

# Integrating CLIL and green education to foster environmental awareness in pre-service English teachers

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**Abstract:** *The paper presents an applied approach to integrating Content and Language Integrated Learning (CLIL) with Green Education to enhance environmental literacy and pedagogical readiness among pre-service English teachers. It outlines the authors' experience in designing and implementing a six-week CLIL module on sustainability topics such as eco-tourism, recycling, and climate change. Conducted with 36 students from “Ion Creangă” State Pedagogical University of Chișinău, the study employed a mixed-method design combining questionnaires, reflections, and classroom observations to measure both cognitive and attitudinal change. Results indicated a significant improvement in participants' environmental awareness, motivation, and understanding of teaching as a vehicle for social responsibility. The research was carried out within the national project Integrating and Promoting Green Education in the Initial Training of English Language Teachers (code 25.80012.0807.56SE), developed under Moldova's strategic direction of Innovative Educational Technologies and Products. The findings demonstrate that CLIL, when enriched with sustainability principles, provides a transformative pedagogical framework that links language learning, critical thinking, and ecological values, shaping educators prepared to inspire change. The findings should be interpreted in light of the study's quasi-experimental design, which did not include a control group and was limited to a six-week intervention.*

**Keywords:** CLIL, Green education, Environmental literacy, Teacher training, Sustainability pedagogy, Innovative learning frameworks.

## 1. Introduction

Embedding sustainability within higher education has become a central global concern (Sterling, 2014; Barth et al., 2016), closely linked to the **United Nations' Sustainable Development Goals**, particularly **SDG 4 (Quality Education)** and **SDG 13 (Climate Action)**. In the field of English Language Teacher Education (ELTE), sustainability functions both as a moral responsibility and a pedagogical avenue: through environmental themes, language instruction can nurture critical thinking, intercultural competence, and civic engagement (Cates, 2016). Nonetheless, the inclusion of green education elements in ELTE programs remains sporadic and uneven.

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Early advocates such as Cates (1990) emphasized peace, human rights, and environmental stewardship in global education, while later frameworks (Haigh, 2012; Tilbury, 2013) incorporated sustainability through Education for Sustainable Development (ESD). Content and Language Integrated Learning (CLIL) integrates content, communication, cognition, and culture (Coyle, Hood & Marsh, 2010), providing a pedagogical framework for combining language learning with disciplinary content.

Building on Coyle's (2007) 4Cs framework, this study reconceptualizes the cultural dimension as *Community* in order to foreground ecological responsibility, social engagement, and local–global interconnectedness. Rather than departing from established CLIL theorisation, the Content–Communication–Cognition–Community model extends it by aligning language-integrated instruction with principles of eco-pedagogy and Education for Sustainable Development. In this adaptation, sustainability functions not merely as thematic content, but as a shared pedagogical orientation shaping interaction, reflection, and professional identity formation in pre-service English teachers.

However, empirical evidence on how CLIL-based sustainability modules influence pre-service English teachers' awareness and pedagogical identity remains limited. This study addresses that gap by examining whether a short, structured CLIL module on topics such as climate change, eco-tourism, and recycling can enhance environmental awareness and readiness to integrate sustainability into teaching.

Grounded in Coyle's 4Cs framework, the module combines authentic materials, multimodal projects, and reflective tasks that foster critical thinking, collaboration, and creativity — competencies central to twenty-first-century education (Trilling & Fadel, 2009). The study aims to:

1. design and implement a CLIL module integrating sustainability into English teacher training;
2. measure changes in environmental awareness through mixed-method analysis;
3. identify features of CLIL tasks that promote ecological responsibility and professional growth.

This research contributes to eco-pedagogy (Freire, 1998; Kahn, 2010) by extending CLIL theory toward environmental literacy, providing empirical evidence of awareness gains, and offering a replicable model for embedding sustainability within ELTE.

## 2. Methods

The study followed the principles of *transparency, validity, and replicability* (Creswell & Plano Clark, 2018) to ensure reliability and transferability across similar English language teacher education contexts. It was conducted within the national research project *Integrating and Promoting Green Education in the Initial Training of English Language Teachers* (code 25.80012.0807.56SE), under

Moldova’s strategic direction *Innovative Educational Technologies and Products*.

A mixed-method, quasi-experimental design combined *quantitative and qualitative tools* to capture both measurable outcomes and participants’ lived experiences. This approach balanced statistical accuracy with pedagogical authenticity (Dörnyei, 2007). The intervention—a six-week CLIL-based sustainability module—was delivered to one experimental group. Pre- and post-tests measured changes in environmental awareness, attitudes, and behavioural intentions, while observations, reflective journals, and semi-structured interviews explored participants’ evolving motivation and professional identity.

Thirty-six pre-service English teachers (28 female, 8 male), aged 20–23, participated voluntarily. All were third-year students at *Ion Creangă State Pedagogical University of Chişinău* and had prior training in ELT methodology but no experience with sustainability in education. Participants were selected purposively (Cohen, Manion & Morrison, 2018) for their developing pedagogical awareness and openness to innovation. Ethical approval and informed consent were obtained, ensuring confidentiality and adherence to institutional research standards.

All sessions took place in a multimedia-equipped classroom that supported the use of authentic online resources such as **BBC Earth**, **National Geographic Learning**, and **The Guardian** sustainability reports.

**2.1 The CLIL module and learning sequence**

The CLIL module was incorporated into the regular course *Methodology of Teaching English* and was designed according to **Coyle’s (2007) 4Cs Framework** — *Content, Communication, Cognition, and Culture* — adapted as *Content, Communication, Cognition, and Community* to highlight ecological and social responsibility. The sequence lasted **six weeks**, with two 90-minute sessions weekly, each dedicated to a sustainability theme relevant to both global and local contexts.

**Table 1.** Structure of the CLIL Module

<b>Week</b>	<b>Theme</b>	<b>Core Activity</b>	<b>Learning Focus</b>	<b>Expected Outcome</b>
1	Sustainability and Everyday Choices	Vocabulary and discussion on ecological footprint	Awareness of personal impact	Self-reflection on daily habits
2	Climate Change and Media Discourse	Critical reading and bias detection in news texts	Critical literacy	Recognition of perspective and bias
3	Eco-Tourism and Local Identity	Project-based creation of tourist materials	Intercultural and environmental awareness	Collaboration and creativity
4	Waste and Recycling	Data interpretation and persuasive	Problem-solving through	Development of rhetorical skills

Week	Theme	Core Activity	Learning Focus	Expected Outcome
		writing	argumentation	
5	Green Cities and Innovation	Group debates and infographic design	Multimodal communication	Integration of digital skills
6	Reflection and Lesson Planning	Design of mini-lessons integrating CLIL and green topics	Pedagogical transfer	Application of sustainable teaching practices

The module integrated **authentic English-language resources** to maintain linguistic realism and topical relevance. Each session followed a three-phase instructional cycle:

1. **Input phase** – exposure to authentic materials and guided comprehension;
2. **Language focus phase** – scaffolding key lexical and grammatical patterns;
3. **Output phase** – collaborative production through debates, projects, or micro-teaching tasks.

This structure encouraged communication, critical thinking, and creativity, aligning with **21st-century competences** (Trilling & Fadel, 2009).

## 2.2 Instruments and data collection

Four complementary instruments were used to evaluate the module's impact:

1. **Environmental Awareness Questionnaire (EAQ)** — A 20-item, five-point Likert-scale instrument adapted from Pe'er, Goldman & Yavetz (2007), measuring knowledge, attitudes, and behavioural intentions. Reliability was high (Cronbach's  $\alpha = 0.87$ ). The EAQ was administered pre- and post-intervention (Weeks 0 and 6).

2. **Observation Checklist** — A 10-item rubric designed for this study assessed engagement, collaboration, and use of environmental vocabulary. Two independent raters observed six sessions, achieving 90% inter-rater reliability.

3. **Reflective Journals** — Participants kept weekly 150–200-word reflections documenting insights, emotions, and changes in perspective, following the reflective practice model of Farrell (2015).

4. **Semi-Structured Interviews** — Conducted with ten randomly selected students after the module, interviews (20–30 minutes) explored motivation, feasibility, and teaching transfer (Patton, 2015).

Instruction was delivered in English, with Romanian used occasionally for clarification (Banegas, 2021).

## 3. Results

The results are presented in two complementary parts:

1. quantitative findings derived from the *Environmental Awareness Questionnaire (EAQ)*

2. qualitative insights drawn from reflective journals, classroom observations, and semi-structured interviews.

Together, they illustrate both the measurable and experiential dimensions of how the CLIL-based sustainability module influenced pre-service English teachers’ awareness, attitudes, and professional outlook.

**3.1 Quantitative results**

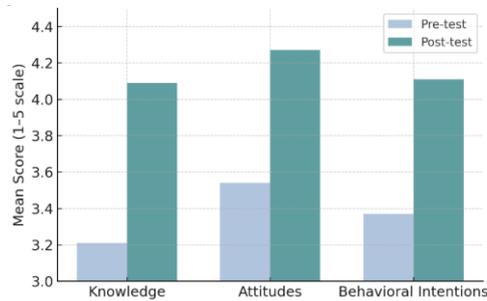
Quantitative data were analyzed in **SPSS v.26** using descriptive statistics and paired-sample *t*-tests. The EAQ results showed significant gains across all three dimensions ( $p < .001$ ):

<b>Dimension</b>	<b>Pre-Test Mean (SD)</b>	<b>Post-Test Mean (SD)</b>	<b>Mean Gain</b>	<b>t-value</b>	<b>p-value</b>	<b>Cohen’s d</b>
Knowledge	3.21 (0.42)	4.09 (0.38)	+0.88	8.43	< .001	1.40
Attitudes	3.45 (0.50)	4.18 (0.41)	+0.73	7.66	< .001	1.28
Behavioural Intentions	3.32 (0.46)	4.06 (0.44)	+0.74	7.89	< .001	1.32

Effect size calculations (Cohen’s *d*) indicate large effects across all three dimensions, suggesting that the CLIL-based sustainability module produced not only statistically significant but also practically meaningful improvements in environmental knowledge, attitudes, and behavioural intentions. These results confirm significant improvement in environmental knowledge, attitudes, and behavioural intentions following the module. Qualitative data (journals, observations, interviews) were thematically coded following Braun & Clarke (2006), yielding three themes: **awareness and cognitive engagement, identity formation, and action orientation**. Triangulation ensured convergence of evidence, and inter-coder agreement reached 90%.

All tools were piloted ( $n = 8$ ) to refine clarity and consistency. Quantitative and qualitative data were integrated using a **convergent parallel design** (Creswell & Plano Clark, 2018). Ethical approval and informed consent were obtained in compliance with the **European Code of Conduct for Research Integrity** (ALLEA, 2017).

All three dimensions registered highly significant improvements, confirming the strong positive effect of the CLIL intervention. The greatest mean gain (+0.88) occurred in *knowledge*, showing that exposure to authentic English materials on sustainability substantially deepened conceptual understanding. Attitudinal and behavioural shifts, though slightly smaller, reflected growing personal engagement and sense of responsibility—supporting findings by Lozano et al. (2021) and Banegas (2021) that sustainability-oriented language tasks can enhance reflection and agency.



**Figure 1.** Comparison of pre- and post-test mean scores across the three dimensions of the Environmental Awareness Questionnaire (EAQ): Knowledge, Attitudes, and Behavioural Intentions (N = 36)

The figure visually reinforces the statistical outcomes presented in Table 2. It highlights consistent improvement across all three dimensions, with knowledge showing the highest gain, followed closely by attitudes and behavioural intentions.

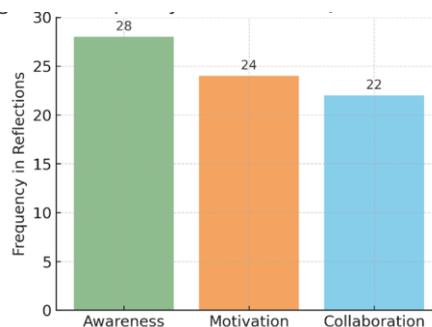
### 3.2 Qualitative findings

Qualitative data from reflective journals, observations, and interviews were analysed following Braun and Clarke's (2006) six-phase thematic analysis. Initial open coding was conducted independently by two researchers to identify recurring ideas related to awareness, motivation, collaboration, and pedagogical development. These initial codes were then compared, discussed, and clustered into broader categories, which were refined into final themes through iterative review and consensus.

The qualitative analysis illuminated the human dimension behind the numbers. Three dominant and interrelated themes emerged from the reflective journals and interviews:

- (1) awareness and self-reflection,
- (2) pedagogical readiness and motivation, and
- (3) collaboration and professional identity.

**Figure 2** illustrates the distribution of these themes, highlighting the aspects of the module that most strongly resonated with participants.



**Figure 2.** Distribution of qualitative themes emerging from participants' reflections

The data show that **awareness** was the most prominent theme, reflecting participants' growing sense of responsibility toward environmental issues. **Motivation** ranked second, highlighting increased enthusiasm and confidence in integrating sustainability into English lessons. **Collaboration** emphasized teamwork and shared purpose in addressing global challenges through language learning.

### Theme 1: Awareness and Self-Reflection

Participants described a gradual awakening to the connection between language learning and environmental consciousness.

*"Before this course, I knew about climate change, but I never thought of it as a topic for English lessons. Now I see how language can make students reflect and act."*

This transition from passive awareness to critical engagement echoes Freire's (1998) notion of *conscientização*, where knowledge becomes a vehicle for social reflection and change.

### Theme 2: Pedagogical Readiness and Motivation

Initially, some viewed sustainability as abstract or overly technical. Through CLIL practice, they discovered its pedagogical feasibility and motivational power:

*"I used to think students would find these themes boring, but CLIL showed me how small, creative tasks can make lessons meaningful". Authentic materials and problem-based tasks transformed sustainability from a distant issue into an engaging learning context.*

### Theme 3: Collaboration and Professional Identity

Collaborative projects—debates, poster creation, and group problem-solving—helped participants experience cooperation as both method and message.

*"Working in teams made me realize that green education isn't only about facts; it's about the collaboration we need to solve real problems."*

This insight reflected a deeper professional shift: participants began to perceive themselves not only as language instructors but as facilitators of socially responsible learning, consistent with Sterling's (2014) conception of education as transformative participation.

Integrating both strands provides a coherent picture of transformation across the **cognitive, affective, and behavioural** domains.

- *Cognitively*, participants gained factual knowledge and conceptual clarity about sustainability.
- *Affectively*, they displayed stronger empathy, curiosity, and motivation to embed environmental themes in their teaching.
- *Behaviourally*, they initiated eco-friendly classroom practices—proposing paper-free projects and including green topics in lesson plans.

These findings indicate that **embedding sustainability through CLIL constitutes not merely a teaching technique but a transformative educational experience**. It strengthens environmental awareness, fosters pedagogical

innovation, and cultivates ethical, reflective teacher identities capable of guiding future learners toward sustainable thinking.

#### 4. Findings and discussions

The study confirms that sustainability-oriented CLIL modules enhance pre-service teachers' environmental awareness, motivation, and pedagogical readiness. The quantitative findings demonstrate consistent improvements across cognitive, attitudinal, and behavioural dimensions, highlighting the synergistic potential of CLIL and sustainability-oriented content.

Observation data further revealed a **40% increase in participation** and collaboration. Students shifted from hesitant exchanges to confident, idea-driven discussions, using eco-lexis such as *carbon footprint* and *renewable resources* spontaneously — evidence that CLIL fosters both conceptual understanding and linguistic fluency (Dalton-Puffer, 2007).

*Qualitative findings* added a human dimension to this transformation. Three themes emerged across journals and interviews:

1. **Awareness and reflection** — Students linked environmental topics with personal and professional responsibility, echoing Freire's (1998) idea of *conscientização* as awareness turned into agency.

2. **Motivation and pedagogical readiness** — Participants reported greater confidence in designing sustainability-based lessons, confirming Banegas' (2021) finding that CLIL enhances intrinsic motivation when tied to real-world content.

3. **Collaboration and professional identity** — Group projects and eco-lesson planning promoted teamwork and social awareness, resonating with Sterling's (2014) notion of education as a participatory, transformative act.

Taken together, the quantitative and qualitative findings reveal progress across cognitive, affective, and behavioural domains. Beyond knowledge acquisition, participants developed greater empathy and began transferring sustainability principles into classroom practice, for example by proposing paper-free lessons and eco-themed activities. The most impactful tasks — debates, poster projects, and micro-lesson design — combined collaboration with creativity, supporting Trilling and Fadel's (2009) 4Cs framework for deep learning.

The findings suggest that CLIL and Green Education share compatible pedagogical principles, including inquiry, interdisciplinarity, reflection, and learner-centeredness. Within this framework, sustainability topics function as contextual amplifiers of Coyle's 4Cs model, reframed in this study as **Community** to emphasize shared responsibility (Coyle, 2015). Within such a framework, the language classroom becomes a microcosm of civic engagement, where ecological and communicative competence grow together.

Pedagogically, the results show that sustainability can be embedded in teacher training without curricular overhaul. Short CLIL modules can integrate environmental thinking into existing ELT courses, aligning them with the UN Sustainable Development Goals (SDGs). Authentic, multimodal materials —

videos, infographics, and articles — were particularly effective in fostering media literacy and intercultural awareness.

Overall, CLIL infused with sustainability transforms English teacher education into a more reflective and action-oriented process. By integrating language, cognition, and ethical engagement, it fosters both environmental literacy and professional identity. As one participant concluded: *“I no longer see English as only a language to teach, but as a way to inspire change.”*

#### 4.1. Limitations and future research

While the findings of this study are encouraging, several limitations should be acknowledged. First, the research adopted a quasi-experimental design without a control or comparison group, which limits the ability to attribute observed changes exclusively to the CLIL-based sustainability intervention. Second, the relatively small sample size ( $N = 36$ ), drawn from a single teacher education institution, constrains the generalizability of the results. Third, the intervention spanned only six weeks, which may not fully capture long-term changes in environmental awareness, pedagogical beliefs, or teaching practices.

Future research should address these limitations by incorporating control groups, expanding sample sizes across multiple institutions, and employing longitudinal designs to examine the sustainability of observed effects. In addition, including mentor teachers' evaluations and classroom implementation data could provide deeper insight into how CLIL-based green education influences professional practice beyond initial teacher training.

## 5. Conclusions

This research demonstrated that blending Content and Language Integrated Learning (CLIL) with Green Education principles in English teacher training can effectively foster **environmental awareness, pedagogical readiness, and professional identity**. Conducted with pre-service teachers at *Ion Creangă* State Pedagogical University of Chişinău, the study showed that even a short, well-structured module using authentic materials and reflective practice can produce meaningful cognitive, attitudinal, and behavioural change.

The mixed-method results confirmed that the **CLIL-for-Sustainability** model is both impactful and adaptable. Quantitative findings revealed significant gains in environmental knowledge and motivation, while qualitative insights highlighted increased confidence, creativity, and ethical engagement. Together, these outcomes demonstrate that integrating sustainability into language education not only improves linguistic competence but also shapes teachers as responsible global citizens.

In the final analysis, the study positions CLIL as a **transformative bridge** between language learning and environmental education — one capable of preparing future educators to inspire ecological awareness, social empathy, and action-oriented learning within their classrooms.

## REFERENCES

- ALLEA (2017) *The European Code of Conduct for Research Integrity*. Revised Edition. Available at: <https://allea.org/code-of-conduct/> [Accessed: 8th November 2025].
- Banegas, D. L. (2021) *Integrating Sustainability Education in English Language Teaching: Global Issues in CLIL Contexts*. Routledge.
- Bruton, A. (2020) Content and Language Integrated Learning and the Sustainability Agenda. *Language, Culture and Curriculum*. 33(2), 132–147. <https://doi.org/10.1080/07908318.2020.1714203>.
- Cates, K. A. (1990) Teaching for a Better World: Global Issues in Language Education. *The Language Teacher*. 14(5), 3–5. <https://jalt.org/pansig/1990/global-issues> [Accessed: 08th November 2025].
- Cates, K. A. (2016) Global Education in English Language Teaching. *TESOL Journal*. 7(3), 539–567. <https://doi.org/10.1002/tesj.230>.
- Coyle, D. (2015) Redefining CLIL: Towards Pluriliteracies in Multiple Languages. *European J. of App. Linguistics*. 3(2), 175–195. <https://doi.org/10.1515/eujal-2015-0007>.
- Creswell, J. W. & Plano Clark, V. L. (2018) *Designing and Conducting Mixed Methods Research*. 3rd ed. SAGE Publications.
- Dalton-Puffer, C. (2007) *Discourse in Content and Language Integrated Learning (CLIL) Classrooms*. John Benjamins Publishing.
- Dörnyei, Z. (2007) *Research Methods in Applied Linguistics: Quantitative, Qualitative, and Mixed Methodologies*. Oxford University Press.
- Farrell, T. S. C. (2015) *Reflective Practice in ESL Teacher Development Groups: From Practices to Principles*. Palgrave Macmillan.
- Field, A. (2018) *Discovering Statistics Using IBM SPSS Statistics*. 5th ed. SAGE Publ.
- Haigh, M. (2012) Fostering Cross-Cultural Empathy with Non-Western Novels. *Journal of Geography in Higher Education*. 36(2), 149–163. <https://doi.org/10.1080/03098265.2011.619529>.
- Johnson, R. B. & Onwuegbuzie, A. J. (2004) Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educational Researcher*. 33(7), 14–26. <https://doi.org/10.3102/0013189X033007014>.
- Lasagabaster, D. & Doiz, A. (2016) CLIL Students' Perceptions of Their Language Learning Process: Delving into Motivation and Attitudes. *Language Awareness*. 25(1–2), 110–126. <https://doi.org/10.1080/09658416.2015.1122019>.
- Mehisto, P., Marsh, D. & Frigols, M. J. (2008) *Uncovering CLIL: Content and Language Integrated Learning in Bilingual and Multilingual Education*. Macmillan Education.
- Sterling, S. (2014) *Sustainable Education: Re-Visioning Learning and Change*. Green Books.
- Tilbury, D. (2013) Another World is Desirable: ESD and Transformative Learning in Higher Education. *Journal of Education for Sustainable Development*. 7(2), 167–172. <https://doi.org/10.1177/0973408214526492>.
- UNESCO (2015) *Education 2030: Incheon Declaration and Framework for Action*. <https://unesdoc.unesco.org/ark:/48223/pf0000245656> [Accessed: 08th November 2025].