

# Using Large Language Models to Enhance Genre-Based English for Academic Purposes (EAP) Writing: A Path to Sustainable Development

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**Abstract:** In the context of the evolving digital era, this study introduces a conceptual model that integrates Education for Sustainable Development (ESD) into English for Academic Purposes (EAP) writing, leveraging Critical Digital Literacies (CDL). It aims to develop EFL doctoral students' competencies necessary for sustainable development, addressing the gap in current genre-based EAP instruction that often neglects comprehensive ESD competencies such as systems thinking and self-awareness. Utilizing innovative tools like ChatGPT within a CDL framework, the model focuses on both explicit teaching objectives related to genre knowledge and implicit ones tied to ESD. Specifically, the study outlines eight scenarios where GPT technology aids in achieving these pedagogical goals. By implementing this model, we aim not only to enrich the EAP writing curriculum but also to subtly shift educational practices towards embracing the values of sustainability and digitalization.

**Keywords:** Education for Sustainable Development (ESD); English for Academic Purposes (EAP); Critical Digital Literacies (CDL); Genre-Based Instruction; EFL Doctoral Students.

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## 1. Introduction

In the interwoven fields of education, sustainability, and technology, the imperative to embed Education for Sustainable Development (ESD) within English for Academic Purposes (EAP) writing instruction emerges as a pivotal endeavor. This integration, particularly under the broad umbrella of Critical Digital Literacies (CDL), represents an innovative stride toward equipping English as a Foreign Language (EFL) doctoral students with the competencies required to navigate, contribute to, and thrive in an increasingly complex and interconnected world. The rationale for incorporating ESD into EAP writing instruction underscores not only the enhancement of academic writing skills but also the cultivation of a deep-rooted understanding of sustainability issues, thereby preparing students for the multifaceted challenges of the 21st century.

Grounded in the principles of CDL, the integration of ESD into EAP writing instruction seeks to transcend beyond mere academic proficiency. It endeavors to embed the essence of sustainability into the core of academic writing, thereby fostering a generation of scholars who are not only adept at articulating their research but are also cognizant of the broader implications of their work on sustainable development. While existing studies have ventured into this territory, illustrating the positive impact of genre-based instruction in EAP writing courses on students' writing skills, they often fall short of fully embracing the comprehensive spectrum of ESD[1-5]. Many equate the improvement of academic English writing proficiency with sustainable development, without delineating the specific core constituents of ESD as pivotal teaching objectives. A scarce number acknowledge the importance of key ESD competencies, yet their focus predominantly lies on critical thinking and collaboration, inadvertently overlooking other crucial competencies such as systems thinking, normative thinking, strategic planning, self-awareness, and integrated

problem-solving.

This oversight signals a significant research gap. The current landscape of EAP writing instruction, though enriched with the use of educational technologies and innovative tools like ChatGPT, lacks a robust, theory-based, and pedagogy-informed framework of CDL that explicitly targets the core components of ESD alongside EAP writing proficiency.

The current study is poised to bridge this gap by proposing a conceptual model that seamlessly integrates ESD into EAP writing instruction within the CDL framework. This model is meticulously designed to target the core constituents of ESD and EAP writing proficiency, steered by the theoretical underpinnings and pedagogical insights of CDL. The aim is to arm EFL doctoral students with the requisite skills and competencies to flourish in a rapidly digitalizing world, ensuring that their academic pursuits are aligned with the principles of sustainability.

To achieve this, the study will first demarcate the connotations and core elements of ESD, elucidate the essence of genre knowledge, and define the teaching objectives of a GBI-based EAP writing course within the context of CDL. Subsequently, it will identify the core elements of ESD as the implicit teaching objectives and the constituents of genre knowledge as the explicit teaching objectives of this conceptual teaching model. Finally, the study will map the core elements of ESD and components of GBI-based EAP writing course within the CDL framework, showcasing scenarios where ChatGPT can be leveraged to facilitate teaching guided by this conceptual model. Through this comprehensive approach, the study aspires to make a substantive contribution to the field of EAP writing instruction, marking a significant step toward the integration of sustainable development and digital literacies in higher education.

## 2. Literature Review

This literature review critically explores the integration of

Education for Sustainable Development (ESD) into higher education, with a specific focus on English for Academic Purposes (EAP) writing courses for students of English as a Foreign Language (EFL). It underscores the vital components of sustainable development frameworks in higher education contexts and emphasizes the significance of embedding critical digital literacies within language instruction paradigms and EAP writing instruction.

## 2.1. Education of Sustainable Development in Higher Education

Education for Sustainable Development (ESD) emerges as a paradigm that champions lifelong learning to navigate and respond to the multifaceted challenges of our world—social, economic, and environmental. It equips individuals with tools necessary to comprehend and address the dynamic challenges presented by our ever-changing global landscape [6]. Higher education plays a crucial role in advancing the ESD agenda [7]. The significance of ESD in higher education has been increasingly recognized over the decades, particularly following the United Nations' emphasis on sustainable development during the 1992 United Nations Conference on Environment and Development in Rio de Janeiro. This emphasis was further solidified with the initiation of the Decade of Education for Sustainable Development [7], alongside national strategies such as the UK's Sustainable Development Strategy of 2005, which underscores the imperative of instilling 'sustainability literacy' as a crucial competency for professional graduates [8]. Furthermore, the dedication of universities in the United States to this cause [9] exemplifies the global movement towards embedding sustainability within higher education.

Studies have identified key ESD competencies, emphasizing critical reflective practices, systemic thinking, and an issue-based instructional approach. In an analysis of international literature, Tilbury [10] highlighted key ESD learning processes that encourage students to engage in critical reflective questioning, value clarification, envisioning more positive futures, thinking systematically, learning through application, and balancing tradition and innovation. Teaching strategies that align with these processes emphasize teamwork and collaboration, exploring issues in-depth, adopting multiple viewpoints, solving problems based on real-life scenarios, and ensuring equity within the educational environment by catering to the diverse needs of all students [10-13]. A comprehensive framework by UNESCO [14] further elaborates on eight core competencies critical to ESD: systems thinking, normative, strategic, collaborative, critical thinking, self-awareness, and integrated problem-solving competencies, underscoring the necessity of embedding these competencies in all disciplines to cultivate a sustainable mindset.

Applying these core competencies involves an issue-based instructional approach [15], which means to foster these core competencies should engage students with real-world, relevant and pressing issues. Consequently, integrating ESD into curricular frameworks transcends the scope of specialized fields, such as environmental studies, necessitating a broader embrace by educators across all disciplines [16] stresses the importance of envisioning the manifestation of sustainable pedagogy within classes. This integration has been effectively demonstrated in research across 18 countries, highlighting ESD's critical role in enabling students to tackle real-world issues while fostering

their critical thinking and adaptive capacities [15]. This establishes the foundational premise for incorporating ESD within EAP courses to solve real-world, pressing issues.

## 2.2. Integrating Education for Sustainable Development into English for Academic Purposes Instruction

Writing competency of English for academic purposes (EAP) is such a vital and pressing issue for English as a foreign language (EFL) doctoral students. It not only enables these students to engage effectively with the global academic community but also significantly impacts their ability to contribute novel insights, access English-dominant academic resources, and secure professional opportunities by publishing in reputable journals and presenting at international conferences. Recent studies elucidate the benefits of incorporating Education for Sustainable Development (ESD) within EAP writing courses, emphasizing the resultant improvement in students' academic writing prowess, critical thinking, and collaboration abilities [2-4]. Man and Zhan [2] delineate the thesis writing challenges encountered by L2 Chinese postgraduate students, underscoring the indispensability of tailored mentorship to bolster sustainable academic growth within EAP courses. Similarly, Sela and Putri [3] affirm that participation in EAP writing courses not only augments academic writing skills but equally fosters the core ESD competencies of critical thinking and collaboration. Olszewska and Lo [4]'s study on the writing group in EAP course highlights three intertwined forms of sustainability crucial for success: relational, communal, and institutional. It emphasizes the importance of collaborative practice that purposefully integrates these forms, fostering engaged and reflective sustainability efforts. Moreover, the assignment of sustainability-themed writing tasks, dubbed 'sustainable composition,' encourages students actively to partake in the sustainability discourse [16]. Academic writing assignment addressing sustainability issues within an engineering education context not only hone linguistic proficiency but also engender a profound comprehension of sustainability challenges [5].

Genre based instruction (GBI) in EAP writing, advocated by scholars such as Hyland [17] and Swales [21-22], focuses on the explicit teaching of academic writing genres. This instruction mode is premised on the understanding that academic writing encompasses a variety of genres, each with its conventions and rhetorical structures. It is prevalent in EAP writing courses [18] and is posited to bolster learners' sustainable development in writing skills [19]. GBI emphasizes explicit teaching of the specific structures, conventions, and purposes of different genres within a subject area, particularly in writing. It aims to enhance student' understanding and communicative efficacy across diverse contexts by focusing on the norms and expectations of particular genres and may "shortcut" the language acquisition processes [17]. It has proven effective, particularly with graduate students [17, 20-22]. To ensure the learner's sustainable development in academic writing, instructors should not only teach rigid language forms and rhetorical structures but also raise students' genre awareness and facilitate genre transferability [23-27]. This comprehensive approach equips learners with both the technical and conceptual tools necessary for effective participation in academic and interdisciplinary dialogues concerning sustainable development.

### 2.3. Critical Digital Literacies and Education of Sustainable Development in EAP Courses

Within the ambit of Education for Sustainable Development (ESD) in English for Academic Purposes (EAP) courses, the construct of critical digital literacies emerges as a pivotal concern. The increasing digitization of academia necessitates the development of critical digital literacies. Such literacies empower students, enabling them to navigate and critique digital content effectively. Diverse frameworks have sought to define the contours of digital literacy, encompassing critical, cognitive, operational, social, emotional, and projective dimensions[28-30]. Incorporating insights from various international frameworks, Martínez-Bravo, et al. [28] identified six dimensions of digital literacy: critical, cognitive, operational, social, emotional, and projective. A framework of digital literacy[29] encompasses the competencies to create, communicate, and evaluate information safely and appropriately using digital devices and networked technologies. Another widely framework is put forward by Hinrichsen and Coombs [30] which identifies five resources constituting critical digital literacies: decoding, meaning-making, using, analysing and persona, thus highlighting the multifarious aspects of engagement with the digital realm.

### 2.4. Incorporating Large Language Model-Based Tools in EAP Writing

Academic research and writing today heavily depend on digital resources, necessitating students' proficiency in efficiently sourcing, analyzing, and integrating digital information into their academic work. The increasing reliance on digital tools for research and writing initiated an extensive exploration on the impact of digital technology. Wang and Vásquez [31] note that educational technology significantly enhances EAP learning by exposing students to multimodal English language, facilitating real interactions, and allowing for personalized, flexible learning experiences. Furthermore, technology-assisted instruction can foster interactive online learning settings that push the boundaries of learning beyond classrooms, nurturing self-reliance and advancing communicative abilities essential for the 21st century[32-34].

In the realm of language instruction, the advent of the large language model tool, ChatGPT, marks a significant evolution. Existing research delineates ChatGPT's efficacy in enhancing linguistic fluency by providing personalized and context-specific language drills. The instant feedback and authentic dialogues empower learners to refine both their writing and oral communication skills [35]. Additionally, ChatGPT is recognized for its potential to simulate real-life language interactions, thereby nurturing collaborative learning environments[36].

The utilization of ChatGPT in enhancing academic writing within the EAP context has emerged as a burgeoning research trend. The past two years, in particular, have witnessed an increasing scholarly interest. GPT has been applied across various stages of Academic English writing instruction, including brainstorming, structuring paragraph, revising, polishing, and feedback, due to its capability to generate academic English texts of a quality surpassing human writing [37-41]. These advancements not only enhance coherence and persuasiveness of articles [42] introduce efficiencies in automated essay evaluation [43], consequently improving writing efficiency [44] and bolstering motivation for writing

[39].

The existing literature emphasizes integrating Education for Sustainable Development (ESD) and critical digital literacies into Higher Education, particularly in EAP writing courses. It highlights the adoption of genre-based instruction (GBI) and large language models like ChatGPT to enhance academic writing skills, focusing on sustainability-themed content and critical engagement with digital resources. Research demonstrates these integration improve students' writing proficiency, critical thinking, and awareness of global sustainability issues, preparing them for professional and academic challenges in a rapidly changing world.

Despite the fruitful findings, several research gaps remain in the literature, particularly concerning the integration of ESD within EAP writing instruction amidst the digital age. First, the majority research overlooks the imperative of inculcating the foundational aspects of sustainability directly within the students. Although exceptions exist, such studies focus only on two elements of ESD: critical thinking and collaboration, thus calling for a more comprehensive and systematic infusion of ESD within EAP pedagogy. Second, a sharp contrast persists between the widespread adoption of technological tools in language learning and the paucity of effective, implementable guidance within classroom settings[45]. Lastly, few research has attempted to perform a comprehensive or systematic analysis of the effective integration of technology into a language learning at the EAP programme level [45]. Thus, a pedagogically-informed, systematic approach to digital literacies in EAP courses remains a valuable endeavor.

## 3. Clarification of Core Concepts in Sustainable Development, EAP Writing Pedagogy and Critical Digital Literacies

This section delineates the foundational concepts underpinning this study: the framework of Education for Sustainable Development (ESD) as issued by UNESCO, the construction of genre knowledge in genre-based English for Academic Purposes (EAP) writing courses to support students' journey toward sustainability, and the critical components of Critical Digital Literacies (CDL).

### 3.1. Education of Sustainable Development (ESD)

This study adopts UNESCO's 2017 ESD framework due to its comprehensiveness and applicability to language teaching [46]. ESD aims to foster cognitive development, attitudinal transformation, and a sustainable action-oriented mindset among learners. The objective of ESD is specified into eight core competencies: Systems thinking, Anticipatory, Normative, Strategic, Collaboration, Critical thinking, Self awareness, and Integrated problem-solving [14]. These competencies are elaborated as follows:

1) **Systems thinking** encourages individuals to understand how systems function in themselves and within contexts.

2) **Anticipatory competency** enables individuals to think in terms of future actions, consequences, and risks.

3) **Normative competency** enlightens the ideological context in which individuals exist and provides opportunities to negotiate conflicting situations mindful of all concerned.

4) **Strategic competency** is about action in the local context and beyond to promote sustainability.

5) **Collaborative competency** as the term suggests encourages individuals to be open to multiple perspectives and be able to resolve conflicts and solve problems in the multidimensional contexts.

6) **Critical thinking** empowers individuals to question one's own and others' norms, values, and belief systems which taking a stance on sustainability.

7) **Self-awareness** is an attitude of understanding oneself as a local and global agent of action.

8) **Integrated problem solving** integrates all competencies and enables individuals to be inclusive and equitable when solving problems sustainably [14].

These foundational competencies encapsulate the essence of ESD, guiding learners towards sustainable cognitive and behavioral outcomes.

### 3.2. The Constitutes of Genre Knowledge

The study emphasizes genre transferability within a Genre-Based Pedagogy (GBP) as an enhancement to the traditional fixed notion of genre knowledge. Genre transferability denotes the capacity to apply and adapt genre-related insights to varying and new writing contexts effectively [26]. The concept of genre transferability, however, is not clearly defined and thus not that teachable. Drawing from Tardy et al's [27] comprehensive delineation, the study refines the model of genre knowledge to encompass genre-specific knowledge, genre awareness, and recontextualization.

**Genre-specific Knowledge:** This refers to writers' understanding of specific genres, which is comprehensive and multidimensional, spanning formal aspects (content, organization, lexicogrammatical features), processes (composing, distributing), rhetorical contexts (discourse community, social relations), and subject-matter knowledge. Discovery-oriented tasks facilitate the acquisition of genre-specific knowledge, encouraging students to investigate genre conventions, application, and even innovations. Such tasks might include ethnographic explorations and engagement with genre practitioners [47-49]. For learners like EFL doctoral students, knowledge of critical genres, such as research articles, provides an entry point into specific discourse communities, enhancing genre awareness and facilitating knowledge transfer to new contexts.

**Genre Awareness:** An explicit awareness or understanding of how genres work—"a consciousness of and process for analyzing, learning, and critiquing any genre" [26]. It is cultivated through expanding students' genre repertoires, exposing them to new genres that leverage their existing knowledge base, and teaching them to apply analytical heuristics to diverse and unfamiliar genres[50, 51]. In essence, genre awareness equips students with the knowledge of genre functionality, enabling them to apply this understanding in recontextualizing genre knowledge in various writing situations.

**Recontextualization:** This is the practical application and adaptation of genre knowledge in specific contexts or its transfer to new ones, aligning with the goals of GBI, genre use or genre performance[27]. It necessitates learners' ability to modify existing knowledge to fit new contexts. Together, these elements underscore the intricacy of genre knowledge within GBI, demonstrating how genre-specific knowledge, genre awareness, and recontextualization work in concert to enhance learners' writing competencies across diverse contexts, as represented in Figure 1.

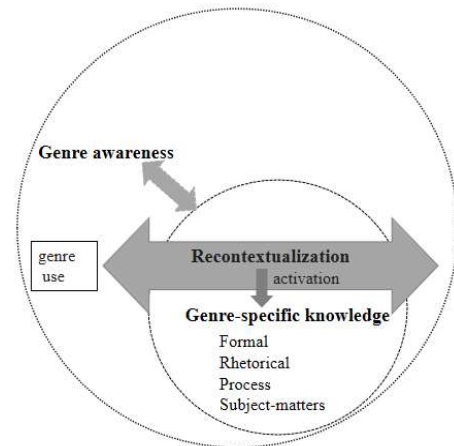


Figure 1. The genre knowledge construct [adapted from27]

### 3.3. Critical Digital Literacies

Critical Digital Literacies (CDL) encompass the proficiency in employing digital tools and managing digital content effectively to navigate the contemporary digital landscape. The present study adopt Hinrichsen and Coombs [30] model of CDL which is characterized by five essential resources: decoding, meaning-making, using, analyzing, and persona.

**Decoding** involves an understanding of the structures and conventions specific to digital media, coupled with an awareness to the different modes of digital genres.

**Meaning-making** relates to the learner's recognition of their role in shaping textual content. It highlights an interactive process where the composition's content, style, and purpose engage with the learner's prior experiences, knowledge, and reactions of the reader, emphasizing the learner's active contribution to textual creation.

**Using** denotes the aptitude to utilize digital tools appropriately and effectively for the current task, along with the skill to address practical challenges using diverse strategies and techniques, both independently and within group settings.

**Analyzing** concerns the capacity to evaluate and make informed decisions within the digital realm, incorporating critical, aesthetic, and ethical considerations into production and consumption of digital materials.

**Persona**, a recent addition to the CDL framework, points to an understanding of how online reputation, identity, and community membership are navigated across digital platforms, emphasizing the strategic management and adjustment of one's digital presence.

Collectively, these components underscore the multifaceted nature of critical digital literacy, positioning individuals to effectively harness digital technologies for communication, learning, and social participation in the digital era.

## 4. Conceptualizing a Pedagogical Model: Blending ESD and Genre Knowledge in EAP Writing via Critical Digital Literacies

This section outlines how the eight core elements of Education for Sustainable Development (ESD) are woven into English for Academic Purposes (EAP) writing courses as the implicit teaching objectives, aligning with the three components of genre knowledge: genre-specific knowledge,

genre awareness, and recontextualization. By integrating these facets, the approach aims to enhance students' normative competence and critical thinking through genre-specific insights. Genre awareness promotes systemic thinking and self-reflection, encouraging students to understand their participatory roles across different contexts better. Moreover, recontextualization emphasizes anticipatory, strategic, and problem-solving abilities, highlighting the role of digital tools and linguistic strategies in addressing real-world challenges. Throughout, a foundation of critical digital literacies supports fostering of these competencies.

#### 4.1. Genre-specific Knowledge

This course targets at EFL doctoral students to develop their academic English literacies and facilitate their research paper writing and publication and cultivate their academic communicative competence in English. Research articles is chosen as the specific genre, which may scaffold their genre awareness and genre transferability. While learning genre knowledge of research articles, students' normative competence and critical thinking are fostered.

##### 1) Normative Competency

During this phase, students are supposed to decode and analyse digital learning materials related to research articles. They will be introduced to the sub-genres of research articles generated by ChatGPT, i.e. Abstract, Introduction, Method, Results, Discussion and Conclusion or the prototypical IMRD structure. For each sub-genre, students are to identify the move structure, lexico-grammatical features and the communicative purposes. Then the contextual factors like rhetorical context, readers are to be explored to identify their impacts on the production of texts. Finally, the textual embodiment of disciplinary norms are to be revealed. In the digital context, these capacities can be cultivated through activities that:

a. Identify the rhetoric structures and linguistic features in digital texts

This involves recognizing and understanding the various rhetorical structures characteristic of research article sub-genres. For example, introductions typically establish research territory, a niche, and then present the work, following Swales' model[22]. Methods sections may contextualize study methods, describe the study, and establish credibility [52]. Emphasizing these differences aids students in adapting their writing to suit the specific requirements of each genre.

b. Determine communicative purposes, target audiences, and contextual influences on text production

Every piece of writing serves a particular purpose, addresses a specific audience, and is influenced by its context. It's vital to understand the purpose (to inform, persuade, entertain, or instruct), identify the target audience (be it experts in the field, the general public, or a specific demographic), and recognize how contextual factors (publication platform, cultural expectations, communication modes etc.) influence writing. Grasping these elements enables students to tailor their writing effectively to their intended audience.

c. Explore disciplinary norms and their manifestations within digital texts

Disciplinary norms vary widely, encompassing writing conventions, citation styles, and evidence presentation[53]. For instance, the humanities may prioritize narrative and argumentation, while scientific writing focuses on empirical

evidence, clarity, and concision. Through understanding these norms, students can become versatile writers adept at navigating various disciplinary contexts, thus enriching their disciplinary understanding.

Through fostering normative competency, educators aim to equip students with the tools necessary to critically engage with and contribute to various genres, adapting their communication strategies to fit different rhetorical contexts. This foundational knowledge supports students in becoming skilled, adaptable communicators, capable of navigating the complex digital landscape of genre-specific writing.

##### 2) Critical Thinking Competency

Critical thinking competency within the context of genre-specific knowledge entails the ability to engage with, analyze, and critique texts and the processes used to create them. This competency is vital for navigating the digital age, where information is abundant and varying in credibility. Within a digital environment, these capabilities can be developed via activities designed to:

a. Verify facts presented in digital texts

The ability to verify facts is fundamental in ensuring the reliability and credibility of any text, particularly in an era where information can be both widespread and misleading. Students should learn to identify factual claims within a text and cross-reference these against reputable sources, scrutinizing the data's accuracy, the claims' validity, and the integrity of presented evidence. It involves scrutinizing the accuracy of data, the validity of claims, and the integrity of evidence presented. This practice cultivates the ability to distinguish between trustworthy information and misinformation, a critical ability in academic writing and beyond.

b. Evaluate the applicability of digital tool-generated move models in academic writing

With the advent of sophisticated digital tools capable of generating textual content, including various move models (structured patterns of organization specific to different sections of academic texts), students must learn to critically evaluate these tools' output. This involves assessing whether a tool's suggested structure for an introduction, literature review, methodology, etc., aligns with disciplinary conventions and effectively serves the communicative purpose of the text. This skill involves a deep understanding of the nuances of academic writing and the ability to judge the appropriateness of algorithm-generated content in different contexts. This skill not only enhances students' critical engagement with digital tools but also fosters their ability to adapt and innovate upon standard academic structures.

c. Compare the move structures across genres

Understanding and analyzing the distinctive organizational patterns of different genres—known as "move structures"—and how they fulfill the genre's communicative purpose is vital. For instance, empirical research articles in the sciences generally adhere to a specific structure (Introduction, Methods, Results, Discussion), contrasting with the more flexible structure of a humanities essay. Comparing these organizational patterns helps students gain insight into how various genres construct meaning and communicate effectively. This analysis sharpens analytical skills and prepares students to tailor their writing to different disciplinary contexts effectively.

Critical thinking competency in genre-specific knowledge empowers students to not only engage with texts more deeply but also to actively question and refine the processes and tools

they use in text production. This competency is essential for academic success and sustainability in the digital age.

## 4.2. Genre Awareness

### 3) System Thinking Competency

System thinking competency in the context of genre awareness involves understanding how various elements within the academic genre ecosystem interact and influence one another. This holistic approach allows learners to appreciate the complexity and dynamics of written communication in academic contexts. Within the digital environment, it's possible to develop these abilities through activities that:

#### a. Investigate interactions in digital academic texts

This component emphasizes the interconnectedness of the writer's intentions, the structure and content of the text, the expectations and interpretations of the reader, and the overarching purpose of the communication. In digital academic texts, these interactions can also be influenced by the medium (e.g., online journals, blogs, educational platforms) through which the text is delivered. Understanding these interactions enables students to produce texts that are more precisely tailored to their intended purpose and audience.

#### b. Gain insights into the academic genre system through digital examples

Leveraging digital examples and applications, such as online databases, academic writing tools, and educational software, students can immerse themselves in the academic genre system, gaining a deeper understanding of its nuances. This exposure helps them to discern patterns, structures, and conventions across various academic texts, enriching their genre-specific knowledge and abilities.

#### c. Identify similarities and differences across genres

By comparing familiar genres with new ones, students improve their systems thinking skills. This comparative analysis reveals underlying principles common to many genres while highlighting distinctive features that set each genre apart. Such insights are invaluable in mastering new genres and adapting writing strategies to meet different academic and disciplinary requirements.

### 4) Self-awareness Competency

Self-awareness competency focuses on reflective practices that enhance learners' understanding of their own learning processes, identity construction, and ethical responsibilities in academic writing.

#### a. Reflect on personal genre knowledge acquisition

Students are encouraged to reflect on their journey of learning and adopting genre conventions, using this insight to inform their continued development as writers. Recognizing personal strengths and areas for improvement allows for more targeted strategies for enhancing genre-specific competencies.

#### b. Explore identity construction through digital text production and sharing

Through creating and sharing texts digitally, students engage in practices that shape their academic and social identities. This process involves making deliberate choices about language, style, and content that align with or challenge the norms of the academic community and broader societal expectations.

#### c. Commit to academic integrity in digital creations.

A critical component of self-awareness involves recognizing and committing to the principles of academic integrity. This includes proper attribution of sources, avoiding plagiarism, and fostering originality in their work. As digital

platforms facilitate the widespread sharing of information, upholding these principles is essential for maintaining the credibility and ethics of academic contributions.

### 5) Collaborative Competency

Collaborative competency underlines the importance of teamwork and collective intelligence in academic writing and learning.

#### a. Examine diverse perspectives presented in learning materials

This entails engaging with a range of viewpoints and interpretations within academic materials, fostering an environment of open-minded inquiry and critical engagement.

#### b. Participate in discussions to build discipline-specific academic writing strategies

Participating in discussions and projects with peers allows students to co-construct knowledge and develop writing strategies that are informed by multiple disciplinary perspectives, enhancing the quality and depth of their academic work.

#### c. Enhance texts with virtual collaboration

Digital platforms provide unique opportunities for collaboration beyond physical classrooms, allowing students to work with peers across the globe. Through such collaborations, they can refine their texts based on diverse feedback, leading to more polished and effective academic writing.

## 4.3. Recontextualization

### 6) Anticipatory Competency

Anticipatory competency is about foreseeing and preparing for future communication needs within specific genres. It's crucial for tailoring content to various audiences and purposes effectively. In the digital environment, these abilities can be developed through tasks that:

#### a. Plan to generate genre-specific texts for particular contexts

This entails understanding the needs and expectations of both the genre and the potential audience, and crafting texts that meet these requirements. Planning includes identifying the purpose of the text, the audience's characteristics, and how the genre conventions can be adapted to communicate effectively in this particular scenario.

#### b. Brainstorm contextual factors that influence text production and reception

Contextual factors such as cultural norms, disciplinary expectations, and platform play a significant role in how texts are produced and perceived. Brainstorming these factors enables writers to anticipate challenges and opportunities in text creation and engagement, their content fits the context.

#### c. Tackle challenges in digital content creation and engagement

Given the dynamic nature of digital platforms and the constant evolution of genre conventions, writers must develop strategies to navigate these changes proactively. This includes staying informed about digital tool updates, audience preferences, and the digital rights management of content, to maintain engagement and relevance in online environments.

### 7) Strategic Competency

Strategic competency is about effectively using tools, models, and strategies to achieve specific writing goals within various genres while clearly expressing the writer's identity. Within the digital realm, these skills can be honed through activities that:

#### a. Use digital tools for efficient text creation and editing.

Leveraging digital tools (e.g., word processors with advanced editing features, cloud-based collaboration platforms) enables writers to streamline the text creation process, enhance collaborative opportunities, and improve the overall quality of their work through sophisticated revision capabilities.

b. Apply adaptable move models for text structuring.

Move models, which organize text based on genre norms, can guide text creation. Tailoring these models to the specific context helps fulfill communicative aims and meet audience expectations.

c. Utilize rhetorical strategies to establish a distinctive voice.

Employing strategic rhetorical choices helps writers convey their unique voice and establish a strong identity within their texts. This includes the use of specific language, tone, and stylistic elements that resonate with the intended audience while adhering to genre conventions.

8) Integrated Problem-solving Competence

This competence merges normative, critical thinking, systemic thinking, self-awareness, collaborative, anticipatory and strategic competencies to address real-world challenges in using digital texts and digital tools. In the digital sphere, these competencies can be refined through tasks that:

a. Use the generated digital texts in real-world scenarios

Implementing digital texts in practical settings involves understanding the text's role within a larger context, such as in academic discussions, professional communications, or public discourse. By doing so, writers can assess see their work's impact and identify improvement areas.

b. Continually reassess and refine texts based on sustainability and feedback

Sustainability in this context refers to the ongoing relevance and adaptability of texts in changing scenarios. Continuous evaluation and refinement based on feedback from peers, audiences, and self-assessment ensure that the texts not only meet current needs but are also poised to remain effective and engaging in the future. This iterative process fosters a culture of continuous learning and improvement in digital text generation. This conceptual model is represented as Figure 2.

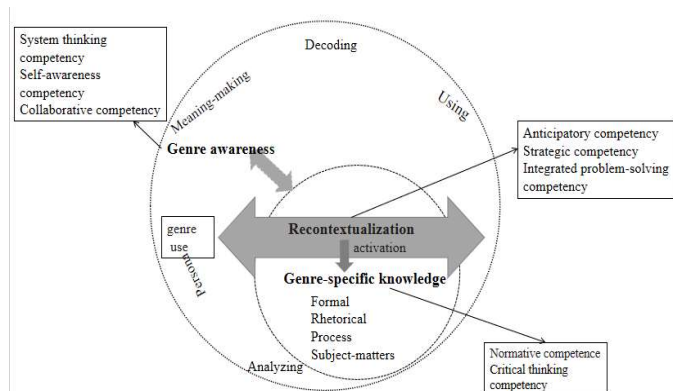


Figure 2. The conceptual model of integrating ESD into EAP writing instruction framed by CDL

## 5. Scenarios of Using ChatGPT in EAP writing course to foster sustainable development

This section delineates the utility of ChatGPT in augmenting students' writing skills through a series of

elaborated scenarios, demonstrating the model's potential in elevating critical thinking, genre analysis, collaboration, and other vital skills.

### Scenario 1: Comprehensive Genre Analysis through Structure Identification and Move-Model Creation

In Scenario 1 ChatGPT is employed to perform a dual-function analysis on texts submitted by users. It first identifies common rhetorical structures and linguistic features inherent in the texts based on their genre. Then, leveraging its extensive training data, it generates a move model that maps out the typical structures of texts within that specific genre. This comprehensive analysis aids users in understanding genre conventions at a deeper level and in crafting their own texts according to these norms.

**Prompt Example:** "I'll feed you with several opinion articles from leading newspapers. Can you identify the common rhetorical structures and linguistic features of these texts, and also generate a move model specific to the opinion article genre?"

**Instructional Use:** Upon receiving the analysis from ChatGPT, students can examine the identified rhetorical patterns and linguistic choices that characterize opinion articles, such as persuasive language, first-person perspective, and strong, assertive statements. Additionally, with the move model outlining the standard flow of these articles—from presenting the issue, through argument development, to concluding with a strong call to action—students gain a clear structural guide for their writing. Students can thus critically analyze provided samples against the generated move model, observing how real-world texts align with or deviate from the ideal structure. This analytical practice not only sharpens their critical thinking but also provides a solid blueprint for crafting their opinion pieces, ensuring they can effectively engage and persuade their intended audience. Whether for academic purposes or personal expression, this dual analytical approach offers a comprehensive toolkit for mastering genre-specific writing skills.

### Scenario 2: Developing Critical Thinking Competency

Scenario 2 accentuates the role of ChatGPT in honing students' critical thinking through fact verification exercises. In an age saturated with information, discerning the accuracy and reliability of digital content becomes paramount. By integrating ambiguities or errors within the generated text, ChatGPT challenges students to verify facts and evaluate information sources critically. This strategic approach not only refines students' research skills but also instills a meticulous mindset crucial for academic writing and beyond.

**Prompt Example:** "Provide three statements about the impact of renewable energy sources on urban development. Please add some ambiguities or factual errors with the texts and guide the students to verify them."

**Instructional Use:** Students research each statement, verifying facts and discussing the reliability of information sources. This task can enhance their ability to critically assess the validity of digital content, a key skill in the era of information overload.

### Scenario 3: Enhancing System Thinking and Academic Genre Mastery

In Scenario 3, ChatGPT is leveraged to enhance system thinking and refine students' proficiency in navigating the academic genre system. Through generating content across various academic genres on a single topic, students explore the adaptability required in academic communications. This scenario fosters an understanding of the nuances of genre-

specific writing, enabling students to identify commonalities and variations in structure and linguistic choices. Such exercises empower students to adeptly customize their communications for distinct academic scenarios, thereby amplifying their overall communicative effectiveness.

**Prompt Example:** “Focus on the issue of climate change and generate content that is specifically tailored for distinct academic genres, including a research article abstract, a grant proposal, a conference presentation, and a digital blog. Subsequently, assist students in recognizing the distinctive features and general similarities across these genres. Focus on the issue of climate change and generate content that is specifically tailored for distinct academic genres, including a research article abstract, a grant proposal, a conference presentation, and a digital blog. Subsequently, assist students in recognizing the distinctive features and general similarities across these genres.”

**Instructional Use:** Students start by reviewing the variety of the generated texts, each tailored to convey the same key message—climate change—through the lens of different academic genres. Following this, educators guide students in a comparative analysis, encouraging them to pinpoint how the rhetorical strategies, evidence presentation, and linguistic choices differ from one genre to another. For example, they may observe that while a research article abstract is concise and focuses on methodology and results, a digital blog might adopt a more narrative style to engage a broader audience.

#### **Scenario 4 Cultivating Self-Awareness Through Diverse Digital Identity Projection**

The exploration of digital identities, as outlined in Scenario 4, introduces a novel dimension to EAP writing courses. By embodying different perspectives and voices tailored to various genres, ChatGPT aids students in navigating the construction and perception of identity in digital realms. This reflective process not only enhances students' adaptability but also prompts a deeper introspection into their communicative choices and the impressions they generate. Understanding the strategic elements of digital communication becomes indispensable in an age where online interactions predominate.

**Prompt Example:** “Craft texts on the topic of environmental conservation, altering your voice and perspective to align with the conventions of a scientific journal article, an impassioned blog post, a formal policy recommendation, and a social media campaign. Highlight how the crafted identities align or contrast with each genre's expectations.”

**Instructional Use:** Educators prompt students to compare the generated texts, each showcasing a distinct voice suited to a particular genre. Students engage in reflective discussions on how the voice in a scientific article differs in its detachment and objectivity from the personal and evocative tone of a blog post. They consider the strategic construction of identity in a policy recommendation to inspire trust and authority, contrasting with the approachable and relatable persona often adopted in social media campaigns. This reflective process enhances their understanding of the strategic elements of digital communication and the impact of genre on self-presentation.

#### **Scenario 5: Enhancing Collaborative Skills Through Virtual Peer Interaction**

Scenario 5 emphasizes the significance of collaborative skills in academic settings. Through simulating roles such as editors and peer reviewers, ChatGPT facilitates an immersive

experience that mirrors real-world collaborative processes. This virtual interaction offers nuanced, role-specific feedback, enabling an intricate understanding of academic collaboration. Students learn to navigate diverse viewpoints, incorporating constructive criticism into their work. This scenario extends beyond technical competencies, fostering soft skills like empathy and resilience critical for teamwork and professional development.

**Prompt Example:** “Act as an editor, peer reviewer, and referee in response to a draft article on renewable energy solutions. Provide feedback, suggest improvements, and raise critical questions from each standpoint, demonstrating the unique contribution each role makes to the development of the piece.”

**Instructional Use:** This approach transforms the learning environment into an interactive workshop where students submit their work-in-progress to a virtual panel of peers acting in distinct roles. Each role played by ChatGPT offers a different lens through which the work is critiqued and enhanced, mirroring real-world collaborative processes. For example, as an editor, ChatGPT may focus on the overall coherence and impact of the article, suggesting structural changes for clarity. As a peer reviewer, it might delve deeper into the accuracy of the content, the robustness of the arguments, and the relevance of the citations. As a referee, it could offer a verdict on the suitability of the article for publication, highlighting strengths and flagging areas for revision. Students then have the opportunity to revise their work based on this multifaceted feedback, learning the value of diverse viewpoints in refining ideas and enhancing quality. Moreover, they engage in discussions about the feedback received, defending their choices or acknowledging the need for adjustment, thus practicing negotiation and persuasive communication. The simulation of different collaborative roles not only demystifies the editorial and review processes but also equips students with the skills to effectively engage in peer-to-peer collaboration. Understanding the expectations and contributions of various collaborators prepares students for real-world teamwork and enhances their ability to work constructively within diverse groups. This scenario nurtures not just the technical competencies required for collaboration but also the soft skills of empathy, flexibility, and resilience, crucial for success in any collaborative endeavor.

#### **Scenario 6: Cultivating Anticipatory Competency**

The sixth scenario underscores the importance of anticipatory competency in effective communication. ChatGPT's role in generating context-specific texts enables students to adapt their writing strategies, considering factors such as audience expectations and persuasive techniques. This anticipatory approach, coupled with critical context analysis, sharpens students' ability to craft resonant messages, a skill invaluable in both academic and professional spheres.

**Prompt Example:** “Generate a persuasive blog post aimed at young entrepreneurs emphasizing the importance of sustainable business practices. Afterward, adapt the core message for a grant proposal to a sustainable development fund. Then create reflective questions on the considerations taken into account for each genre, including audience expectations, language formality, and persuasive strategies.”

**Instructional Use:** In a classroom setting, the instructor assigns learners the task of developing texts for diverse, specified contexts, guiding them to first identify the genre and its accompanying expectations by using the generated texts as examples. ChatGPT then serves as an interactive tool, where

students experiment with crafting messages for different audiences and purposes, such as a speech for a community event versus an article for a professional newsletter. Following each writing exercise, ChatGPT, simulating various stakeholders, provides targeted feedback, highlighting how well the text meets the anticipated context requirements and suggesting areas for improvement. Additionally, students engage in discussions about their strategic choices, leveraging ChatGPT to simulate debates or panel discussions on the effectiveness of different contextual adaptations. This process not only sharpens their anticipatory and adaptive writing skills but also deepens their understanding of how texts are shaped by and can shape their contexts.

### **Scenario 7: Enhancing Strategic Competency in Research Writing**

Scenario 7 focuses on the strategic aspects of academic research writing, particularly for EFL doctoral students. By integrating digital tools in the drafting and publishing processes, students refine their argumentation and presentation skills. ChatGPT aids in structuring articles using models like IMRaD, ensuring coherence and adherence to academic standards. This scenario exemplifies how strategic planning and digital tool utilization can significantly impact the quality and clarity of scholarly articles.

**Prompt Example:** Compile a literature review for a research article focused on a topic within the field of artificial intelligence. Structure your article using the IMRaD (Introduction, Methods, Results, and Discussion) model, emphasizing cohesion and coherence throughout. Employ rhetorical strategies to highlight the significance of your research findings. Then generate several questions leading students to reflect on how strategic decisions regarding your framework, argumentation, and digital tools facilitated your writing process.”

**Instructional Use:** The activity begins with instructors introducing essential digital tools suited for academic writing, including reference management software, citation generators, and platforms for collaborative feedback. Students are then instructed to draft an academic article, applying strategic structuring using the IMRaD model as guidance. Throughout the drafting process, ChatGPT assists by providing examples of effective academic language, offering feedback on the organization and clarity of arguments, and simulating the peer-review process to help students refine their manuscripts. Students engage with ChatGPT for personalized advice on enhancing the persuasive power of their research findings and discussions. The AI can suggest ways to better articulate the study's implications for the field, how to make complex information accessible, and strategies for addressing potential criticisms. Upon completing their drafts, students use ChatGPT and other digital writing tools to polish their articles, focusing on aspects such as coherence, logical flow, and adherence to academic conventions. They then present their work, sharing how the integration of digital tools and strategic writing frameworks impacted their process and outcomes.

### **Scenario 8: Integrated Problem-Solving Competence**

Scenario 8 highlights the significance of interdisciplinary approaches in problem-solving. By engaging in exercises that require an integrated knowledge base, students tackle complex issues from multiple perspectives. This holistic approach not merely fosters innovative solutions but also underscores the importance of cross-disciplinary collaboration in addressing global challenges.

**Prompt Example:** “Identify a pressing global issue from an interdisciplinary standpoint, involving at least three different fields of study. Analyze the problem by considering its various dimensions and impacts. Develop a multifaceted solution plan, integrating knowledge and strategies from the disciplines involved. Reflect on the process and how an integrated approach contributed to a more robust and innovative solution.”

**Instructional Use:** Instructors begin by introducing students to methodologies for interdisciplinary problem identification and analysis, highlighting how problems often span multiple domains and require considerations beyond a single field's perspective. Students select a global issue to address and use interactive platforms, such as ChatGPT, for brainstorming and gathering insights from different academic and practical viewpoints. Working in teams, students map out the problem's dimensions and identify how principles from each chosen discipline can contribute to a comprehensive understanding and solution. ChatGPT facilitates this process by offering information, proposing potential interdisciplinary overlaps, and suggesting innovative approaches previously utilized in similar contexts. Students are tasked with developing a proposal that synthesizes their interdisciplinary analysis into practical solutions. They should consider the feasibility, impact, and potential challenges in implementing these solutions. ChatGPT serves as a sounding board, helping students refine their ideas and ensuring their proposals are grounded in interdisciplinary knowledge. Finally, teams present their proposals, focusing on how their integrated approach enhances the depth and applicability of their solutions. They also submit reflective essays discussing the role of interdisciplinary thinking in problem-solving, the challenges encountered, and the potential for such approaches to address complex issues in the real world.

The above eight scenarios collectively elucidate the model's capacity to enhance critical academic competencies, from genre mastery and critical thinking to collaborative skills and strategic competence. By facilitating a dynamic, interactive learning environment, such tools not only prepare students for academic challenges but also equip them for the multifaceted demands of the professional world.

## **6. Conclusion**

In conclusion, the innovative conceptual model presented in this research delineates a fresh pedagogical framework that conceptually marries Education for Sustainable Development (ESD) with Genre-Based English for Academic Purposes (EAP) writing, all through the lens of Critical Digital Literacies (CDL). While primarily conceptual in nature, and hence not yet applied within real-world educational settings, the model offers significant theoretical implications and serves as a springboard for future research and curriculum development in EAP writing instruction. The model's purpose is twofold: to enhance the academic writing and critical thinking skills of EFL doctoral students, and to deepen their understanding of and dedication to sustainability. This dual focus showcases the model's educational innovation and its importance in the context of today's digital and environmentally-aware society.

Moreover, this model underscores a pivotal pedagogical implication: the necessity of transcending traditional mechanisms of teaching EAP writing to embrace a more holistic and contextually responsive curriculum. By focusing on both the explicit teaching objectives tied to genre-specific

knowledge and the implicit objectives related to ESD, the model advocates for a more comprehensive and nuanced educational experience. The pedagogical scenarios outlined in this study not only exemplify how technological tools can be leveraged to enhance learning outcomes but also how education can evolve to meet the demands of the 21st century—preparing students not merely as academic writers but as informed and responsible global citizens poised to address complex sustainability challenges.

As a conceptual blueprint, this model sparks essential dialogue among educators, curriculum developers, and researchers about the evolving role of EAP writing instruction in an increasingly interconnected and digitally oriented world. It underscores the urgency of embedding sustainability into academic discourse and highlights the transformative potential of digital tools in achieving these educational objectives. Importantly, this model encourages a pedagogical shift towards a more integrated and responsive approach to teaching and learning, one that prepares students not just as competent academic writers but as reflective, responsible individuals attuned to the challenges of sustainable development. However, it's important to acknowledge the model's conceptual status. Before its potential can be fully realized, it must undergo empirical testing in educational practice to ascertain its practicality and effectiveness. This step will help determine its practicality and effectiveness, thereby directing the trajectory of future research.

## Acknowledgments

Funding: This work was funded by Hunan Province Degree and Graduate Education Teaching Reform Research Project: “AIGC Empowered Research on Enhancing Graduate Academic English Competence (Project Number: 2024JGYB165)” and Ministry of Education Collaborative Education Project: “Research on Cultivating Deep Integration of Large Language Models and Teaching Ability (Project Number: 230806121242956)”.

## Institutional Review Board Statement:

Not applicable.

## Conflicts of Interest:

The authors declare no conflict of interest.

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