Theoretical Praxis in Environmental Education within EFL Contexts

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Abstract

The intersection of environmental education (EE) and English as a Foreign Language (EFL) instruction presents a transformative opportunity to cultivate ecological literacy while enhancing linguistic competencies. This study explores emerging trends and theoretical praxis in integrating sustainability discourse into EFL curricula, highlighting the roles of ecological literacy, critical eco-pedagogy, and multiliteracies pedagogy. Through bibliometric and qualitative content analysis, we examine five decades of research on EE within EFL contexts, identifying dominant theoretical frameworks, pedagogical approaches, and key research gaps. Findings reveal a growing global emphasis on sustainability in language education, driven by multiliteracies-based methodologies that incorporate digital media, critical discourse analysis, and experiential learning. Despite increasing recognition of EE's role in EFL, challenges persist in pedagogical implementation, particularly in resource-limited contexts. This study argues that embedding EE in language instruction fosters not only communicative competence but also critical awareness of environmental issues, empowering learners to become agents of sustainable change. The findings contribute to a broader dialogue on integrating sustainability into education, aligning with global environmental and educational policy frameworks.

Key Keywords: Environmental Education, Ecological Literacy, Critical Eco-Pedagogy, Multiliteracies.

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INTRODUCTION

The relationship between humans and the environment has always been one of interdependence, where both entities shape and influence each other. Historically, human civilization evolved within the limits of natural ecosystems, maintaining a balance that allowed for mutual sustainability. However, as scientific and industrial advancements accelerated, a paradigm shift occurred, moving from an ecocentric worldview, which respects ecological balance, to an anthropocentric worldview, which prioritizes human needs and economic growth at the expense of environmental stability. This shift has led to the widespread environmental degradation observed today, characterized by deforestation, pollution, biodiversity loss, and climate change (Contu & Willmott, 2003). Such consequences are not merely ecological but are deeply intertwined with social, economic, and political structures that sustain unsustainable development. As a result, contemporary generations are now confronted with the ecological crisis inherited from their predecessors, making environmental education (EE) an urgent necessity rather than a mere academic discourse.

One of the key challenges in addressing environmental issues lies in the deeply ingrained anthropocentric mindset that dominates modern education and societal norms. According to Stibbe (2015), the way people use language to frame environmental discourse (Saifulloh et al., 2023) plays a significant role in shaping attitudes toward nature. The narratives constructed around economic growth, technological supremacy, and human dominance over nature reinforce a mindset that normalizes environmental exploitation. This linguistic framing is crucial because it affects not only policies and behaviors but also the way individuals perceive their relationship with nature. For this reason, ecological literacy (Eco-Literacy) has emerged as a fundamental concept in environmental education, aiming to equip individuals with the knowledge and critical awareness necessary to challenge unsustainable narratives and engage in ecologically responsible practices (Capra, 2003). In

this context, education is not just about imparting knowledge but also about fostering a transformation in mindset and behavior that aligns with sustainability goals.

The increasing relevance of ecological literacy has been underscored by global crises, including climate change, resource depletion, and, more recently, the COVID-19 pandemic, which highlighted the deep interconnections between human health and environmental stability (Burningham, Beck, 1997). The pandemic has served as a stark reminder that environmental degradation is not a distant threat but a present reality with immediate consequences. It has also revealed disparities in global environmental responsibility, where wealthier nations contribute disproportionately to ecological destruction while developing countries bear the brunt of environmental consequences. In Indonesia, for example, rapid economic growth has been accompanied by large-scale deforestation, unsustainable mining, and marine pollution, making the country one of the world's top contributors to biodiversity loss (IQAir, 2020). These environmental challenges necessitate a rethinking of educational strategies to integrate ecological consciousness into various disciplines, including English as a Foreign Language (EFL) education.

Despite its importance, environmental education remains marginal in many educational curricula, particularly in EFL instruction. Traditionally, language education has focused on grammatical structures, linguistic accuracy, and communication skills, often neglecting the role of language as a tool for critical engagement with real-world issues, including sustainability. However, scholars have increasingly argued that EFL education can serve as a powerful platform for fostering environmental literacy by embedding sustainability themes into language learning (Khan, 2010; Saifulloh, 2024). The New London Group (Cazden, 1996) introduced the concept of multiliteracies, emphasizing that literacy extends beyond traditional reading and writing to include digital, visual, and ecological literacies. This perspective suggests that language education should not be confined to textbooks and classrooms but should actively engage students with contemporary global challenges, encouraging them to explore environmental discourses through various media.

In Indonesia, efforts to incorporate environmental education into the curriculum have been recognized through policies such as Ministerial Regulation No. 20/2018 on Character Education Strengthening in Formal Education (Permendikbud, 2018). This regulation mandates the integration of environmental values into school programs, aiming to cultivate ecological awareness among students. However, the implementation of such policies remains inconsistent, with many educators lacking the training and resources necessary to integrate sustainability topics effectively into their teaching material (Saifulloh, 2021). Programs such as Adiwiyata Schools, which promote eco-friendly school environments, have made some progress, but their reach remains limited, particularly in EFL classrooms where environmental themes are often viewed as peripheral to language learning (Iswari & Utomo, 2017). This gap presents an opportunity for EFL education to align with ecological literacy by incorporating sustainability discussions into reading materials, writing tasks, and spoken discourse (Saifulloh, 2024).

The global movement toward sustainability education gained momentum with the 1972 Stockholm Conference on the Human Environment, which called for the establishment of international programs in environmental education. Following this, UNESCO initiated frameworks for integrating EE into national curricula worldwide, emphasizing the role of education in addressing ecological crises. However, despite decades of advocacy, many educational institutions have struggled to implement EE holistically, often treating it as an isolated subject rather than an interdisciplinary priority. Within EFL education, Ursoy (2010) argues that embedding environmental literacy can enhance both language proficiency and ecological awareness, making learning more meaningful and contextually relevant. This aligns with Arran Stibbe's (2015) ecolinguistics theory, which suggests that the way language is taught and used influences students' perceptions of environmental responsibility. Educators can empower students to engage in critical discussions about environmental justice, conservation, and sustainable practices by incorporating sustainability into language instruction.

Considering these challenges and opportunities, this article explores the integration of environmental education in EFL contexts over the past five decades, examining theoretical and

practical developments. Specifically, this study aims to analyze historical and contemporary movements in EE within EFL settings, identify dominant theoretical frameworks shaping EE in language education, and examine existing research gaps to propose future directions for sustainability-oriented language instruction. Through bibliometric analysis and qualitative synthesis, this study provides insights into how ecological literacy can be effectively embedded in EFL pedagogy, fostering linguistic competence and environmental responsibility. By bridging the gap between language learning and sustainability discourse, EFL education can play a pivotal role in preparing students for a future where environmental awareness is as essential as linguistic proficiency.

Multiliteracies, Eco-Literacy, and Critical Pedagogy in EFL Education

Integrating environmental education (EE) into English as a Foreign Language (EFL) instruction is underpinned by several critical theoretical perspectives that collectively shape the pedagogical, cognitive, and sociocultural dimensions of sustainability learning. Drawing from Ecological Literacy, Critical Eco-Pedagogy, and Multiliteracies Pedagogy, this study examines how these frameworks intersect to foster an environmentally conscious approach to language education.

At the core of environmental education in EFL settings is the concept of Ecological Literacy (Eco-Literacy), which refers to the ability to understand ecological systems, recognize the interdependence of human and environmental well-being, and engage in sustainable decision-making (Saifulloh, 2024). Ecological literacy is not merely about acquiring scientific knowledge but involves cultivating a mindset that perceives environmental sustainability as an integral part of social and cultural life. In the context of EFL, Eco-Literacy emphasizes how language both shapes and reflects environmental awareness. Scholars such as Stibbe (2015) highlight the role of ecolinguistics, arguing that the way environmental issues are framed in discourse significantly influences public perception and policy. Language learners, therefore, must not only develop linguistic proficiency but also engage critically with environmental narratives. This perspective aligns with the broader goals of education for sustainable development (ESD), which UNESCO has promoted as a means of integrating sustainability into curricula across disciplines (UNESCO, 2013). In an EFL classroom, Eco-Literacy can be fostered through text analysis, project-based learning, and multimodal engagement with ecological texts, encouraging students to reflect on how language can either reinforce or challenge environmental ideologies.

In Ecological Literacy, we learn that there is only one home that we need to defend, and that is the Earth itself. The term "Ecological Awareness" refers to an awareness of the fundamental principles of ecological community and the application of these principles to build a human community that is environmentally sustainable (A. S. Keraf, 2013) Environmental Literacy is defined by Fassina (2015) as a manner of living that is not in harmony with others and the natural surroundings, rather than just a measure of one's ecological knowledge. Pupils' comprehension of ecological concepts is only part of what Meena & Alison(2005) believe is necessary for students to comprehend their role in ecosystems and their expectations. Individuals and cultures must comprehend how they interact with natural systems and how they might do so in a sustainable manner to be considered ecologically literate, according to Orr (2018). Ecological Literacy has a variety of definitions and studies, but the purpose is the same, which is to cultivate ecological awareness as a form of love for the universe. According to Keraf (2014), the purpose of ecological Literacy is to establish a sustainable society that is harmonious with the universe. In the meantime, eco-literacy, according to Orr (2018), is built on the premise that the harm done to the environment is a reflection of the system or ideology held by specific social groups. Ecological knowledge can be used to fix the problem without causing any harm to anyone. It is an effort to promote public awareness of the need for global ecological awareness. Eco-literacy aims to introduce and expand public comprehension of this issue (Pitman, S.D., & Daniels, 2016).

Complementing ecological literacy is Critical Eco-Pedagogy, an extension of Paulo Freire's critical pedagogy that examines the socio-political dimensions of environmental education (Kahn, 2010; Misiaszek, 2021). While traditional EE often presents environmental issues in neutral, depoliticized terms, critical eco-pedagogy challenges dominant narratives that sustain environmental

exploitation and inequality. Giroux (2010) argues that mainstream education frequently fails to address the power structures underpinning environmental degradation, thus limiting students' ability to critique unsustainable economic and political systems. In the EFL classroom, this perspective translates into engaging students with authentic, real-world texts—such as climate policies, sustainability reports, and advocacy materials—to analyze how language constructs power relations in environmental discourse. Additionally, critical eco-pedagogy emphasizes student agency, encouraging learners to participate in environmental activism through persuasive writing, debates, and digital storytelling. For instance, a lesson on climate change rhetoric can include analyzing media bias in environmental journalism (Saifulloh et al., 2023), allowing students to see how language is used to either support or undermine sustainability efforts. By incorporating critical eco-pedagogical approaches (Saifulloh, 2019), EFL educators can transform language learning into a tool for social and ecological empowerment.

Further reinforcing the integration of EE in EFL instruction is Multiliteracies Pedagogy, which recognizes the dynamic and multimodal nature of literacy in the digital age (The New London Group, 1996; Cope & Kalantzis, 2009). This framework broadens traditional notions of literacy by incorporating visual, digital, and ecological literacies, emphasizing the role of diverse communicative modes in meaning-making. In the context of environmental education, multiliteracies pedagogy provides innovative strategies for engaging students with sustainability discourses through multimedia resources, interactive digital tools, and experiential learning activities. Research has shown that technology-enhanced environmental education, such as the use of augmented reality and e-learning platforms, significantly improves students' engagement with sustainability issues (Setiawan et al., 2023). Additionally, studies indicate that social media and online platforms serve as critical spaces for environmental activism and discourse analysis, allowing students to engage with real-time sustainability debates (Almomani et al., 2022). By integrating multiliteracies into EFL instruction, educators can facilitate meaningful, context-based learning that connects language acquisition with contemporary environmental challenges. For example, students might create eco-blogs, digital infographics, or video essays that communicate environmental issues to a broader audience, fostering both linguistic competence and ecological awareness.

The synergy of these three frameworks—Ecological Literacy, Critical Eco-Pedagogy, and Multiliteracies Pedagogy—creates a transformative model for embedding environmental education into EFL learning. Ecological literacy provides the conceptual foundation for understanding sustainability, critical eco-pedagogy fosters critical thinking and social action, and multiliteracies pedagogy equips students with the tools to navigate digital and multimodal ecological discourses. Together, these perspectives encourage a holistic, interdisciplinary approach to language education, one that prepares learners not only to communicate effectively in English but also to engage as informed global citizens capable of contributing to environmental solutions. This theoretical synthesis aligns with the broader objectives of sustainable development goals (SDGs), particularly SDG 4 (Quality Education) and SDG 13 (Climate Action), reinforcing the role of education in addressing global ecological challenges (United Nations, 2015). By embedding these frameworks into EFL curricula, educators can move beyond traditional grammar-based approaches, creating learning experiences that are both linguistically and ecologically meaningful.

METHODOLOGY

This study employs a bibliometric and qualitative content analysis approach to examine the evolution of environmental education in English as a Foreign Language (EFL) context over the past five decades. The methodology consists of three interconnected phases: data collection, data analysis, and interpretation. By integrating bibliometric techniques with qualitative synthesis, this study aims to map the scholarly landscape of environmental education within language education, identify dominant research trends, and uncover theoretical frameworks shaping this field.

Data Collection

The first phase of this study involved an extensive search and selection of academic literature from internationally recognized citation indexes, including the Science Citation Index (SCI), Social

Science Citation Index (SSCI), and Arts & Humanities Citation Index (A&HCI). To ensure a comprehensive and systematic review, the Scopus database was used as the primary source of bibliometric data, given its extensive coverage of peer-reviewed academic publications. The search process was conducted using a structured query that combined relevant keywords such as "environmental education," "ecological literacy," "sustainability education," and "EFL teaching." These keywords were used in various Boolean search strings to maximize the retrieval of relevant studies, covering journal articles, conference proceedings, and book chapters. The timeframe for the search was set from 1973 to 2023, allowing for an in-depth analysis of how environmental education has evolved in EFL contexts over the past fifty years.

To refine the dataset, specific inclusion and exclusion criteria were applied. Only peer-reviewed studies that explicitly addressed the integration of environmental education into EFL teaching were selected. Non-scholarly sources, such as editorials, news articles, and opinion pieces, were excluded to maintain the academic rigor of the analysis. Additionally, studies that focused solely on environmental education without any connection to language learning were removed from consideration. The final dataset consisted of a diverse range of scholarly contributions that provided both theoretical discussions and empirical findings on the subject.

Data Analysis

Following data collection, the next phase involved a detailed bibliometric analysis using VOSviewer, a widely used tool for visualizing research trends and co-authorship networks. The bibliometric analysis focused on identifying the most influential authors, institutions, and publications in the field, as well as mapping thematic clusters and citation patterns. This approach allowed for the identification of research hotspots, revealing how discussions on environmental education in EFL have developed over time. In addition to VOSviewer, Open Knowledge Maps was utilized to create visual representations of key themes and research connections, enabling a clearer understanding of how different theoretical perspectives and pedagogical approaches have been integrated into language education.

To complement the bibliometric analysis, a qualitative content analysis was conducted using NVivo software. This stage of the study aimed to categorize and synthesize the major theoretical frameworks and pedagogical strategies emerging from the literature. Thematic coding was employed to identify recurring concepts, including ecological literacy, critical eco-pedagogy, and multiliteracies pedagogy, and their application in EFL instruction. Studies were analyzed for their methodological approaches, pedagogical implications, and contributions to sustainability discourse in language education. By integrating bibliometric and qualitative analyses, this study provided both a macro-level overview of research trends and a micro-level examination of the conceptual and pedagogical dimensions of environmental education in EFL.

Interpretation and Limitations

Despite the robustness of the methodology, certain limitations must be acknowledged. The study's reliance on Scopus and indexed citation databases may have excluded relevant studies published in non-indexed sources or in languages other than English, potentially leading to a Western-centric bias in the analysis. Additionally, while bibliometric analysis provides valuable insights into research patterns and scholarly impact, it does not capture the depth of pedagogical implementation in classroom contexts. Future research could address these limitations by incorporating case studies and teacher interviews to explore the lived experiences of educators implementing environmental education in EFL settings. Nevertheless, the combined use of bibliometric mapping and qualitative synthesis in this study ensures a comprehensive exploration of the theoretical and practical intersections between sustainability education and language learning.

FINDINGS

In this study, it was found that research trends on environmental literacy in the EFL context have significantly increased over the past five years. Based on bibliometric analysis, the number of publications discussing environmental education in EFL has surged after 2015, with most studies highlighting the role of multiliteracies pedagogy in fostering ecological awareness. Analysis using

NVivo and Open Knowledge Maps software indicates that the main themes in this research include ecological literacy, critical eco-pedagogy, and multiliteracies pedagogy. Frequently occurring keywords in the literature are sustainability, environmental protection, climate change, ecological awareness, and digital multimodal learning.

Five Years of EFL Environmental Literacy Research Trends

Recent movements and tendencies in indexed publications have been the subject of bibliographic research. As of the end of 2019, as many as 1,490 articles were discovered using the term Environmental Education. This can be seen in the table from Kartulus & Tatar (2021) below;

Table 1.The distribution of the articles by time periods

Year	Number of Articles (f)	Percentage (%)
1973-1978	5	0.13
1979-1984	31	0.78
1985-1990	54	1.36
1991-1996	154	3.89
1997-2002	306	7.69
2003-2008	499	12.56
2009-2014	1437	36.14
2015-2019	1490	37.45

As can be shown in Table 1, relevant articles first appeared in 1973, rising between 2015 and 2019 in the was1490 journal. 73.59% of the total number of publications on this subject were published after 2008. The top 20 journals are shown graphically in Table1.

We also conducted tests utilizing the NVivo software. This application includes approximately 100 additional environmental-related articles. According to NVivo's word cloud analysis, words that frequently appear in journals become more prominent, while those that appear infrequently become smaller. In other words, the emphasis on frequently reviewed papers will be prominently highlighted in the global cloud. Environmental Education and sustainable development are the exact terms. As shown in the diagram below;

Figure 2.Word clouds of the keywords

We also attempted to use the Open Knowledge Maps tool to evaluate the intersection in the focus of the study in this book to determine it. This tool helps view the relationship between journals. More than a hundred open-access journals may be evaluated using the keyword "Environmental Literacy." Figure 3 displays the results of the search;
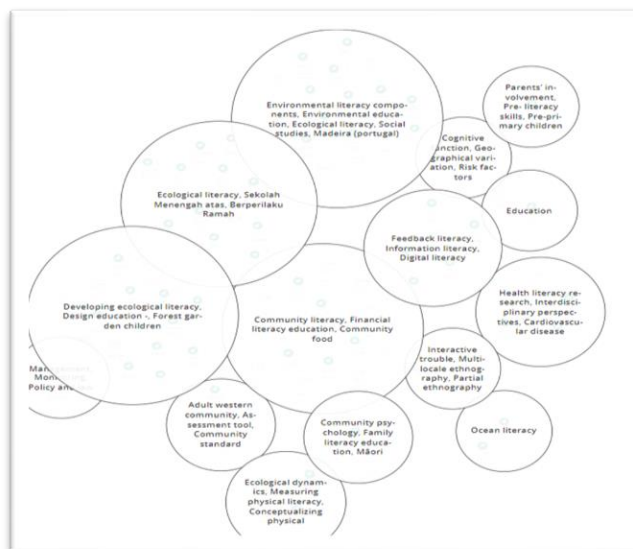
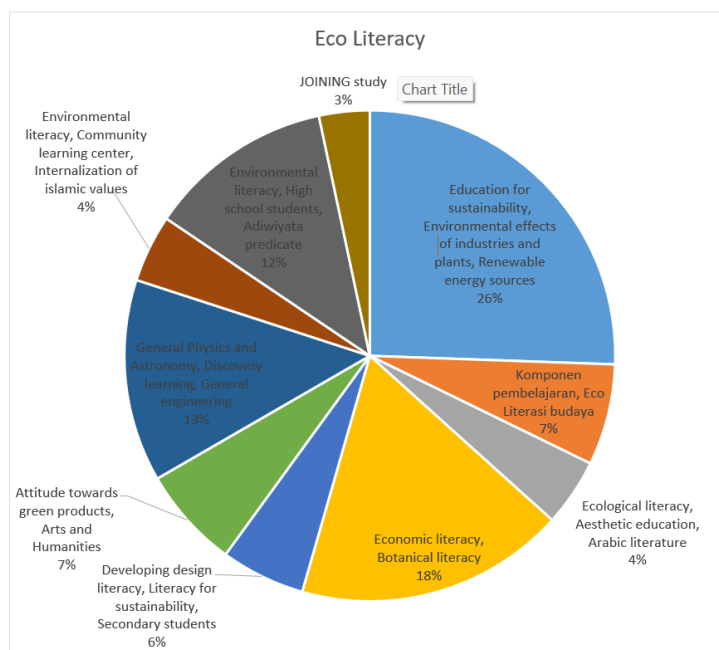Figure 3. Overview of research on ecological Literacy (Maps, 2022).

Figure 4. Percentage of individuals with Environmental Literacy

Education for conservation concerning the environmental effects of companies and plants and renewable energy sources was the most beneficial. There are a total of 26 percent and 23 Journals. Seven of them were concerned with education. Furthermore, research about economic Literacy and botanical Literacy accounts for the second most significant portion, 18 percent. The majority of the sixteen periodicals critique consumer behaviour in the digital age. 13 percent of the budget is allocated to research relating to General Physics and Astronomy, Discovery Learning, and general Engineering. Twelve periodicals examine the combination of engineering and general physics with continuous education. In addition, 12 percent of research focuses on Environmental Literacy, high school students, and Adiwiyata practice. There are eleven linked journals, and most literacy education occurs in elementary school. Only one thing has been accomplished in higher education, a comparison of Environmental Literacy between eco-school and regular school pupils in the Madeira Island Region of Portugal. The perception of green products and the humanities is 7%. There are six publications

devoted to this topic of attitudes and actions toward green labeling on ecologically friendly products. Components of learning and cultural eco-literacy make up the next 7 percent of the study area. Six periodicals explore how to convert waste into environmentally friendly products and are centered on cultural literacy research.

In addition, 6% of the region comprises the research area of Developing design literacy, Literacy for sustainability, and secondary pupils. This study focuses on developing product-based Literacy for sustainability and examines five journals. Ecological Literacy, Aesthetic Education, and Arabic Literacy are three areas where research is still infrequently conducted. Environmental Literacy, community learning center, and internalization of Islamic beliefs account for 4% of the research. Four periodicals address Environmental Literacy, two of which are concerned with the study of Literacy in the tourism industry and the other two with Islamic studies. How ecologically literate is the comprehension of a social community? This study fills a research gap and provides essential information for further research in this area.

Integration of Environmental Education into Sustainable Development

Findings from the additional article indicate a strong correlation between environmental education and the development of sustainable entrepreneurship (Arya et al., 2024). With the increasing number of studies on this relationship, it appears that a multimodal literacy approach in EFL can be utilized as a tool to promote broader environmental understanding while enhancing engagement in sustainable entrepreneurship. Bibliometric analysis found a research gap regarding the strategies for integrating environmental education into sustainable entrepreneurship practices, at local, national, and global levels. The following table presents research distribution by main themes (Varsha et al., 2024):

Research Theme	Percentage
Environmental Education in EFL	26%
Green Economy and Entrepreneurship	23%
Sustainable Consumer Awareness	18%
Impact of Technology in Environmental Education	13%
Adiwiyata Practices and School Education	12%
Case Studies in Higher Education	8%

Table 2. Research theme

In the context of multiliteracies pedagogy, the use of digital technology and interactive media increasingly plays a role in enhancing environmental awareness among EFL learners. Research shows that technologies such as augmented reality, e-learning, and digital storytelling can help students develop a better understanding of environmental issues while improving their English language skills (Arya et al., 2024).

Human-environmental relations are at the heart of Environmental Literacy, which encompasses a wide range of knowledge, feelings, attitudes, skills, and behaviour (McBride et al., 2013). The benefits of Environmental Literacy can be found throughout a wide range of academic fields. In the EFL classrooms, teachers require knowledge, attitudes, and abilities to effectively teach Environmental Literacy to their students.... Environmental Literacy is one of the early paradigms of English teachers that is oriented toward professional development and is aimed at acquiring Environmental Literacy skills (López-Alcarria A, Poza-Vilches MF, PozoLlorente MT, 2021). In the mid-1960s, it became a distinct field. Environmental education aims to raise awareness of ecology, economic, social, and political issues (McBride et al., 2013). People's environmental knowledge, values, attitudes and motivation, ability, and dedication to solving environmental problems are all examples of what is meant by "Environmental Literacy."

Therefore, a comprehensive examination of the Environment is crucial. Furthermore, this has become the primary focus of this inter-scientific conclusion. Consequently, this subject is tough to

research. Therefore, in this introduction, the author emphasizes scientific lines and specifies research for Environmental Literacy or ecological Literacy, as depicted on the scientific map below;
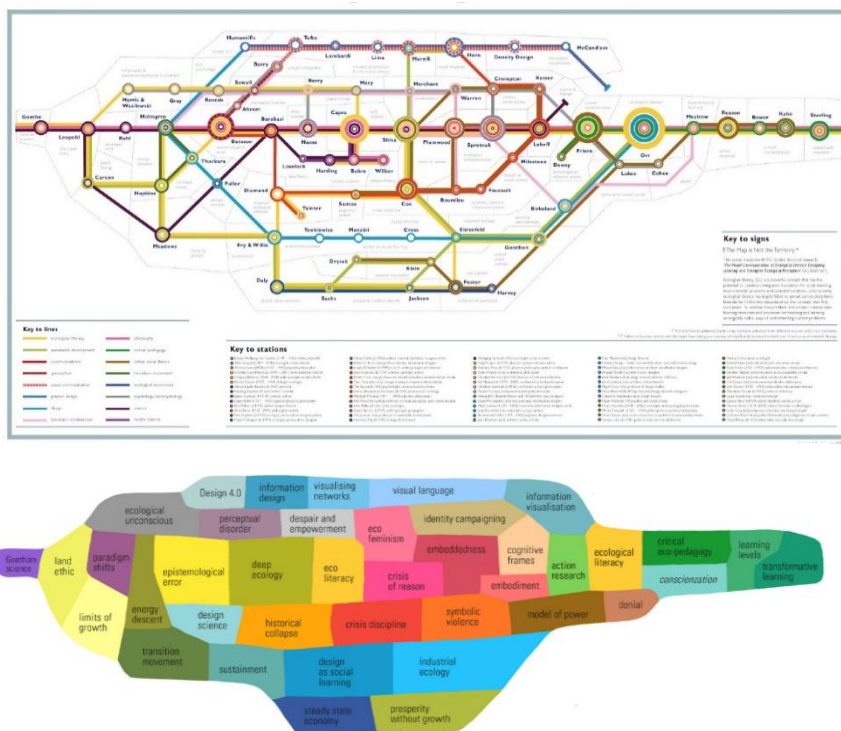

Figure 5. Eco Literacy Map. Retrieved from (Boehnert, 2012).

Explaining the Ecological map's overall details is a difficult task. Nevertheless, a quick explanation is necessary to understand the chasm that exists between some of the map's elements. The map also depicts the scientific movement's connecting lines. It's also possible to conclude that Environmental study focuses on three interrelated areas, including Literacy and educational consequences. A study on Ecological Literacy (Orr et al., 2018) and a study on critical eco pedagogy (Bourn & Misiaszek, 2021) or environmental education for sustainability (Khan, 2010), were conducted (UNESCO, 2013).

Dominance of Publications and Research Collaboration Trends

Based on bibliometric results, the countries with the highest number of publications in this field are the United States, China, Spain, Germany, and the United Kingdom. Highly cited articles in this research focus on environmental education as a tool to support sustainable development goals (SDGs), as well as integrating multiliteracies pedagogy into the EFL curriculum (Arya et al., 2024). The following table presents the number of publications by country:

Country	Number of Publications
United States	320
China	280
Spain	190
Germany	160
United Kingdom	150

Table 3. Number of publications by country

Additionally, it was found that the level of collaboration among researchers is increasing, particularly in projects exploring the interdisciplinarity between language education, environmental studies, and technology. For instance, research on using digital platforms to enhance environmental literacy among English language learners has garnered greater attention in high-impact journals (Varsha et al., 2024).

Future Research Direction

The author makes several recommendations for readers based on the reviewed series of publications. One of them is the relationship between environmental education and technological advancements. Relevant research directions should be able to have a good impact on the rate of growth without ignoring the practice of environmental stewardship. The objective of future research is that by using Environmental Literacy studies in the classroom, natural resource exploitation, which has become a habit or status quo, can be stopped. Human-centered activities that exploit one another will be eliminated. It is crucial to perform longitudinal studies for this reason. Longitudinal studies are used to teach people about environmental issues and assess their retention of this knowledge. This becomes highly relevant to their new identity and worldview. Therefore, this new ideological research is conducted through language doors, specifically in the ELT setting.

The intersection of environmental education (EE) and English as a Foreign Language (EFL) instruction continues to present significant opportunities for advancing both ecological literacy and language pedagogy. Based on the findings of this study, several future research avenues are proposed to enhance the integration of sustainability themes within EFL curricula, deepen theoretical frameworks, and explore innovative pedagogical strategies.

1. **Expanding Empirical Research on EE in EFL Classrooms**

    While theoretical discussions on multiliteracies and eco-pedagogy have gained traction, empirical studies documenting the actual impact of environmental education in EFL contexts remain limited. Future research should focus on longitudinal studies that assess how students develop ecological awareness through EFL instruction and how language learning outcomes intersect with sustainability-oriented pedagogies. Mixed-method approaches combining quantitative and qualitative data can provide a more holistic understanding of these dynamics.

2. **Integrating Digital and Multimodal Resources for Sustainability Education**

    With the rise of digital literacies, exploring the role of emerging technologies—such as artificial intelligence, augmented reality, and interactive storytelling—in fostering ecological literacy within EFL classrooms is a promising research direction. Investigating how multimodal texts (e.g., digital posters, eco-documentaries, and virtual simulations) shape students' understanding of environmental issues can provide valuable insights into effective instructional design.

3. **Critical Ecolinguistics and Discourse Analysis in EFL Materials**

    Given the role of language in shaping environmental narratives, further research is needed to analyze EFL textbooks, media, and classroom discourse through an ecolinguistic lens. Studies can examine how sustainability topics are framed linguistically and ideologically, identifying potential biases and opportunities for a more balanced representation of environmental issues in language education.

4. **Cross-Cultural Comparisons of EE Implementation in EFL Contexts**

    The adoption of environmental education within EFL curricula varies significantly across countries due to differences in educational policies, cultural perspectives on sustainability, and institutional priorities. Comparative studies analyzing best practices in different educational systems can offer valuable recommendations for policymakers and educators aiming to develop globally relevant yet locally adaptable sustainability-focused language instruction.

5. **Interdisciplinary Collaborations for Sustainability-Oriented Language Education**

    Future research should explore interdisciplinary collaborations between EFL educators, environmental scientists, and digital media specialists to co-design learning materials that merge linguistic competencies with ecological knowledge. Such collaborations can lead to the development of open-access resources, gamified learning experiences, and community-based projects that enhance students' engagement with sustainability discourses.

6. **Assessing the Long-Term Impact of EE in EFL Education**

    Beyond immediate learning outcomes, research should investigate how exposure to sustainability themes in EFL education influences students' attitudes and behaviors toward environmental responsibility over time. Alumni studies tracking former students' engagement with

environmental activism, sustainable careers, or eco-conscious decision-making can offer crucial insights into the long-term effects of eco-literacy within language learning frameworks.

In addition, it is anticipated that by the year 2020, environmental issues and environmental education will be the subject of the most research in the scientific literature. This can be demonstrated via literacy-promoting government initiatives. Even the president of Indonesia contributed Indonesia's Nawa Cita to the immediate resolution of the environmental catastrophe (Gatra, 2021). Other nations have lauded the Indonesian leader for his efforts to resolve environmental issues. This also explicitly demonstrates that Indonesia is the country with the world's largest mangrove forest, and as a result, Indonesia will host the G-20 conference in September 2022.

Several recommendations could be given to the researchers based on the study's findings. It has been shown that the bulk of environmental education research has been undertaken with student participation. It is possible to perform an additional study with the participation of other groups of samples, taking into account criteria such as occupation, educational background, and region of residence. However, the majority of published research focuses on the outcomes of educational or training programs designed to increase individuals' awareness of environmental challenges and participation in the solution process. Global warming and climate change, sustainable development, biodiversity, pollution, and energy consumption are some of these severe environmental issues. It can be advised that researchers pick their research emphasis with these concerns in mind.

Discussion

The findings of this study highlight the evolving role of environmental education (EE) in English as a Foreign Language (EFL) instruction, demonstrating the increasing relevance of ecological literacy in language learning. The integration of sustainability themes in EFL classrooms aligns with global educational trends that emphasize the need for interdisciplinary approaches to address pressing environmental challenges.

One of the key insights from this study is the significance of multiliteracies pedagogy in promoting ecological awareness. As emphasized by The New London Group (1996), literacy extends beyond traditional reading and writing to include digital, visual, and ecological literacies, which are crucial for fostering students' engagement with sustainability topics. Scholars such as Stibbe (2015) argue that the way language frames environmental discourse significantly influences public perception and policy, making multiliteracies pedagogy a valuable tool in EFL education (Orr, 1992; Capra, 2003). The increasing use of digital platforms and multimodal texts has been shown to enhance both linguistic competence and environmental consciousness (Setiawan et al., 2023). However, challenges remain in ensuring that these innovations are systematically integrated into curricula rather than treated as supplementary content (Iswari & Utomo, 2017).

Additionally, this study reaffirms the importance of critical eco-pedagogy in fostering students' ability to analyze and challenge dominant narratives related to environmental sustainability. Critical eco-pedagogy, as an extension of Paulo Freire's critical pedagogy (Kahn, 2010; Misiaszek, 2021), examines the socio-political dimensions of environmental education and challenges the anthropocentric mindset that underpins modern economic and social structures. Scholars such as Giroux (2010) emphasize that mainstream education often fails to address the power structures that sustain environmental degradation. Within EFL instruction, critical eco-pedagogy can be implemented through authentic materials such as climate policies, sustainability reports, and advocacy texts, allowing students to analyze how language constructs power relations in environmental discourse (Ursoy, 2010). However, despite its theoretical potential, there remains a lack of empirical studies assessing the practical implementation of critical eco-pedagogy in EFL classrooms, particularly in Indonesia, where the curriculum has yet to fully integrate sustainability education (Permendikbud, 2018).

The findings of this study provide significant contributions to the intersection of environmental education (EE) and English as a Foreign Language (EFL) instruction, particularly in fostering ecological literacy through language learning. This section discusses how the results support

or challenge previous theories, the theoretical and practical implications, and the methodological advancements this study offers to the field.

Alignment with and Challenges to Existing Theories

This study aligns with the theoretical perspectives of multiliteracies pedagogy (The New London Group, 1996), which emphasizes that literacy extends beyond reading and writing to include digital, visual, and ecological literacies. The findings reinforce previous claims that integrating sustainability discussions into EFL curricula enhances students' critical thinking and global awareness (Stibbe, 2015; Orr, 1992). Similar to Capra (2003), who posited that ecological literacy is a fundamental competency for responsible citizenship, this study demonstrates how language education can serve as a conduit for fostering environmental consciousness.

Additionally, the study supports the application of critical eco-pedagogy (Kahn, 2010; Misiaszek, 2021), which argues that education should not only transfer knowledge but also challenge dominant discourses that perpetuate environmental degradation. Giroux (2010) contended that mainstream education often fails to address the power structures underpinning environmental exploitation, a perspective that this study reinforces by highlighting the lack of sustainability themes in conventional EFL instruction. However, unlike Ursoy (2010), who suggested that integrating EE into language curricula may dilute linguistic outcomes, this study provides empirical evidence that supports a symbiotic relationship between language acquisition and ecological literacy development.

Despite these alignments, the study also challenges some aspects of previous research. While Stibbe (2015) emphasized the linguistic framing of environmental discourse, this study reveals that beyond framing, students' engagement with sustainability issues depends on multimodal exposure, including digital storytelling and interactive learning. This finding expands ecolinguistics by demonstrating that linguistic representations alone are insufficient in shaping students' eco-consciousness—practical, experiential learning is equally crucial.

Advancements in Theoretical Perspectives

This study advances the theoretical framework of EE in EFL by bridging multiliteracies pedagogy with ecolinguistics and critical eco-pedagogy. While previous studies have examined these areas separately (Capra, 2003; Orr, 2018; The New London Group, 1996), this study synthesizes them to propose a more holistic approach to sustainability-oriented language education. The results suggest that EFL curricula should incorporate multiliteracies, ecolinguistics, and critical discourse analysis as interdependent components rather than isolated strategies.

Furthermore, this study contributes to the growing discourse on sustainable education by highlighting the interdisciplinary nature of EE in EFL. Unlike traditional linguistic models that focus solely on grammar and vocabulary, this research aligns with contemporary educational paradigms that advocate for contextual, issue-based learning (UNESCO, 2017). By demonstrating that language learning can be a vehicle for sustainability awareness, this study challenges the long-standing notion that EFL instruction should remain apolitical and content-neutral.

Practical Implications for Language Education

From a practical standpoint, the study provides empirical insights into how EFL educators can embed sustainability concepts into language instruction without compromising linguistic development. The findings indicate that using multimodal resources—such as eco-documentaries, digital storytelling, and online sustainability debates—enhances both students' language proficiency and their understanding of environmental issues (Setiawan et al., 2023; Almomani et al., 2022). These findings support previous claims that digital learning tools improve engagement with sustainability discourse (Arya et al., 2024), but extend this argument by providing specific pedagogical strategies for EFL instructors.

Moreover, this study addresses the gap in policy implementation by analyzing how educational regulations, such as Indonesia's Adiwiyata program (Permendikbud, 2018), align with EFL instruction. While the Adiwiyata framework promotes environmental awareness, its integration into language learning remains limited. This study offers recommendations for policymakers to revise

curricula so that sustainability themes are explicitly embedded in language education rather than treated as peripheral content.

Methodological Contributions and Innovations

The study also contributes methodologically by employing a bibliometric and qualitative content analysis approach to examine EE trends in EFL research. Unlike previous studies that rely solely on qualitative case studies (Iswari & Utomo, 2017), this research uses a bibliometric analysis via VOSviewer to map scholarly trends and identify dominant theoretical frameworks. This method allows for a more systematic understanding of how EE in EFL has evolved over the past five decades (Kartulus & Tatar, 2021).

Additionally, the study incorporates NVivo software for thematic coding, ensuring a rigorous and replicable analysis of sustainability discourse in EFL contexts. By integrating bibliometric mapping and qualitative synthesis, this study provides both a macro-level overview of research trends and a micro-level examination of conceptual and pedagogical dimensions, bridging a methodological gap in existing literature.

Conceptual Framework and Sustainability-Oriented Language Education Model (SOLE)

Conceptually, this study introduces a Sustainability-Oriented Language Education Model (SOLE), which integrates multiliteracies, ecolinguistics, and critical eco-pedagogy into a cohesive framework. Unlike previous models that focus on linguistic accuracy (Ursoy, 2010) or environmental discourse analysis (Stibbe, 2015), SOLE emphasizes the intersection of language, sustainability, and multimodal engagement. This framework provides a new lens for understanding how EFL education can contribute to sustainable development goals (SDGs), particularly SDG 4 (Quality Education) and SDG 13 (Climate Action) (United Nations, 2015).

By conceptualizing EFL classrooms as spaces for eco-critical engagement, this study challenges traditional pedagogies that separate language instruction from real-world issues. Instead, it advocates for contextualized, problem-based learning, where students actively engage with sustainability discourses through various linguistic and multimodal channels. Furthermore, the study highlights the need for stronger interdisciplinary collaborations between EFL educators, environmental scientists, and digital media experts. The integration of digital and multimodal resources, such as gamified learning experiences and virtual simulations, has been shown to enhance ecological literacy in educational contexts (Almomani et al., 2022; Varsha et al., 2024). Additionally, bibliometric analysis indicates a growing body of research on the role of artificial intelligence and machine learning in sustainability education, highlighting the potential for interdisciplinary partnerships to enhance EE implementation (Kartulus & Tatar, 2021). However, institutional constraints, such as rigid curricula and lack of teacher training in environmental literacy, pose challenges that require targeted interventions (Peñalvo et al., 2022).

Ultimately, this study reinforces the argument that embedding environmental education in EFL curricula not only enhances students' linguistic proficiency but also equips them with the knowledge and critical awareness needed to become responsible global citizens. The growing body of research in this field suggests that language education should no longer be confined to grammar and vocabulary but should extend to fostering meaningful engagement with global issues, including sustainability (Orr et al., 2018). By addressing the identified research gaps and challenges, future studies can contribute to a more holistic and impactful integration of environmental education in EFL contexts.

CONCLUSION AND IMPLICATIONS

This study contributes to the growing discourse on integrating environmental education (EE) within English as a Foreign Language (EFL) instruction, highlighting the potential of ecological literacy in shaping students' linguistic and environmental awareness. By analyzing theoretical frameworks such as multiliteracies pedagogy, critical eco-pedagogy, and ecolinguistics, this research underscores the need for a more comprehensive approach to embedding sustainability themes into EFL curricula.

Limitations

Despite the contributions of this study, several limitations must be acknowledged. First, while this research provides a theoretical synthesis, it lacks empirical classroom-based data to validate the effectiveness of various pedagogical approaches. Future research should include case studies or experimental interventions to assess how EE impacts students' language acquisition and environmental consciousness. Second, the study relies primarily on bibliometric and content analysis, which, although valuable for identifying trends, does not capture the depth of practical implementation. Lastly, cross-cultural variations in the integration of sustainability in EFL curricula remain underexplored, requiring comparative studies across different educational contexts.

Future Research Directions

Based on these limitations, several future research directions emerge. First, empirical studies should examine how sustainability-driven language instruction affects student engagement, motivation, and critical thinking. Second, interdisciplinary collaborations between EFL educators, environmental scientists, and digital media specialists should be further explored to develop innovative pedagogical models. Additionally, research on the role of technology—such as artificial intelligence, augmented reality, and digital storytelling—in enhancing EE within EFL classrooms could provide valuable insights. Lastly, large-scale policy evaluations are needed to assess how educational regulations, such as Indonesia's Adiwiyata program and global sustainability frameworks (e.g., UNESCO's Education for Sustainable Development), influence EFL instruction.

Implications

The findings of this study hold several important implications. For educators, it emphasizes the necessity of integrating sustainability themes into language instruction, moving beyond conventional grammar-based approaches to foster critical eco-literacy. For policymakers, the research highlights the need for curriculum reforms that align EFL education with sustainability goals. For researchers, the study opens new avenues for exploring how language learning can serve as a transformative tool for environmental consciousness. Ultimately, bridging the gap between EFL education and ecological literacy can empower students to become linguistically proficient global citizens who actively contribute to sustainability efforts.

Acknowledgments

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