Building Problem-based Learning English Curriculum to Enhance Chinese College Students' English Reading, Writing Proficiency and Sustainability Awareness

Ziwei Luo[1,2] & Peng-Fei Chen[1,*]

[1]Chinese International College, Dhurakij Pundit University, Bangkok, Thailand

[2]School of Foreign Studies and International Communication, College of Arts and Sciences Kunming, Yunnan, China

*Correspondence: Chinese International College, Dhurakij Pundit University, Bangkok, Thailand. E-mail: blissfulalice@gmail.com

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Abstract

Amid accelerating globalisation, English has become the default medium for cross-border collaboration, yet Chinese undergraduates continue to underperform in reading and writing. Anchored in Problem-Based Learning theory, this study embedded United Nations Sustainable Development Goals within a five-unit, eight-step reading-and-writing curriculum to lift both language proficiency and sustainability literacy. A five-member expert panel validated the syllabus, confirming that authentic socio-environmental problems, scaffolded inquiry cycles and peer-review protocols create a secure, student-centred milieu which markedly heightens engagement, argumentative accuracy and critical awareness of global-local sustainability challenges.

Keywords: problem-based learning (PBL), sustainability, English as a foreign language (EFL), quasi-experimental intervention, reading and writing proficiency

1. Introduction

English education in China is prioritised as a national lever for development and global engagement (China Daily, 2020). Since the Belt-and-Road Initiative, researchers have foregrounded systemic weaknesses: exam-oriented, teacher-fronted classrooms suppress higher-order thinking and self-efficacy, producing undergraduates who mis-use vocabulary, grammar and discourse structure (Hu, Li, & Luo, 2024; Zheng, 2023; Wei, Sulaiman, & Ismail, 2024). IELTS 2023-24 attests the cost: Chinese candidates averaged 6.3/9 in reading (rank 22/39) and only 5.8/9 in writing (rank 31/39) (British Council, 2025). The UN Education 2030 Framework and Sustainable Development Goal (SDG) 4 position quality education as the engine for sustainable development, demanding graduates who can think systemically, solve interdisciplinary problems and act collaboratively (United Nations, 2024). Education for Sustainable Development (ESD) operationalises this mandate, yet in Chinese universities ESD is still narrowly equated with isolated environmental warnings (Owojori, Mulaudzi, & Edokpayi, 2022; Zhou & Lee, 2022). Integrating ESD into English curricula via PBL can simultaneously widen sustainability awareness and remedy the documented reading-writing deficit.

Problem-Based Learning (PBL)—an inquiry-driven, student-centred model—has consistently improved EFL writing quality, especially argumentative and expository genres, while also raising reading comprehension, listening and oral proficiency (Alghamdy, 2023; Ibnian, 2023; Lin, 2018; Lin, Ansarian, Tik, & Nai, 2019). By embedding stakeholder analysis, debate and role-play, PBL classes generate authentic communicative need, enlarge domain knowledge and boost motivation and life skills (Moslemi, Zarei, & Sarani, 2023; Biancardi et al., 2023). PBL is particularly compatible with ESD because its hallmark activities—negotiating messy, real-world scenarios—cultivate complexity thinking, reflective judgement and collaborative problem-solving, the very competencies ESD foregrounds (Carrió Llach & Llerena Bastida, 2023; Funa, Roleda, & Prudente, 2024). Conversely, language research shows that sustainability themes supply cognitively rich, morally engaging content that elicits longer, better-structured texts and deeper reading processing (Cordova, 2024; Vettori, Casado Ledesma, Tesone, & Tarchi, 2024). Despite these synergies, no empirical study has yet tested whether a PBL-ESD intervention can measurably advance Chinese

university students' English reading and writing proficiency while expanding their systemic understanding of sustainability.

Accordingly, the study research designs, implements and evaluates a one-semester PBL-ESD English curriculum. Using a mixed-methods, quasi-experimental design, this study compares intervention and control cohorts on IELTS-based reading and writing pre/post gains, as well as sustainability awareness. Findings will inform evidence-based pedagogies that marry language proficiency with the sustainability competencies China's future workforce urgently needs.

2. Theoretical Framework

This study is based on the eight-phase PBL model adapted by Lu and fellows (Lu, Bridges, & Hmelo-Silver, 2014). PBL is inherently interdisciplinary, forcing groups to integrate "knowledge, skills and abilities from diverse sources" and to mobilise complementary methodologies when fashioning robust, real-world solutions (Savery, 2019, pp. 85-86; Moallem, 2019; Rosário & Dias, 2024; Jensen, Stentoft, & Ravn, 2019); and it is fiercely contextualised, embedding problems in local or global realities that heighten motivation, strategic information-searching and cognitive growth (Wilson, 2021; Orhan, 2024). Within EFL classrooms the approach is especially potent because language competency is treated as an amalgam of linguistic skills (receptive and productive), higher-cognitive operations (analysing, reasoning, evaluating) and cultural-idiomatic knowledge (Zhang, Yuan, & He, 2020; Cui, Wang, Yang, & Shao, 2023; Song, Razali, Sulaiman, & Jeyaraj, 2024; Ghanizadeh, Al-Hoorie, & Jahedizadeh, 2020; Luque & Morgan-Short, 2021; Peng & Patterson, 2022). Large-class, teacher-fronted environments in China routinely deprive students of interactive English use, eroding motivation and triggering negative emotions, yet PBL reverses this trend by supplying authentic communicative necessity and documented gains in academic performance (Xie, 2022; Liu, Wu, & Yang, 2024; Long, Tang, Wang, Sutton-Jones, & Tong, 2024).

When sustainability is chosen as the problem context, PBL and ESD enter a mutually reinforcing loop. Confronting issues such as nuclear energy or child labour obliges students to perform evidence-based critical analysis, interdisciplinary synthesis and ethical reasoning, thereby cultivating the precise higher-order cognitive skills and civic dispositions that ESD foregrounds (Edsand & Broich, 2020; Firinci Orman, 2024). The pedagogy simultaneously satisfies three core ESD mandates: it creates action-oriented platforms that translate theoretical understanding into societal transformation initiatives (United Nations Educational， Scientific and Cultural Organization [UNESCO], 2020), it fosters participatory learning dynamics by connecting students with governmental, corporate and individual stakeholders (Fernando & Tajan, 2024), and it anchors learning in community-specific environmental and social challenges, ensuring local relevance (UNESCO, 2020).

This research adopts an eight-step PBL approach (Lu et al., 2014), aiming to cultivate students' English reading and writing proficiency as well as sustainability awareness. Eight steps in the research includes stating problem scenario which illustrates a real-world problem about sustainability in academic papers and articles; identify facts and generate hypotheses during group discussion using collaborative learning skills; identify knowledge gaps after information within and between groups; engage in self-directed learning and apply new knowledge to problem after class, and submit position papers to illustrate their findings; evaluate each other's work as peer review is expected to promote their understanding of the topic and teachers will also give comments on students' paper as summary; and students will be required to reflect in the form of reflective journals after class. This intervention includes five units in the intervention, and students need to complete eight steps below for each unit in 4 classes.

As shown in Figure 1, sustainability-themed English reading and writing curriculum is developed incorporate the following eight steps: It begins with a real-world sustainability dilemma—climate change, decent work or executive remuneration—introduced through academic readings that students summarise and react to in English, an immediacy that heightens motivation (Cörvers, Wiek, de Kraker, Lang, & Martens, 2016). In small groups they trawl English-language media for verifiable facts, distil them into mini-articles and thereby practise source evaluation (Maier, 2020). Using conditional "If we…, then…" clauses they brainstorm potential solutions, strengthening collaborative discourse (Saleh et al., 2022) before systematically listing knowledge gaps framed as interrogative questions, a move that primes self-directed inquiry (Wijnia, Noordzij, Arends, Rikers, & Loyens, 2024). Between classes each team pursues scholarly texts and videos to produce a formal position paper that exercises academic register and critical reasoning, skills central to the human-rights and working-conditions strands (Wang, 2011). Reconvening, they weave new evidence into stakeholder role-plays that demand interdisciplinary argumentation (Smith et al., 2022). Public presentations of their solutions invite peer scrutiny focused on feasibility, forcing comparative language and reflective judgement (Wang, 2011). The cycle closes with individual reflective reports in

simple past tense that recount what was learned and how problems were solved, while instructors simultaneously audit the curriculum's success in overcoming typical PBL pitfalls such as uneven learner readiness and complex assessment logistics (O'Connor, Power, Blom, & Tanner, 2024).

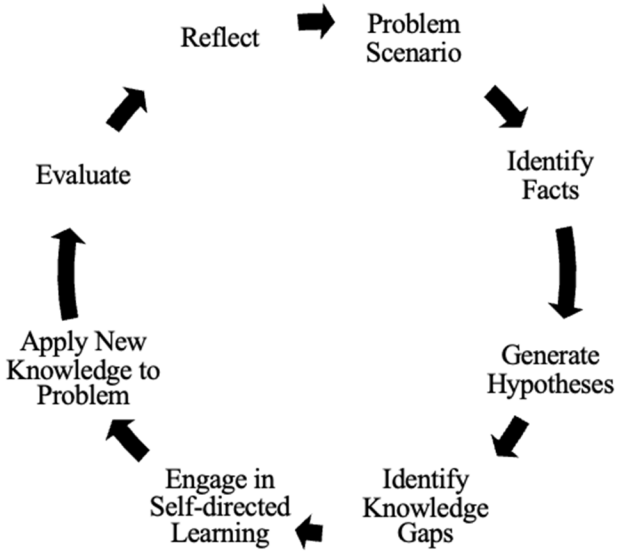

Figure 1. Eight-phase PBL Tutorial Cycle

Note. This figure shows the eight phases of problem-based learning for adult learners. Adapted from "Problem-based learning," by J. Y. Lu, S. Bridges, and C. E. Hmelo-Silver, 2014, In R. Keith Sawyer (Ed.), *The Cambridge handbook of the learning sciences*, p. 299 (https://doi.org/10.1017/CBO9781139519526.019). Copyright 2014 by Cambridge University Press.

3. Methods

This research is dedicated to enhancing the reading and writing skills of Chinese university students by implementing a PBL-based EFL curriculum with an embedded sustainability theme. The study was conducted in two stages, as illustrated in Figure 2.

Figure 2. Research Framework of PBL Curriculum Development

Figure 2 suggests that in the initial stage, an examination of PBL's theoretical framework and related literature on its pedagogical principles, together with empirical studies on ESD and English language education, identifies design features that can significantly improve college students' reading and writing competencies. Based on these insights, a curriculum—comprising teaching objectives, instructional activities, and assessment instruments—is formulated. Subsequently, five seasoned EFL education professionals are asked to evaluate the proposed curriculum and lesson structures. The second stage was to conduct the expert panel to review the curriculum.

3.1 Building a Problem-based Learning Course Design with Sustainability Themes

Drawing on an extensive review of PBL, ESD and Common European Framework of Reference (CEFR)-aligned English proficiency pedagogy, this study constructs a 12-week, 24-session intervention that simultaneously targets English reading-writing proficiency and sustainability awareness among Chinese first-year non-English majors. The curriculum is organised into five two-session thematic units (three hours per unit) that spiral from A2 to B1 on the CEFR scale and from foundational climate awareness to critical governance evaluation. Each unit cycles through eight research-based PBL steps—problem scenario, fact identification, hypothesis generation, knowledge-gap

mapping, self-directed study, knowledge application, peer evaluation and reflective synthesis—thereby operationalising PBL model (Lu et al., 2014) within an ESD framework. Learning objectives specify two language benchmarks (from A2 to B1 for reading and writing) and five sustainability competencies (from LO.1 to LO.5) that scaffold students from conceptual understanding to systemic critique. Formative assessment is embedded in group discourse, position papers and reflective journals, while summative assessment comprises IELTS academic reading-writing tasks and a questionnaire based on Sustainable Investing Certificate exam questions from the perspective of environmental, social, governance dimensions.

3.2 Expert Panel

Expert validity denotes the degree to which a curriculum aligns with core disciplinary standards and practical field needs as judged by qualified scholars and practitioners who systematically review its content for relevance and quality (Porter, Graham, Myles, & Holmes, 2022).

Table 1. Background of Experts Who Verify the Curriculum and Course Design

Experts	Educational Background	Professional Title	Experience (Y)
A	Ph.D, Curriculum Development	Professor	37 years
B	Ph.D, Education Management	Assistant Professor	25 years
C	Ph.D, English Language Education	Assistant Professor	20 years
D	Ph.D, English Language Education	Lecturer	12 years
E	Ph.D, Education Management	Lecturer	8 years

Note. This table illustrates background information of experts who validated the curriculum.

As shown in Table 1, five tertiary-level EFL/ESD specialists (Professors A–E; 8–37 years of experience; all holding doctoral degrees in education) reviewed the proposed syllabus, learning objectives, pedagogical sequence and assessment instruments. Content Validity Index (CVI) values ranged from 0.82 to 1.00, exceeding the 0.78 threshold recommended for educational interventions (Polit, Beck, & Owen, 2007).

Table 2. Overview of Experts' Evaluations of the Curriculum and Course Design

Contents	Experts' Opinions			CVI
	Agree	Need Revision	Disagree	
Learning Objectives	5			1
Teaching Contents	5			1
Teaching Methods	5			1
Activities Assessment	4	1		.800
Intervention Period	4	1		.800
Lesson 1	5			1
Lesson 2	5			1
Lesson 3	5			1
Lesson 4	5			1
Lesson 5	5			1
Lesson 6	5			1
Lesson 7	5			1
Lesson 8	5			1
Lesson 9	5			1
Lesson 10	5			1

Note. This table illustrates overall feedback of experts who validated the curriculum.

As summarized in Table 2, qualitative feedback converged on three issues: (i) cognitive load—Experts A and C cautioned against over-packing single sessions with concurrent activities, arguing that depth would be sacrificed for breadth; (ii) temporal scope—Expert D recommended extending the intervention to a longer period once preliminary

efficacy is established; (iii) linguistic scaffolds—Expert E suggested inserting micro-lessons on hedging and citation to support argumentative writing in position papers. All experts endorsed the integration of SDG themes, the dual-assessment protocol (language and sustainability awareness) and the recursive PBL cycle. Revisions were enacted accordingly: activity sets were re-distributed across pre-class, in-class and post-class phases; optional language micro-tasks were appended to Unit 1 and Unit 5; and a longitudinal extension pathway will be flagged for future iterations. The adjusted curriculum thus attained unanimous expert approval for theoretical coherence, practical feasibility and potential to generate measurable gains in both EFL literacy and sustainability competence.

4. Results

This paper focuses on evaluating students through learning objectives, which are essential for guiding students as they engage with educational material. The learning objectives outlined above encompass both language competencies and sustainability awareness, reflecting a holistic approach to education that integrates communicative language skills with environmental, social, and governance dimensions of sustainability. Learning objectives A2-R, A2-Wr, B1-R and B1-Wr demonstrate clear progression across English reading and writing competencies aligned with the CEFR levels.

4.1 The Objectives of the Transformative Curriculum Based on TLT

Table 3. Learning Objectives of the PBL Curriculum

Main capacities	Sub-capacities
A. Reading	A2-R: Students can understand short, simple texts containing the highest frequency vocabulary, including a proportion of shared international vocabulary items.
	B1-R: Students can read straightforward factual texts on subjects related to their field of interest with a satisfactory level of comprehension.
B. Writing	A2-Wr: Students can produce a series of simple phrases and sentences linked with simple connectors like “and”, “but” and “because”; and can compose short, simple formulaic notes relating to matters in areas of immediate need.
	B1-Wr: Students can produce straightforward connected texts on a range of familiar subjects within their field of interest, by linking a series of shorter discrete elements into a linear sequence and can compose personal letters and notes asking for or conveying simple information of immediate relevance, getting across the point they feel to be important.
C. Sustainability Awareness	SA-LO.1 Environment—Climate change: explain key concepts relating to climate change, including climate change mitigation, climate change adaptation, and resilience measures.
	SA-LO.2 Environment—Circular economy: explain key concepts related to natural resource use (land and marine), water, waste, pollution, biodiversity, and a circular economy.
	SA-LO.3 Social—Human Rights: assess key megatrends influencing social change in terms of potential impact on companies and their social practices: climate change and transition risk; water scarcity; pollution; mass migration, geopolitical conflict; and loss and/or degradation of natural resources and ecosystem services.
	SA-LO.4 Social—Working Conditions: explain the systemic relationships and activities between business activities and social issues, including: globalization; automation and artificial intelligence (AI); economic inequality; digital disruption; changes to work–life balance; changes to the work force and families; changing demographics; urbanization; and religion
	SA-LO.5 Governance—Executive Pay: assess key characteristics of effective corporate governance and the main reasons why they may not be implemented or upheld: board structure, DEI, effectiveness, and independence; executive remuneration, performance metrics, and key performance indicators (KPIs); reporting and transparency; financial integrity and capital allocation; business ethics.

Note. This table illustrates overall feedback of experts who validated the curriculum.

As shown in Table 3, this research design systematically advances English language proficiency from A2-R to B1-R in reading competencies and from A2-Wr to B1-Wr in writing competencies, reflecting a well-designed developmental trajectory that mirrors the CEFR's graduated approach to incremental language acquisition. For sustainability awareness, it defines five progressive learning objectives (LOs) that explicitly structure competency

development across key content dimensions. Together, these LOs strategically scaffold learning progression from foundational conceptual understanding (LO.1–2) to applied trend analysis (LO.3), systemic integration (LO.4), and advanced critical appraisal (LO.5), thereby providing a coherent pedagogical framework for effective sustainability education that fully integrates both language and content learning.

4.2 Applying PBL into Course Unit

4.2.1 Unit Content

The curriculum is organised into five two-class units, each three hours in length, whose themes are derived directly from the United Nations' 17 SDGs established in 2015. Unit 1 addresses climate change (SDG 13); Unit 2 examines pollution (SDGs 6, 11, 12, 14); Unit 3 explores human rights (SDG 16); Unit 4 investigates child labour (SDG 8); Unit 5 analyses working conditions (SDG 8); and Unit 6 interrogates executive pay (SDG 10). Teaching activities and methods increase in complexity from Unit 1 to Unit 6.

Unit 1 initiates with regional climate-challenge scenarios. Students identify atmospheric-science principles through curated policy case studies, generate testable mitigation hypotheses in structured groups, and conduct self-directed database searches to locate transnational policy gaps, thereby establishing foundational sustainability awareness.

Unit 2 expands into pollution epidemiology. Learners progress from contaminant-source identification to exposure-pathway analysis, participate in simulated stakeholder consultations to evaluate remediation proposals, and perform comparative international case-study reviews. Peer assessment of technical and economic feasibility sharpens critical-evaluation skills while fostering collaborative and innovative solution design.

Unit 3 advances to jurisprudential case analysis. Students deconstruct human-rights violations, identify legal precedents and cultural variables, formulate contextualised enforcement hypotheses during moderated symposia, and apply frameworks in simulated international tribunal proceedings. Peer rubrics assess argumentation rigour and cultivate pluralistic, sustainable social perspectives.

Unit 4 implements experiential learning cycles. Archival occupational-health analysis is followed by think-pair-share hypothesis generation, comparative legal research, and simulated collective bargaining grounded in ILO benchmarks. Structured peer feedback connects theoretical labour-economics knowledge to professional ethics, enhancing communication and problem-solving competencies.

Unit 5 integrates full problem-based learning. Dataset analysis of proxy statements identifies pay-performance correlations; Delphi-method consultations generate equitable-distribution hypotheses; shareholder-meeting simulations apply agency theory; and multidimensional peer assessment evaluates stakeholder-aligned compensation proposals. The sequence promotes higher-cognitive skills and deepens understanding of economic distribution mechanisms.

4.2.2 Pedagogy

An eight-step PBL sequence (Lu et al., 2014) is adopted consecutively unit by unit: Unit 1 adopts method 1 problem-scenario introduction via academic articles and method 2 fact identification through English-medium Internet research. Unit 2 adopts method 3 hypothesis generation using conditional clauses in collaborative groups and method 4 systematic articulation of knowledge gaps. Unit 3 and unit 4 involves method 5 self-directed exploration of academic sources culminating in a position paper and method 6 application of new knowledge through role-play and argumentative integration. Unit 5 consists of method 7 peer evaluation of feasibility and linguistic accuracy and unit 8 structured reflective journaling.

4.2.3 Teaching Activities

In the intervention design, there are six teaching activities to improve students' sustainability awareness, linguistic competencies and higher-order cognitive skills based on PBL and ESD pedagogy as follows:

Reading Case Study: In the first class of each unit, students will develop a comprehensive understanding of the problem scenario and foundational facts through the case study provided in the reading materials. From the perspective of sustainability awareness, this phase lays solid foundation for students' future development. From the linguistic perspective, students will master professional vocabulary, cultivate reading skills such as skimming and intensive reading, as well as collect source materials for writing section.

Group Discussion: After understanding basics of the problem, students will be encouraged to collaboratively generate an initial response to the two key questions during group discussions. Collaborative learning skills will get promoted through the process of exchanging ideas, and students' higher-cognitive skills will be improved by

supporting or disagreeing each other with valid proof.

Self-directed Information Searching: To promote self-directed learning, homework will be assigned, requiring students to research information that they believe can substantiate and enhance their answers. Given that role-playing is considered an effective method to deepen students' comprehension of the problem, each group will be required to author a position paper from the perspective of their assigned roles prior to the second class.

Peer Evaluation: Teachers' assessment, self-assessment and peer assessment are three types of commonly adopted assessment in curriculum development research, and each of them is believed to add a new perspective of students' learning outcome and provide suggestions for future improvements (Al-Eyd, Seki, & Griffin, 2024; Aulakh, Wahab, Richards, Bidaisee, & Ramdass, 2025). Peer assessment and self-assessment are supplementary to teachers' assessment, and both are expected to promote students' understanding of teaching content by comparing their own work and peers' (Topping et al., 2025). In the second class, students will be required to read each group's position paper, and later engage in peer evaluation of each group's position paper. The evaluation criteria will encompass both content and linguistic dimensions. In terms of content, assessments will focus on the clarity of the position articulated, reliability and validity of the supporting evidence provided, and demonstration of higher-order cognitive skills such as critical thinking and analysis. From a linguistic perspective, evaluations should consider logical coherence of the argumentation, accuracy of language use, and overall clarity and effectiveness of expression.

Reflective journal: After the second class, students will be encouraged to reflect on their overall performance and identify areas for improvement by writing a reflective journal after the second class. This phase is anticipated to strengthen students' writing proficiency by writing in a logic and organized way. Moreover, it also mandatorily requires students to organize and reflect what they have learnt about sustainability. Lastly, writing reflective journal is also believed to facilitate students conduct self-monitoring and increase learning autonomy.

4.2.4 Assessment

Teachers' assessment is the most frequently used tool in curriculum development research, as it is believed to provide a more professional perspective, consisting of summative assessment and formative assessment (Elizondo-montemayor, 2004). Formative assessment can explicitly reflect students' immediate understanding, and it facilitates teachers to adjust teaching pace promptly according to students' learning condition.

Table 4. Course Syllabus of English Reading and Writing Based on the PBL

Unit Theme	Learning Objectives	Teaching Contents	Teaching Methods	Activities	Assessment	Lessons (hours)
Climate Change	A2-R, A2-Wr, SA-LO.1, SA-LO.2	1. Local climate challenges 2. Low-carbon lifestyle strategies	Providing problem Scenario; Identifying Facts;	Reading Case Study; Group Discussion; Self-directed Information Searching;	Formative Assessment (Participation and Engagement; Reflective Journals);	2 classes (3 hours)
Circular Economy	A2-R, A2-Wr, SA-LO.1, SA-LO.2	1. Linear vs. circular models 2. Global waste management practices	Generating Hypotheses; Identifying Knowledge Gaps;	Reading Case Study; Self-directed Information Searching; Role Play;	Formative Assessment (Participation and Engagement; Reflective Journals);	2 classes (3 hours)
Human Rights	B1-R, B1-Wr, SA-LO.3, SA-LO.4	1. Labor rights in global supply chains 2. Technology vs. human rights	Engage in Self-directed Learning; Apply New Knowledge to Problem;	Reading Case Study; Role Play; Peer Evaluation;	Formative Assessment (Participation and Engagement; Reflective Journals);	2 classes (3 hours)

Table 4. Course Syllabus of English Reading and Writing Based on the PBL (Continued)

Unit Theme	Learning Objectives	Teaching Contents	Teaching Methods	Activities	Assessment	Lessons (hours)
Working Conditions	B1-R, B1-Wr, SA-LO.3, SA-LO.4	1. Decent work standards 2. Automation and career evolution	Engage in Self-directed Learning; Apply New Knowledge to Problem;	Self-directed Information Searching; Peer Evaluation;	Formative Assessment (Participation and Engagement; Reflective Journals);	2 classes (3 hours)
Executive Pay	B1-R, B1-Wr, SA-LO.5	1. Global compensation disparities 2. Debates on income inequality	Evaluate; Reflect	Role Play; Peer Evaluation; Reflective Journal.	Formative Assessment (Participation and Engagement; Reflective Journals); Summative Assessment (Reading Comprehension Exam; Writing Exam; Sustainable Awareness Questionnaire)	2 classes (3 hours)

Note. This table indicates the detailed syllabus from Unit 1 to Unit 5.

As shown in Table 4, formative assessment in this research comprises participation and engagement, as well as the writing of reflective journals. Specifically, students' performance in group discussions, contributions to position papers, and the quality of their reflective journals will all be considered as key components of the assessment framework. Summative assessment in this research includes written exams of reading comprehension, writing proficiency and sustainable awareness. In which, reading comprehension questions will examine students' mastery of reading skills, their ability of grasping key information, and their understanding of different genres; Writing exam function as a comprehensive test for English proficiency as it includes students' mastery of vocabulary, grammar, logic and organization; Sustainable Investing Certificate is utilized to test students' level of sustainability awareness and their interdisciplinary learning abilities.

5. Discussion

This study anchors itself in PBL theory and, following the eight-step PBL model of Lu et al. (2014), constructs a five-unit English reading-and-writing course that simultaneously cultivates sustainability awareness among Chinese university freshmen. The curriculum design resonates with Arruzza, Chau, & Kilgour (2023) and Orhan (2025), who contend that authentic socio-environmental problems can convert language classrooms into arenas for active inquiry and higher-cognitive growth, thereby advancing English teaching from a knowledge-based to a skill-based paradigm. By embedding the UN Sustainable Development Goals in every task, the experiment also responds to Niemczyk et al. (2022) and Wilczewski & Alon (2023), who argue that sustainability themes infuse language learning with ecological, social and economic depth while widening learners' global horizon and sense of responsibility.

The quasi-experimental intervention extends earlier PBL-ESL studies in three ways. First, it targets reading and writing—two modalities frequently cited as weakest among Chinese undergraduates (Zheng, 2023; Wei et al., 2024)—and measures progress with IELTS-aligned rubrics. Second, it situates language development within five locally contextualised sustainability scenarios, thereby answering Mato's (2015) warning that globally standardised ESD risks marginalising indigenous voices. Third, it subjects the pedagogical package to a double-blinded, pre-post control-group design, addressing internal validity through matched baselines, uniform materials and fixed instructor protocols, while safeguarding external validity by implementing the treatment in unaltered timetable slots (Jeon, Kellogg, Khan, & Tucker-Kellogg, 2020).

Empirically, the study expects to replicate Biancardi et al. (2023) and Moslemi et al. (2023): extensive disciplinary reading and iterative position-paper writing should yield measurable gains in lexical sophistication, argument structure and textual coherence. Simultaneously, engagement with climate policy, pollution condition, human-rights jurisprudence, labour statutes and executive-pay governance is anticipated to internalise sustainability as a personal

value system rather than an add-on topic (Yu, Guo, & Fu, 2024). Role-play, peer evaluation and reflective journals—activities repeatedly flagged by Alghamdy (2023) and Turpin (2021) as catalysts for adult-language-learner motivation—are embedded to ensure that cognitive skills (critical thinking, problem-solving, creativity) evolve alongside linguistic accuracy. Methodologically, the four-hour pre-service teacher-training session and the researcher-blind grading procedure mitigate the "friendliness bias" noted by Consoli (2021) and secure the objectivity demanded by Hanks (2019).

6. Conclusion

The design demonstrate that a PBL-driven, sustainability-themed curriculum can be successfully embedded within Chinese university English reading-and-writing courses. The intervention is pivotal in raising participants' textual comprehension, argumentative writing accuracy and socio-environmental awareness—competencies now demanded by domestic and international labour markets. By wedding authentic SDG scenarios to an eight-step problem-solving cycle, the design refreshes traditional text-based instruction with task-based, student-centred dynamism, markedly boosting classroom engagement and higher-order thinking. Future iterations should fine-tune task difficulty gradients, expand local case repositories, integrate peer-feedback literacy training and extend assessment to speaking and intercultural dimensions so that graduates command a fully rounded, sustainability-sensitive English repertoire.

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