questionnaire, encompassing: Self-efficacy regarding global issues (5 items), awareness of global issues (7 items), perspective-taking (5 items), adaptability (6 items), awareness of intercultural communication (7 items), engagement with others regarding global issues (8 items), interest in learning about other cultures (4 items), respect for people from other cultural backgrounds (5 items), global mindedness (6 items), and attitudes towards immigrants (4 items). The reliability of the GCC questionnaire was .960 for the pre-test and .987 for the post-test, confirming excellent internal consistency.

#### 3.4.3 Engagement survey

Student engagement was measured using a self-report Engagement Survey developed within the framework of the Self-Concordance Model (Sheldon and Elliot 1998, 1999). According to this model, goal self-concordance—the degree to which individuals' goals reflect their enduring interests and personal values—plays a central role in sustained motivation and achievement. Individuals who pursue self-concordant goals (those motivated by intrinsic enjoyment and/or identified personal value) tend to exert greater and more persistent effort, which in turn leads to higher levels of goal attainment. This relationship is typically modeled as a sequential process:

Goal Self-Concordance → Sustained Effort → Goal Attainment

Drawing on this theoretical foundation, the survey assessed three components—self-concordance, effort, and perceived outcomes—across four learning domains that reflected the aims of the AI-assisted CLIL course:

- 1) Language Learning (LL)
- 2) Digital Literacy for Language Learning (DL\_LL)
- 3) Global Citizenship and Competence (GCC)
- 4) Digital Literacy for GCC (DL\_GCC)

Digital literacy was conceptualized as comprising two domains: AI use for LL and AI use for GCC, which served a cognitive scaffolding function. AI use for language learning included vocabulary logging, AI-assisted

think-aloud reading, and personal response writing. AI use for GCC involved translating authentic texts for comprehension, searching for related articles for presentations, and conducting critical literacy analyses, including GCED theme analysis and multiple-perspective analysis.

Following the Self-Concordance Model (Sheldon and Elliot 1998, 1999), each construct was operationalized as described below.

*Self-Concordance.* Two items per domain measured the extent to which students' learning goals were aligned with their personal values and interests.

- Identified motivation: "I believe that achieving this goal is valuable and important."
- Intrinsic motivation: "I think that working toward this goal is an interesting and enjoyable challenge."

*Effort.* One item per domain measured perceived effort using a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

*Outcome.* One item per domain assessed self-reported progress using the same 7-point Likert scale. The complete list of survey items adapted for the four learning domains is provided in the Appendix.

This multidimensional design allowed examination of students' motivational alignment (self-concordance), behavioral persistence (effort), and perceived educational impact (outcome) within the AI-assisted CLIL framework for GCC. The reliability of the engagement survey was confirmed by Cronbach's alpha coefficients of .919, .961, and .973 at the three administration points, respectively, indicating excellent internal consistency.

### 3.5 Data Analysis

#### 3.5.1 Preliminary analysis

Prior to conducting the main hierarchical multiple regression analyses, preliminary statistical tests were performed to examine differences between pretest and posttest scores on students' self-efficacy in LS and GCC. These analyses were intended to verify whether significant overall improvements occurred following participation in the AI-assisted CLIL course and to establish the suitability of these variables for subsequent regression analyses.

Independent-samples *t*-tests were conducted to compare pretest and posttest means for LS and GCC self-efficacy. Paired-samples *t*-tests were not employed because matching pretest and posttest responses would have resulted in a considerable reduction in the available sample size. Results indicated a statistically significant increase in self-efficacy in LS,  $t(109) = 10.00$ ,  $p < .001$ , two-tailed, with a large effect size (Hedges'  $g = 1.21$ ). Similarly, self-efficacy in global citizenship and competence significantly improved from pre- to post-course,  $t(114) = 10.38$ ,  $p < .001$ , two-tailed, with a large effect size (Hedges'  $g = 1.27$ ).

A Bonferroni correction was applied to control for Type I error inflation associated with multiple comparisons. The adjusted significance level was set at  $\alpha = .025$  ( $.05 / 2$ ). Both differences remained significant after correction, confirming robust improvements in both domains.

Descriptive statistics and *t*-test results are presented in Table 4. These findings support the assumption that students' self-efficacy increased over the course, providing a strong foundation for the subsequent regression analyses examining how engagement and other predictors influenced these learning outcomes.

**Table 4. Descriptive Statistics for Self-Efficacy in LS and GCC**

Dependent variables	Mean (SD)		Mean difference
	Pretest <i>n</i> = 131	Posttest <i>n</i> = 121	
Self-efficacy			
Reading (1)	3.92(1.55)	4.84(1.44)	.92
Listening (1)	3.87(1.34)	4.70(1.40)	.83
Writing (1)	3.11(1.41)	4.27(1.60)	1.16
Speaking (1)	3.51(1.18)	4.42(1.50)	1.28
Average	3.51(1.18)	4.56(1.30)	1.05
PISA global competence			
	Pretest <i>n</i> = 134	Posttest <i>n</i> = 122	
Self-efficacy regarding global issues (6)	3.27(1.39)	5.03(1.14)	1.76
Awareness of global issues (7)	3.74(1.30)	5.14(1.13)	1.40
Perspective-taking (5)	5.00(1.06)	5.55(1.15)	.55
Adaptability (6)	4.34(1.18)	5.20(1.16)	.85
Awareness of intercultural communication (7)	5.36(.99)	5.61(1.18)	.25
Student's engagement (with others) regarding global issues (7)	3.45(1.10)	4.87(1.27)	1.41
Interest in learning about other cultures (4)	4.69(1.47)	5.39(1.22)	.69
Respect for people from other cultural backgrounds (5)	5.60(1.16)	5.66(1.15)	.06
Global mindedness (6)	4.53(1.11)	5.43(1.17)	.91
Attitudes towards immigrants (4)	5.10(1.20)	5.44(1.19)	.34
Average	4.43(.81)	5.30(1.01)	.88

*Note.* Numbers in parentheses indicate the number of survey items for each construct.

### 3.5.2 Primary analyses: Hierarchical multiple regression

To address Research Questions 2 and 3, a series of hierarchical multiple regression analyses were conducted to examine how the engagement variables—goal self-concordance, effort, and perceived outcomes—influenced students' self-efficacy in LS and GCC within the AI-assisted CLIL framework.

A stepwise entry method was used to assess the incremental contributions of each predictor variable. For each dependent variable (SE-Post LS and SE-Post GCC), self-efficacy pretest scores were entered at Step 1 to control for baseline differences. The engagement variables were then entered sequentially: goal self-concordance (Step 2), effort (Step 3), and perceived outcomes (Step 4). This procedure allowed examination of the unique variance explained by each engagement factor beyond that accounted for by initial self-efficacy levels.

Separate regression analyses were conducted for Time 2 and Time 3 engagement variables to compare the influence of these predictors across learning stages. Model fit and predictor significance were evaluated using the coefficient of determination ( $R^2$ ), change in explained variance ( $\Delta R^2$ ), and standardized beta coefficients ( $\beta$ ).

No Time 1 engagement variables were entered into the regression models predicting post-course self-efficacy in SE-Post LS or SE-Post GCC, indicating that early differences in self-concordance, effort, and perceived outcomes across the four learning domains did not significantly predict post-course self-efficacy. This finding is expected, as students' engagement in course activities had not yet occurred at this stage. In contrast, the engagement variables found to be significant at Time 2 and Time 3 can be attributed to students' evolving learning experiences within the AI-assisted CLIL framework for global citizenship and competence. Together, these results provide initial evidence that sustained, course-based engagement—rather than pre-existing motivational dispositions—plays a critical role in shaping students' post-course self-efficacy outcomes.

## 4. Results

### 4.1 Impact of AI-Assisted CLIL on Student Engagement

Across all four learning domains, self-concordance generally increased over time, with more substantial gains observed in *digital literacy for language learning (DL-LL)*, *global citizenship and competence (GCC)*, and *digital literacy for GCC (DL-GCC)* than in *language learning (LL)*. Self-concordance in LL initially declined and showed partial recovery by the end of the course. Effort showed the most pronounced increase, particularly in the digital literacy and GCC domains, suggesting heightened engagement in these areas over time. Perceived outcomes followed a similar upward trend, indicating that as students invested greater effort, they also reported higher perceptions of learning progress.

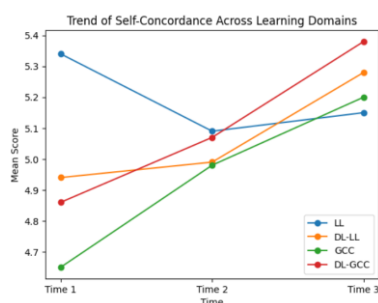
To determine whether these changes in self-concordance were statistically significant, independent-samples *t*-tests were conducted for the four learning domains using *SPSS* (Version 21). A Bonferroni correction was applied to control for Type I error across the four comparisons, resulting in an adjusted significance level of  $\alpha = .0125$  ( $.05 \div 4$ ).

Results revealed no significant difference in self-concordance for *language learning (SCLL)* between the first and third measurement points,  $M_1 = 5.34$  ( $SD = 1.30$ ) and  $M_3 = 5.15$  ( $SD = 1.34$ ),  $t(109) = -2.04$ ,  $p = .044$ , which did not meet the Bonferroni-adjusted criterion. However, significant increases were found in the other three domains.

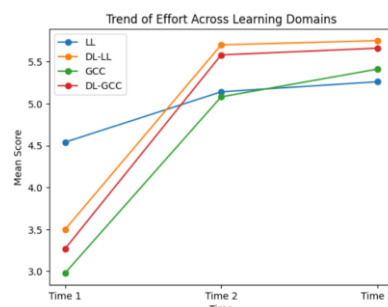
For *digital literacy for language learning (SCDL-LL)*, self-concordance increased significantly from  $M_1 = 4.94$  ( $SD = 1.27$ ) to  $M_3 = 5.28$  ( $SD = 1.19$ ),  $t(109) = 2.62$ ,  $p = .010$ . In the *global citizenship and competence* domain (SCGCC), scores rose from  $M_1 = 4.65$  ( $SD = 1.46$ ) to  $M_3 = 5.20$  ( $SD = 1.31$ ),  $t(109) = 3.76$ ,  $p < .001$ . Finally, self-concordance in *digital literacy for GCC (SCDL-GCC)* increased significantly from  $M_1 = 4.86$  ( $SD = 1.37$ ) to  $M_3 = 5.38$  ( $SD = 1.23$ ),  $t(109) = 4.17$ ,  $p < .001$ .

These findings indicate that students demonstrated statistically significant gains in SCDL-LL, SCGCC, and SCDL-GCC, while SCLL displayed only modest improvement that did not return to its initial level.

Figures 1–3 display the longitudinal trends of self-concordance, effort, and perceived outcomes across the three measurement points for each learning domain (LL, DL-LL, GCC, and DL-GCC). Table 5 presents the descriptive statistics for the engagement variables across the three time points.



**Figure 1. Longitudinal Trends of Goal Self-Concordance Across Four Learning Domains (Time 1-3)**



**Figure 2. Longitudinal Trends of Effort Across Four Learning Domains (Time 1-3)**

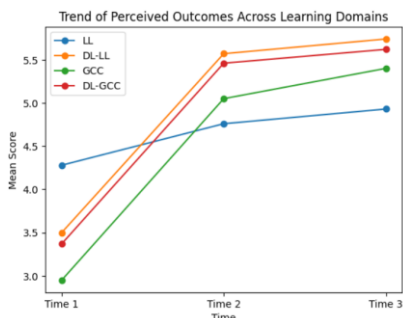


Figure 3. Longitudinal Trends of Perceived Outcome Across Four Learning Domains (Time 1-3)

Table 5. Descriptive Statistics for the Engagement Variables

Engagement Variables	Mean (SD)			
	Time1 n = 131	Time2 n = 143	Time3 n = 111	Time3 - Time1
<b>Self-concordance</b>				
LL	5.34(1.30)	5.09(1.43)	5.15(1.34)	-.19
DL-LL	4.94(1.27)	4.99(1.35)	5.28(1.19)	.34
GCC	4.66(1.45)	4.98(1.35)	5.20(1.31)	.55
DL-GCC	4.86(1.37)	5.07(1.23)	5.38(1.23)	.52
<b>Effort</b>				
LL	4.54(1.35)	5.14(1.25)	5.26(1.29)	.72
DL-LL	3.50(1.50)	5.70(1.19)	5.75(1.19)	2.26
GCC	2.98(1.44)	5.08(1.28)	5.41(1.25)	2.44
DL-GCC	3.27(1.52)	5.58(1.19)	5.66(1.22)	2.39
<b>Perceived Outcome</b>				
LL	4.28(1.46)	4.76(1.24)	4.93(1.34)	.65
DL-LL	3.50(1.46)	5.57(2.24)	5.74(1.22)	2.24
GCC	2.95(1.51)	5.05(1.29)	5.40(1.30)	2.45
DL-GCC	3.37(1.48)	5.46(1.26)	5.62(1.36)	2.25

#### 4.2 Impact of the Engagement Variables on Self-Efficacy in LS

Multicollinearity was assessed using variance inflation factor (VIF) values, and no issues were detected (Time 2 VIF range = 1.000–3.175; Time 3 VIF range = 1.000–2.113). Two separate models were tested: the first model included engagement variables from Time 2, and the second model included engagement variables from Time 3. In both models, self-efficacy pre-test scores (SE-LS Pre) were entered as a control variable at Step 1. The results of the analyses are presented in Table 6.

##### 4.2.1 Predicting self-efficacy in language skills using Time 2 engagement variables

A hierarchical multiple regression analysis was conducted to examine how Time 2 engagement variables predicted post-course self-efficacy in LS (SE-LS Post). At Step 1, self-efficacy pretest scores were entered to control for baseline differences. At Step 2, self-concordance for digital literacy for language learning (SCDL-LL2) significantly improved the model,  $\Delta R^2 = .099, p < .01, \beta = .33$ , indicating that aligning digital literacy goals with language learning was positively associated with higher SE-LS Post.

At Step 3, effort in language learning (ELL2) explained an additional 3% of the variance,  $\Delta R^2 = .030, p < .05, \beta = .23$ , suggesting that increased engagement in language-related tasks contributed meaningfully to students' self-efficacy in language learning. At Step 4, perceived outcome in language learning (OLL2) emerged as the strongest predictor,  $\Delta R^2 = .049, p < .01, \beta = .37$ , highlighting the importance of students' perceived learning success. Finally, at Step 5, perceived outcome in digital literacy for GCC (ODL-GCC2) added a smaller yet significant contribution,  $\Delta R^2 = .019, p < .05, \beta = .18$ .

The final model accounted for 54.9% of the variance in SE-LS Post,  $R^2 = .549, p < .01$ , with the most influential predictors being SCDL-LL2, ELL2, and OLL2. These findings suggest that students' self-efficacy in language learning was shaped by their integration of digital literacy skills, sustained effort, and positive perceptions of learning progress within the AI-assisted CLIL framework.

**Table 6. Hierarchical Multiple Regression Analyses Predicting Self-Efficacy for LS from the Engagement Variables**

Predictor	Self-Efficacy-LS Post		Predictor	Self-Efficacy-LS Post	
Time 2	$\Delta R^2$	$\beta$	Time 3	$\Delta R^2$	$\beta$
Step 1	.373**		Step 1	.373**	
SE-LS Pre		.611**	SE-LS Pre		.611**
Step 2	.099**		Step 2	.154**	
SCDL-LL2		.328**	SCDL-LL3		.403**
Step 3	.030*		Step 3	.039**	
ELL2		.228*	EGCC3		.263**
Step 4	.049**		Step 4	.049**	
OLL2		.370**	OLL3		.321**
Step5	.019*				
ODL-GCC2		.180*			
Total $R^2$	.570**		Total $R^2$	.600**	
<i>n</i>	121				

Note: · SE-LS Pre was entered as a control variable at Step 1 in both models.

- In the first model, four self-concordance variables from Time 2 were entered at Step 2, while in the second model, four self-concordance variables from Time 3 were entered at Step 2.
- In the first model, four effort variables from Time 2 were entered at Step 3, while in the second model, four effort variables from Time 3 were entered at Step 3.
- In the first model, four outcome variables related to English enhancement from Time 2 were entered at Step 4, while in the second model, four outcome variables from Time 3 were entered at Step 4.

#### 4.2.2 Predicting self-efficacy in language skills using Time 3 engagement variables

A second hierarchical multiple regression was conducted using Time 3 engagement variables to predict SE-LS Post. After controlling for pretest scores at Step 1, self-concordance for digital literacy for language learning (SCDL-LL3) entered at Step 2 significantly improved the model,  $\Delta R^2 = .154, p < .01, \beta = .40$ , indicating that continued alignment between digital literacy and language learning goals was a strong predictor of self-efficacy.

At Step 3, effort in global citizenship and competence (EGCC3) contributed an additional 3.9% of explained variance,  $\Delta R^2 = .039, p < .01, \beta = .26$ , suggesting that students who actively engaged in GCC-related learning

activities exhibited stronger confidence in their English abilities. At Step 4, perceived outcome in language learning (OLL3) remained the strongest predictor,  $\Delta R^2 = .049$ ,  $p < .01$ ,  $\beta = .32$ .

The final model explained 60.0% of the variance in SE-LS Post,  $R^2 = .600$ ,  $p < .01$ . Among the predictors, SCDL-LL3, EGCC3, and OLL3 had the most substantial effects, emphasizing the role of sustained engagement and perceived learning success in strengthening students' language self-efficacy during the later stages of the AI-assisted CLIL course.

### 4.3 Impact of the Engagement Variables on Self-Efficacy in GCC

Multicollinearity was assessed using variance inflation factor (VIF) values, and no issues were detected (Time 2 VIF range = 1.000–2.354; Time 3 VIF range = 1.000–3.934). The results of the analyses are presented in Table 7. Two separate models were tested: the first model included engagement variables from Time 2, and the second model included engagement variables from Time 3. In both models, self-efficacy pre-test scores (SE-GCC Pre) were entered as a control variable at Step 1.

**Table 7. Hierarchical Multiple Regression Analyses  
Predicting Self-Efficacy for GCC from the Engagement Variables**

Predictor	Self-Efficacy-GCC Post		Predictor	Self-Efficacy-GCC Post	
	$\Delta R^2$	$\Delta R^2$		$\Delta R^2$	$\beta$
Time 2			Time 3		
Step 1	.320**		Step 1	.308**	
SE-GCC Pre		.566**	SE-GCC Pre		.555*
Step 2	.144**		Step 2	.253**	
SCDL-GCC2		.400**	SCGCC3		.555*
Step 3	.072**		Step 3	.047**	
EDL-GCC2		.320**	EGCC3		.315**
Step 4	.020*		Step 4	.027**	
ODL-GCC2		.217*	OGCC3		.324**
Total $R^2$	.556**		Total $R^2$	.635**	
<i>n</i>	122				

*Note.* The same procedure as the hierarchical multiple regression analyses predicting SE-LS Post (Table 5) was adopted, except that SE-GCC Pre was entered as a control variable at Step 1 in both models.

#### 4.3.1 Predicting self-efficacy in global citizenship and competence using Time 2 engagement variables

A hierarchical multiple regression analysis was conducted to determine how Time 2 engagement variables predicted post-course self-efficacy in global citizenship and competence (SE-GCC Post). After controlling for pretest scores at Step 1, self-concordance for digital literacy in GCC (SCDL-GCC2) significantly improved the model at Step 2,  $\Delta R^2 = .144$ ,  $p < .01$ ,  $\beta = .40$ , indicating that students with stronger goal alignment in digital literacy reported higher levels of self-efficacy in GCC.

At Step 3, effort in digital literacy for GCC (EDL-GCC2) contributed an additional 7.2% of explained variance,  $\Delta R^2 = .072$ ,  $p < .01$ ,  $\beta = .32$ , suggesting that increased effort in digital literacy activities was associated with greater confidence in addressing global issues. At Step 4, perceived outcome in digital literacy for GCC (ODL-GCC2) added a smaller but significant increment,  $\Delta R^2 = .020$ ,  $p < .05$ ,  $\beta = .22$ , underscoring the importance of perceived success in technology-mediated learning.

The final model explained 55.6% of the variance in SE-GCC Post,  $R^2 = .556$ ,  $p < .01$ , with SCDL-GCC2, EDL-GCC2, and ODL-GCC2 emerging as key predictors. These findings highlight the central role of digital literacy engagement—particularly goal alignment and sustained effort—in fostering self-efficacy related to global citizenship and competence within the AI-assisted CLIL context.

#### 4.3.2 Predicting self-efficacy in global citizenship and competence using Time 3 engagement variables

A second hierarchical regression analysis examined the predictive effects of Time 3 engagement variables on SE-GCC Post. After baseline control at Step 1, self-concordance for GCC (SCGCC3) entered at Step 2 and significantly improved the model,  $\Delta R^2 = .253$ ,  $p < .05$ ,  $\beta = .56$ , suggesting that students with stronger alignment between personal values and GCC goals demonstrated greater post-course self-efficacy.

At Step 3, effort in GCC (EGCC3) accounted for an additional 4.7% of variance,  $\Delta R^2 = .047$ ,  $p < .01$ ,  $\beta = .32$ , indicating that active participation in GCC-related activities further enhanced self-efficacy. At Step 4, perceived outcome in GCC (OGCC3) explained an additional 2.7% of the variance,  $\Delta R^2 = .027$ ,  $p < .01$ ,  $\beta = .32$ , reflecting the reinforcing effect of perceived achievement on confidence development.

The final model accounted for 63.5% of the variance in SE-GCC Post,  $R^2 = .635$ ,  $p < .01$ , with SCGCC3, EGCC3, and OGCC3 identified as the strongest predictors. These results demonstrate that, by the end of the course, students' global self-efficacy was primarily shaped by sustained engagement and perceived learning success within the CLIL framework for global citizenship and competence.

## 5. Discussion and Conclusion

This study examined the impact of AI-assisted CLIL on students' engagement and self-efficacy in LS and GCC in an EFL tertiary context. Results revealed a general increase in self-concordance across all domains except for self-concordance in language learning (SC-LL). The significant gains in self-concordance for GCC and both digital literacy domains indicate that students' goals in these areas became increasingly self-determined as the course progressed. This pattern aligns with self-concordance theory (Sheldon and Elliot 1998, 1999), which posits that motivation strengthens when learners internalize goals through meaningful engagement. In the present study, AI-assisted CLIL activities—such as AI-supported reading, critical analysis of global issues, and collaborative jigsaw presentations—appear to have supported this internalization process, particularly in domains that were likely less familiar to students at the outset.

Effort exhibited the most pronounced increase across time, especially in the GCC and digital literacy domains. This sharp rise suggests that as students became more comfortable with AI tools and global issue content, they were willing to invest greater sustained effort. Importantly, perceived outcomes followed a similar upward trajectory, indicating that increased effort was accompanied by stronger perceptions of learning progress. This pattern lends support to a virtuous cycle model of engagement, in which self-concordance fosters effort, effort enhances perceived outcomes, and positive learning experiences further reinforce engagement.

This trajectory empirically corroborates and extends the findings of Henry et al. (2023), who demonstrated that language learners pursuing self-concordant goals exhibit greater resilience and sustained effort. While Henry et al. focused on general language learning contexts, the present study confirms that this motivational dynamic operates effectively within the specific domains of digital literacy and global citizenship. Students who internalized the

value of GCC goals were more willing to invest effort in AI-mediated tasks, thereby validating the causal link between self-concordance and sustained engagement in a technology-enhanced CLIL environment.

The particularly strong gains observed in DL-GCC and GCC highlight the pedagogical value of integrating AI tools into critical literacy and global citizenship tasks. These findings align with and expand upon Porto's (2019, 2024) research, which established that CLIL pedagogies—particularly when integrated with arts-based or translanguaging approaches—can effectively foster students' civic engagement and ecological consciousness. By introducing AI as a novel translanguaging scaffold, this study extends Porto's argument, demonstrating that AI-mediated meaning-making can similarly cultivate global competence. Rather than functioning merely as technical supports, AI tools in this course served as motivational and cognitive scaffolds, enabling students to access authentic texts, analyze multiple perspectives, and articulate informed personal responses. These experiences likely contributed to students' growing sense that their learning goals in these domains were meaningful and personally relevant.

One unexpected finding concerns engagement variables related to language learning (LL). Although the decrease in self-concordance for language learning (SCLL) from Time 1 to Time 3 did not reach statistical significance, SCLL declined initially and showed only partial recovery by the end of the course. Importantly, this pattern contrasts with the steady increases observed in students' effort and perceived outcomes in language learning. Despite a slight weakening in explicit goal alignment with language learning as an independent objective, students invested increasing effort in language-related tasks and reported stronger perceptions of learning progress over time.

This apparent paradox can be interpreted through the lens of Cognitive Load Theory (Sweller 1988). AI-assisted CLIL requires learners to integrate linguistic processing, digital tool use, and complex global content, resulting in substantial intrinsic cognitive load. As language learning goals became embedded within broader digital literacy and global citizenship tasks, students' attentional and motivational resources may have been reallocated rather than diminished. From this perspective, the temporary decline in SCLL does not indicate disengagement from language learning, but rather a re-prioritization of motivational focus, whereby language learning was increasingly perceived as instrumental to engaging with meaningful global issues rather than as a stand-alone goal.

This interpretation is further supported by the hierarchical regression findings. At Time 2, self-efficacy in language skills (SE-LS) was significantly predicted by engagement variables associated with digital literacy for language learning (SCDL-LL2), effort in language learning (ELL2), and perceived outcomes in language learning (OLL2), with digital literacy for global citizenship and competence (ODL-GCC2) providing an additional, albeit smaller, significant contribution. These results suggest that perceived success in AI-mediated GCC-related tasks strengthened students' confidence in their linguistic abilities, even at relatively early stages of engagement.

Notably, at Time 3, effort in global citizenship and competence (EGCC3)—rather than effort in language learning (ELL3)—emerged as a significant predictor of post-course SE-LS. This finding underscores that sustained engagement in GCC activities contributed meaningfully to students' confidence in their language abilities. Rather than competing with language learning, global citizenship engagement appears to have reinforced language self-efficacy, highlighting a reciprocal relationship between content engagement and linguistic development within the AI-assisted CLIL framework.

These patterns suggest a motivational shift from intrinsic motivation toward language learning itself to a more identified form of motivation. Identified motivation, a core construct within Self-Determination Theory (Ryan and Deci 2000), refers to goals that are valued because they align with learners' personal interests and values. The observed pattern indicates that language learning came to be increasingly valued not as an end in itself, but as a means of participating in personally meaningful and socially relevant global issues. The findings that ODL-GCC2

and EGCC3 significantly predicted self-efficacy in language skills (SE-LS) further suggest that AI-assisted translanguaging and critical literacy practices facilitated this motivational transformation by rendering authentic English texts accessible and relevant. Through AI-mediated support, students were able to engage deeply with complex global content, thereby externalizing and recontextualizing the value of language learning.

Moreover, these results resonate with Dörnyei's (2009) concept of the Ideal L2 Self. As students increasingly engaged with global citizenship themes and began to perceive themselves as capable participants in global discourse, their emerging global citizenship identity may have merged with their language learner identity. In this sense, meaningful engagement with global issues—supported by AI tools—may have contributed to a reconfigured Ideal L2 Self, in which being a competent English user is inseparable from being an informed, critically engaged global citizen. When global citizenship values begin to shape learners' Ideal L2 Self, motivation for language learning is sustained not by linguistic goals alone, but by the desire to communicate, reflect, and act within a global context.

Taken together, these findings provide empirical support for the motivational hypothesis proposed in the literature review. Within the AI-assisted CLIL framework designed to foster global citizenship and competence, exposure to authentic English materials addressing global issues—made comprehensible through AI-mediated translanguaging—appears to have created conditions under which engagement in GCC and digital literacy domains significantly contributed to language self-efficacy. The observed decrease in SCLL, therefore, should not be interpreted as a weakening of language motivation, but rather as evidence of a motivational redistribution and integration, in which language learning becomes embedded within broader, value-driven global engagement. This reciprocal reinforcement between language and content engagement highlights the synergistic potential of AI-assisted CLIL to cultivate both linguistic development and globally oriented learner identities.

For self-efficacy in global citizenship and competence (SE-GCC), significant predictors emerged from engagement variables within the GCC and DL-GCC domains rather than from LL or DL-LL. Students who demonstrated higher levels of self-concordance, invested greater effort, and perceived stronger learning outcomes in GCC- and DL-GCC-related activities reported significantly higher SE-GCC. These findings indicate that engagement in AI-supported global and digital learning activities directly contributed to students' perceived educational attainment in global citizenship and competence. In contrast to language self-efficacy, which benefited from cross-domain engagement, global citizenship self-efficacy was primarily shaped by content-specific and value-oriented engagement, underscoring the domain-sensitive nature of self-efficacy development.

The findings yield several pedagogical implications related to inclusivity, learner motivation, and the cultivation of globally competent communicators. First, AI-assisted CLIL enhances inclusivity by expanding access for lower-proficiency EFL learners through the use of AI as a translanguaging scaffold. By mediating comprehension and reducing linguistic barriers, AI tools enabled students to engage meaningfully with authentic and conceptually demanding global texts. Importantly, the observed directionality of influence indicates that engagement in AI-assisted content learning contributed to students' self-efficacy in language learning, suggesting that meaningful participation in global citizenship-related activities can translate into increased confidence in language use. This inclusive design aligns with UNESCO's vision of equitable and transformative GCED, demonstrating that high-level global issues can be made accessible across diverse proficiency levels when supported by AI-mediated scaffolding.

Second, the incorporation of goal self-concordance, effort, and perceived outcomes as engagement variables offers a process-oriented framework for understanding learner motivation in AI-mediated environments. Consistent with Dörnyei and Ryan's (2015) view of motivation as dynamic and context-dependent, the present findings illustrate how goal self-concordance sustains effort and agency across the CLIL learning cycle. AI-

assisted learning, in this sense, extends beyond facilitating comprehension to fostering motivational alignment between learners' values, goals, and learning behaviors. The finding that engagement in GCC-related activities—rather than language learning effort alone—predicted post-course language self-efficacy provides empirical support for this framework, suggesting that meaningful, value-driven content engagement can enhance linguistic confidence through purposeful goal pursuit.

Taken together, the results suggest that AI-assisted CLIL supports the development of integrative global communicators by uniting language learning, digital literacy, and global competence within a single pedagogical framework. The concurrent attainment of these learning outcomes indicates that AI-assisted CLIL for GCC represents a promising direction for higher education in an era of digital transformation. As learners confront global challenges such as climate change, widening inequalities, and geopolitical conflict, this approach equips them with the critical, intercultural, and reflective capacities needed to engage responsibly across multilingual and multimodal contexts. Within this framework, AI functions not merely as a linguistic support tool but as a cognitive, intercultural and motivational bridge, enabling students to co-construct meaning, critically interpret complex issues, and participate in global discourse as reflective and responsible communicators.

Despite these pedagogical contributions, several limitations should be acknowledged. First, the current research design did not include a comparison condition (e.g., a non-AI-supported CLIL or traditional EFL class). Consequently, it is not possible to causally separate the effects of the CLIL pedagogical framework from the specific contributions of AI-mediated support. It remains unclear to what extent the observed gains in self-efficacy and engagement are attributable to the CLIL approach itself, the specific AI assistance, or the interaction between the two. Future research should therefore employ comparative or factorial designs to isolate the specific impact of AI integration on student outcomes.

Second, the use of independent-samples t-tests, while methodologically justified due to missing matched cases, limits the ability to track individual-level change. Future studies employing fully matched longitudinal designs or latent growth modeling could provide deeper insights into individual engagement trajectories. Third, the findings rely on self-reported measures, which may be influenced by social desirability or retrospective bias.

In addition, mixed-method designs would provide a more comprehensive understanding of how AI-assisted CLIL influences language development, digital literacy, and global competence over time. Incorporating qualitative data—such as learner reflections, classroom discourse, and AI interaction logs—could offer deeper insights into the cognitive, affective, and motivational processes underlying engagement in AI-mediated learning environments.

AI-assisted CLIL offers an inclusive and future-oriented pedagogy that integrates linguistic, cognitive, and global learning dimensions. By positioning AI as both a translanguaging and cognitive scaffold, the approach enables learners to access authentic global texts, develop digital literacy, and sustain motivation through goal self-concordance and meaningful engagement. Continued empirical and theoretical inquiry into AI-assisted CLIL for GCC is essential for advancing equitable, intelligent, and globally relevant language education in higher education.

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**APPENDIX.**

## Engagement Survey Items

## Section 1. Effort

Instruction: Based on your learning experiences in the *Global Citizenship and English* course so far, please indicate the degree of effort you made for each item.

Scale: 1 = Not at all / 4 = Moderate / 7 = Very much

1. Improving English proficiency
2. Developing global citizenship and global competence
3. Improving digital literacy for language learning (e.g., how to use ChatGPT or machine translation tools effectively)
4. Improving digital literacy for effective information acquisition to explore global issues (e.g., how to use ChatGPT or machine translation tools effectively)

## Section 2. Perceived Outcome

Instruction: Based on your learning experiences in the *Global Citizenship and English* course so far, please indicate the level of outcome you achieved for each item.

Scale: 1 = Not at all / 4 = Moderate / 7 = Very much

1. Improving English proficiency
2. Developing global citizenship and global competence
3. Improving digital literacy for language learning (e.g., how to use ChatGPT or machine translation tools effectively)
4. Improving digital literacy for effective information acquisition to explore global issues (e.g., how to use ChatGPT or machine translation tools effectively)

## Section 3. Self-Concordance

Targets:

- Improving English proficiency
- Developing global citizenship and global competence
- Improving digital literacy for English learning
- Improving digital literacy for effective information acquisition to explore global issues

Instruction: Please indicate how much you agree with each statement regarding the goals you want to achieve through the *Global Citizenship and English I* course.

Scale: 1 = Strongly disagree / 4 = Neutral / 7 = Strongly agree

1. I believe that achieving this goal is valuable and important.
2. I think that working toward this goal is an interesting and enjoyable challenge.

Examples in: English

Applicable Languages: English

Applicable Level: Tertiary