

Ecopedagogy in Educational Research with Reflections for ELT: A Bibliometric Analysis

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Abstract

Protecting the environment has become a prominent issue globally in recent years. It is now obvious that careless use of environmental resources will result in social, economic, and environmental problems. At this point, it is important to integrate environmental issues into education. Therefore, by conducting a bibliometric analysis of the literature on ecopedagogy, the purpose of this study is to review and determine the significance of ecopedagogy in the field of education, along with insights for English language teaching. This study adds significantly to the existing research on ecopedagogy by analyzing the current situation, pointing out areas that require improvement, and outlining potential directions for future research. The study entailed keywords related to ecopedagogy during the period of 2014 to 2024 in the Web of Science platform (SSCI, SCI, SCI-E, and AHCI). Data was gathered by a data extraction table from 374 articles. This extended bibliometric analysis reveals notable insights in the field of ecopedagogy. The findings indicate that ecopedagogy is crucial for equipping students to address global challenges, including biodiversity loss, environmental justice, and climate change. The study highlights the need for interdisciplinary collaboration, and that an actual collaboration of pedagogy, environmental science, social studies and languages can contribute considerably to improvement of ecopedagogical research and practice. Nonetheless, the analysis also reveals regional and thematic gaps in ecopedagogy research suggesting a need for more studies exploring ecopedagogical theories and practices in different cultural and socioeconomic contexts. This type of research would provide further evidence for the worldwide effectiveness of ecopedagogy to encourage students to actively engage in sustainability and social justice issues in their communities.

Keywords: Ecopedagogy, critical pedagogy, sustainability, bibliometric analysis.

Eğitim Araştırmalarında Ekopedagoji ve İngiliz Dili Eğitimi İçin Yansımalar: Bibliyometrik Bir Analiz

Öz

Çevrenin korunması son yıllarda küresel çapta öne çıkan bir konu haline gelmiştir. Çevresel kaynakların dikkatsiz kullanımının sosyal, ekonomik ve çevresel sorunlara yol açacağı artık aşikârdır. Bu noktada çevre konularının eğitime entegre edilmesi önem kazanmaktadır. Bu nedenle, ekopedagoji üzerine yapılan literatürü bibliyometrik bir analizle inceleyerek, bu çalışmanın amacı ekopedagojinin eğitim alanındaki önemini değerlendirmek ve İngilizce öğretimi için çıkarımlar sunmaktır. Bu çalışma, mevcut durumu analiz ederek, geliştirilmesi gereken alanlara işaret ederek ve gelecekteki araştırmalar için potansiyel yönleri belirleyerek ekopedagoji üzerine mevcut araştırmalara önemli ölçüde katkıda bulunmaktadır. Çalışma, 2014-2024 yılları arasında Web of Science platformunda (SSCI, SCI, SCI-E ve AHCI) ekopedagoji ile ilgili anahtar kelimeleri içermektedir. Veriler, 374 makaleden bir veri çıkarma tablosu ile toplanmıştır. Bu genişletilmiş bibliyometrik analiz, ekopedagoji alanında önemli içgörüler ortaya koymaktadır. Bulgular, ekopedagojinin öğrencileri biyoçeşitlilik kaybı, çevresel adalet ve iklim değişikliği gibi küresel zorlukları ele alacak şekilde donatmak için çok önemli olduğunu göstermektedir. Çalışma, disiplinler arası işbirliğine duyulan ihtiyacı ve pedagoji, çevre bilimi, sosyal bilgiler ve dillerin gerçek bir işbirliğinin ekopedagojik araştırma ve uygulamaların geliştirilmesine önemli ölçüde katkıda bulunabileceğini vurgulamaktadır. Bununla birlikte analiz, ekopedagoji araştırmalarındaki bölgesel ve tematik boşlukları da ortaya koymakta ve farklı kültürel ve sosyoekonomik bağlamlarda ekopedagojik teori ve uygulamaları inceleyen daha fazla çalışmaya ihtiyaç duyulduğunu göstermektedir. Bu tür araştırmalar, öğrencileri kendi toplumlarında sürdürülebilirlik ve sosyal adalet konularına aktif olarak katılmaya teşvik eden ekopedagojinin dünya çapındaki etkinliği için daha fazla kanıt sağlayacaktır.

Anahtar kelimeler: Ekopedagoji, eleştirel pedagoji, sürdürülebilirlik, bibliyometrik analiz.

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INTRODUCTION

As environmental problems continue to threaten the ecosystems, biodiversity, and wellbeing of humans and non-human animals, there is a greater need for anticipatory educational solutions. Environmental issues are the problems which threaten the ecosystem and life on earth. They influence the natural life, health and well-being of humans and organizations. Climate change, loss of biodiversity, air pollution, water pollution and overpopulation are some of these problems. Through education and scientific research, people learn more about environmental problems and the ways to reduce these problems. The key factor in raising public awareness and environmental preservation initiatives is cooperation among civil society and organizations.

Based on the Freirian principle, ecopedagogy aims to provide students with profound knowledge and awareness of environmental issues (Misiaszek, 2023). As ecopedagogy takes a holistic view of the world and requires collaborative actions from different sectors and disciplines English language teaching (ELT) has the responsibility to address ecological problems and raise awareness in the community. ELT has the opportunity to increase learners' awareness by incorporating environmental issues into the courses and course materials. The application of ecopedagogy in ELT is necessitated by the desire to respond to environmental issues globally and foster a sense of responsibility among learners. The transformation is being realized in many learning settings, as ecopedagogy is being adopted to promote language and ecological literacy.

Literature Review

Within the larger context of environmental education, ecopedagogy is a critical pedagogical approach which is considered as part of critical pedagogy, and it is described as a teaching approach aiming to teach not only language and culture but also to critically analyze the circumstances in which language is used as well as the social, cultural, and ideological intentions behind its use (Weaver, 2006). This approach encourages learners to critically analyze prevailing narratives and comprehend the power dynamics inherent in environmental discourse, with the objective of fostering sustainable and equitable practices. The main aim of ecopedagogy is to enable individuals and communities to engage actively in environmental discussion (Misiaszek, 2023). Additionally, this concept in education emphasizes the connection between human behavior and environmental health and it encourages learners to act according to the environmental consequences of their preferences (Dana & Saraçlı, 2019). Besides disseminating environmental consciousness; it may bring a change in attitudes and behaviors for a sustainable lifestyle. Through the lens of bibliometric analysis, examining its development as an academic and practical field helps to explicate insights, trends, influential researchers, and the extent of the research on ecopedagogy. The growth of ecopedagogy, its cross-disciplinary impact, and the key issues shaping its current and future pathways can be comprehended in detail through bibliometric analysis.

Environmental education has previously been explored through bibliometric and meta-analytical studies. (e.g. Onopriienko et al., 2021; Lasino et al., 2023; Lopes et al., 2024; Şeker & Önal, 2024;). Most such analyses focus on early childhood education or adults and youth examining subjects such as curriculum planning and pedagogy. While they indicate a growing interest from academia in environmental education and a concern for the need for interdisciplinary collaboration, they should be pointed out as not specifically addressing ecopedagogy or its connection to ELT. This is an indication of a gap in literature and a reaffirmation of the need for specialized research bridging ecopedagogical principles with ELT practice.

Critical pedagogy, as explained by Paulo Freire (1970), centers on education as the agent of social transformation by cultivating critical consciousness among learners. Critical pedagogy opposes the dominant ideologies, resists oppressive relations, and demands emancipatory praxis through dialogue and critical reflection (Freire, 1970; Giroux, 1988). Ecopedagogy further expands the principles of critical pedagogy to include ecological and environmental dimensions of social justice (Kahn, 2010). Rather than perceiving environmental education as neutral or technical, ecopedagogy situates ecological issues within political, cultural, and moral contexts, encouraging educators to confront the systemic origins of environmental crises (Misiaszek, 2016). Thus, ecopedagogy is in line with Freirean philosophy in trying to empower learners not only to understand environmental problems, but also to produce emancipatory action toward sustainability and ecological justice. Briefly, ecopedagogy is grounded in critical and transformative action (Misiaszek, 2020) — aligning the primary goal of teaching to bring about social and environmental justice as proposed by Paulo Freire. A sustainable world needs empowerment of learners' language use, therefore teaching environmental issues has to be done from

different perspectives. The aim of ecopedagogy can be stated and conceptualized as defining wellbeing and justice to emerge only through sustainable interaction between human beings and nature. This is closely linked with the field of ecolinguistics, which is defined as the study of language and ecology. The notion is rooted in our understanding that ideas often translate into actions; hence, words can help humans to engage in environmental protection (Stibbe, 2021). Language has a significant role in not only enunciating the relationship among human beings but also decoding how they interact with the environment (Wu, 2018). Since ecolinguistics investigates the relation between human beings and their environment, it can help students to critically analyze environmental problems (Zia et al., 2023). According to The International Ecolinguistics Association, ecolinguistics focuses on the function of language between humans and the natural world. The association further explains that the goal of ecolinguistics is to create linguistic theories which consider people as part of the ecologic system and how language can be used to address environmental problems. When language learning is concerned, ecolinguistics provides teachers with real life issues to integrate into their teaching and give them the opportunity to guide learners in protecting the environment for a sustainable life. Additionally, when learners are engaged in linguistics and environmental issues, their educational outcomes will be enriched promoting global citizenship (Mühlhäusler & Peace, 2006).

Ecolinguistics helps to enhance language awareness of learners to empower education for sustainable development (ESD). ESD aims to help people and their communities to understand and analyze social, economic, and environmental aspects of sustainability and to provide them with a sustainable life (UNESCO, 2017; Reid, 2002). Making ESD part of language teaching theories and methods leads to a paradigm shift which enables students to deal with environmental problems (Yu et al., 2024). This is supported by transformative learning theory because it encourages students to engage critically with environmental problems and hence create a more sustainable world (Yu et al., 2024). By combining students' language skills with environmental topics, ecolinguistics offers broader educational goals regarding protecting the environment and being a responsible citizen. Integrating sustainability into education does not only improve quality of environment but also quality of life (Anyolo et al., 2018). In this regard, ELT provides an ideal platform to incorporate sustainability into education by discussing environmental challenges (Kanwal, 2024). Language teaching entails more than teaching grammar and vocabulary as it shapes students' attitudes, behaviors, and perspectives (Bekteshi & Xhaferi, 2020). First of all, ELT tends to apply content-based instruction, which facilitates the involvement of teachers in using authentic themes such as climate change, environmental justice, and sustainability in communicative language tasks. Second, as the English language is a world lingua franca, ELT classrooms provide a context for exploring global perspectives and fostering intercultural sensitivity toward global ecological concerns. Third, students can improve their critical thinking and problem-solving skills by working on topics related to sustainability, such as biodiversity, climate change, and pollution.

There has been a growing body of research on ecolinguistics and sustainability in recent years and more recently these constructs have been integrated into language teaching. The aim of this study is to analyze and identify the research regarding ecopedagogy. Therefore, bibliometric analysis was conducted to investigate the research on ecopedagogy by reporting data in a meticulous manner. Bibliometric analysis is used to systematically evaluate scientific outputs derived from the examination of research on a particular topic by making use of statistical analysis to assess variables such as number of articles per year, predominant research topics, leading journals in the field, most profiling authors, number of citations and keywords (Ellegaard & Wallin, 2015). Bibliometric analysis, in contrast to alternative review methodologies, utilizes a macro-level perspective and uncovers the structure and dynamics of a study domain (Öztürk, 2021).

Recent research has indicated that ecopedagogy based learning can enhance student eco-literacy and environmental involvement. Considering this, the present paper offers a comprehensive bibliometric overview which outlines trends, foundational works, and emerging directions in the field; and this may yield significant insights for academics and educators who are focused on ecopedagogy in ELT. The study addresses the following research questions:

1. What are the publication trends in ecopedagogy within ELT categorized by year, country, and institution?
2. What are the leading journals and authors in ecopedagogy in ELT from 2014 to August 2024?
3. What are the keywords within ecopedagogy in ELT From 2014 to August 2024?
4. What are the most frequently used words in titles and abstracts within ecopedagogy in ELT from 2014 to August 2024?

METHOD

Research Design

The present study implemented a bibliometric analysis in an attempt to visualize the current research trends of “ecopedagogy” with insights for “ELT” framework. Bibliometric analysis has been widely regarded as a powerful tool in knowledge domain mapping and has been utilized in several academic fields to evaluate scientific output in terms of quantity, impact, and thematic structures (Van Eck & Waltman, 2017). In this case, it is allowed to have an overall grasp of how ecopedagogy has evolved over time.

Technique Used

Scientific mapping method was used to analyze and evaluate authors, publication trends, journals, countries, and keywords in the published literature in terms of ecopedagogy in various fields of education (Chen & Abdullah, 2024). Based on this, research on the works published during the last 10 years was investigated, starting from 2014 until December 2024. The method is primarily preferred in bibliometric studies because it gives the researcher an opportunity to systematically manage big datasets and discover the patterns hidden in the academic landscape (Donthu et al., 2021).

Search Protocol

The methodological step for achieving the objectives of this research was performed in two stages: First, the relevant documents were identified by systematic searches in academic database, “Web of Science”. This has been a very important selection criterion so that the quality and relevance of the research study are maintained in accordance with the best practices that exist in bibliometric research (Zupic & Čater, 2015). From an initial search, 10,929 publications were generated. Then, a retrieval protocol was employed to ensure the maximum selection of appropriate publications included in this study. This data filtering protocol included four categories: time span (2014-2024), document type, exact keywords, language, Web of Science Index (ESCI, SSCI, SCI-Expanded, and A&HCI), and Research Areas (Education Educational Research). From the above filtering, 374 publications, as depicted in Figure 1, were considered appropriate for considerations within the context of this study. These selected articles then underwent processing in VOSviewer in order to develop visualization maps of keywords, authors, and journals that might be useful in exploring the research landscape. Using the binary counting technique, co-occurrence of keywords was mapped, which gave insights into the most central topics and subthemes in ecopedagogy research (Van Eck & Waltman, 2017). In his seminal work on bibliometrics, Pritchard (1969) pointed out that analysis of co-occurrence data allows discovery of relations between research areas not easily seen otherwise. The above approach made noticeably clear both the theoretical and practical orientations of the field, complementing thereby the results of this study.

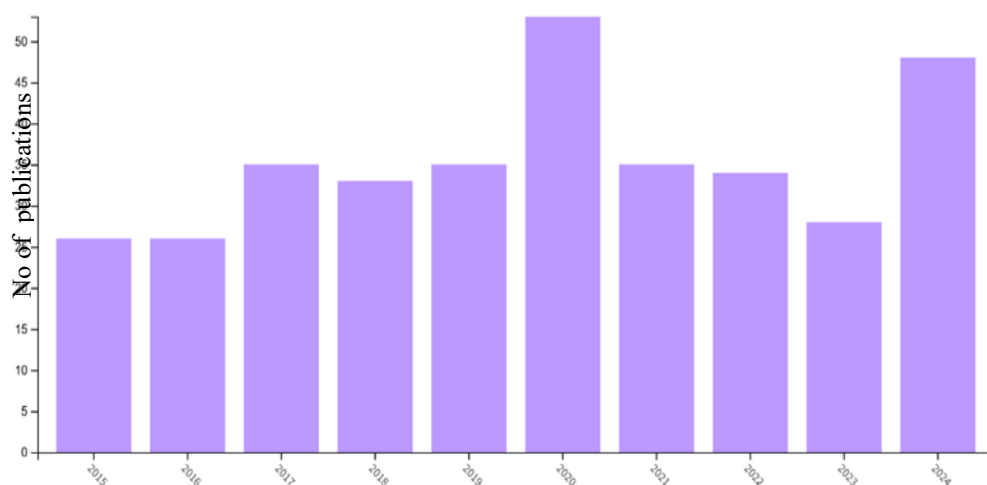


Figure 1. *Publication Years*

Software

VOSviewer software tool was used to analyze data such as authors' keywords and the most frequent keywords from the title and abstract. Moreover, this tool has also made it possible to develop scientific maps that represent the relationships among the keywords in visual form. This study has chosen VOSviewer due to the fact that it maintains one of the most advanced capabilities in the construction and visualization of bibliometric networks, thus offering a more effective and straightforward way of representing connections between keywords and research trends (Van Eck & Waltman, 2010).

FINDINGS

Publication Trend by Year

A total of 374 publications were found using the search protocol. As illustrated in Figure 1, ecopedagogy was in its early developmental stages between 2015 and 2019. However, there is a significant increase in 2020, with 53 publications. From that point onwards in those years, there was a slight decrease in 2021 and 2022, although the levels are still above what was obtained before 2017. In 2023, there is a noticeable decrease, which may result from the challenges on educational priorities, availability of resources, or competing demands in the curriculum. Despite this lowering, the data is pointing to a strong recovery in 2024, closer to the 2020 peak.

The recent surge in publications mirrors the broader global discourse on climate change, ecological degradation, and sustainable development. With environmental crises coming to the fore, there is now an increasing interest in the need for embedding ecological awareness and sustainable practices within different educational contexts-including ELT. Indeed, scholars have become interested in how education can be a means of preparing the grounds for environmental responsibility and a sustainable mindset among learners, especially since language education reaches both a diverse and global audience (Sterling, 2021).

Another driving force in this trend is its congruence with global frameworks aligned with ecopedagogy, such as the United Nations' Sustainable Development Goals (SDGs), particularly Goal 4-Quality Education and Goal 13-Climate Action (UN 2015). Both goals put forward a transformative pedagogical concept that involves environmental sensitivity and sustainable principles. Consequently, there has emerged a clear body of research into how ELT can contribute to the attainment of such goals and how language education could prepare learners with knowledge, skills, and values to address global environmental challenges.

It is clear that the rise in ecopedagogy-related research since 2015 underlines the urgent need that has arisen to take up ecological issues through education. The rising output in this area represents both the pressing nature of environmental challenges and the evolving role of education in cultivating environmental stewardship and sustainable living.

Distribution of Publications by Countries

There was a total of 19 countries mentioned in ecopedagogy publications. In response to the most contributing countries, Figure 2 presents the top 10 countries in the field of ecopedagogy. The highest number of publications was written in the Australia ($n = 105$). Most of the studies were performed in the USA ($n=72$), Canada ($n =70$), England ($n = 35$) and Finland ($n= 20$). This underlines the fact that ecopedagogy has drawn significant interest in countries where educational research systems are well developed. The implication that Australia, the USA, and Canada dominate suggests that these countries will be more concerned with environmental education in their language teaching frameworks, whether due to national policies that support ecopedagogy in education. Moreover, England and Finland are interesting cases that illustrate the potential impact of advanced educational systems that have integrated ecological awareness into their educational practices. While this distribution reflects the global interest in ecopedagogy, it bears witness to the differing emphasis placed on ecopedagogy in these different contexts within education. Geographically broad-based contributions from several countries such as China, Scotland, Taiwan, Türkiye and New Zealand represent that the idea of ecopedagogy is an important concern for the world, where practically every country tries to embed sustainability and environmental awareness into the ELT framework. This trend has expressed an ever-increasing international cooperation and commitment in the face of environmental issues through education - the global nature of both language learning and the challenges of sustainability.

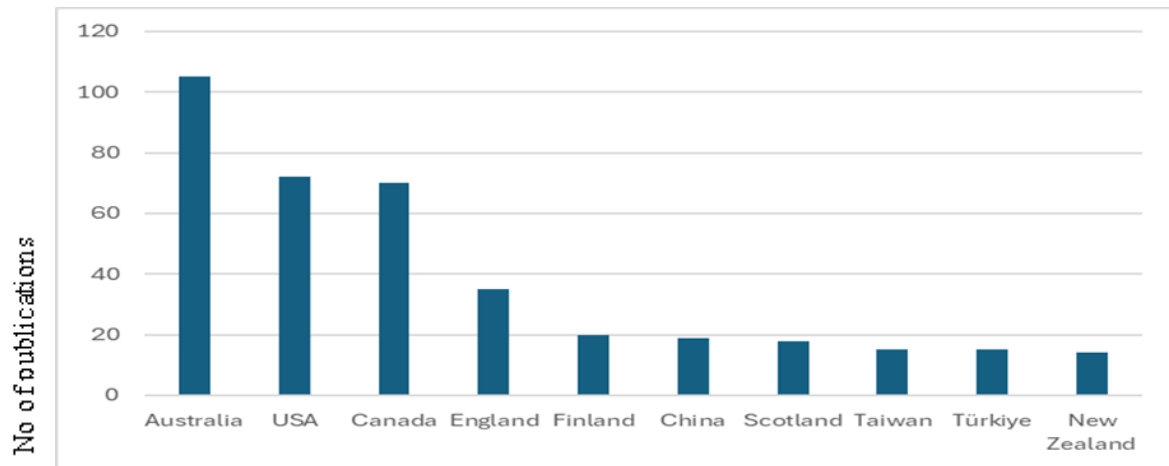


Figure 2. *Top 10 countries with ecopedagogy in ELT publications*

The Most Productive Institutions

This section visualizes authors' contributions from academic institutions worldwide to ecopedagogy in different fields of education. Figure 3 shows the top 10 contributing universities in the field of ecopedagogy from 2014 to 2024. Monash University comes top with 29 publications, followed closely by institutions such as the Simon Fraser University and the Toronto University, each of which contributed over 16 papers on the subject. The institutional diversity represented-from universities in Canada, and Australia-indicates an international interest in ecopedagogy. In fact, with this large geographical span, there is a suggestion that environmental concerns and issues about ecopedagogy in education are now universally accepted as essential themes across diverse regions and institutions.

In that respect, the other high-ranking contributors are the University of Edinburgh, the Southern Cross University, Rmit University and Deakin University. Hence, they add to an ever-growing volume of work being carried out on ecological and sustainability principles which can be brought into ELT. Thus, these are important in cultivating a more environmentally sensitive curriculum and devising pedagogical strategies in response to the global need of sustainability education.

The emergence of these leading institutions in ecopedagogy research underlines a growing trend for ELT to move toward inter-disciplinarity where it interfaces with the study of sustainability. This trend is most likely to continue as there is a big need for the education systems globally to respond to the environmental challenges of the 21st century. These institutions' cooperation suggests an ever-widening circle of active researchers involved in the embedding of ecological awareness into language teaching and, by extension, changing how future generations will work with language and the environment. This trend is likely to continue, driven by the need for education systems globally to respond to the environmental challenges of the 21st century.

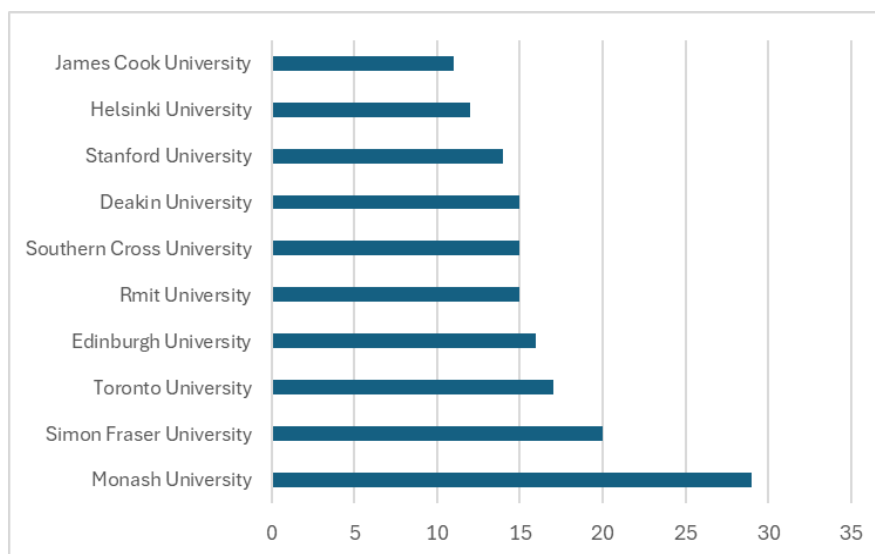


Figure 3. *Top 10 contributing universities*

Leading Journals

The paper's focus was limited to English-language publications about ecopedagogy for the ten-year period starting in 2014 and ending in 2024, within well-established journals. Figure 4 highlights that not more than 10 journals contributed over 40 articles to the ecopedagogy research field. On the top-ranking position, the “Environmental Education Research” included 107 articles, which underlined the leading position in bridging education and ecopedagogy research. Among others, this journal has been joined by “Australian Journal of Environmental Education”, “Journal of Environmental Education” and “International Research in Geographical and Environmental Education” to testify to the fact that the field of ecopedagogy is increasingly approached from diversified interdisciplinary perspectives, connecting environmental and sustainability issues with language teaching and learning.

The dominance of educational-focused journals within the list underlines the pedagogical core in this area. With the addition of more specialized journals, such as the “Education Sciences”, interest in searching the interface among sustainability issues, environmental challenges, and their applications within the language education framework has been increasing. These journals should be useful in gaining broad-based insight into how language education can serve as a critical vehicle in advancing ecological literacy and environmental awareness by engaging students in exploring pressing global environmental issues. Language education within sustainable development gives an important role to facing global challenges, as it helps the learners to develop in such a way that they are not only provided with linguistic tools but also the knowledge and attitudes to think in a critical way about sustainability. This fits well with the idea that language teachers have the potential to include environmental themes into their curriculum so as to foster responsible citizenship and inspire learners to undertake actions in the area of sustainable development in their personal and professional lives.

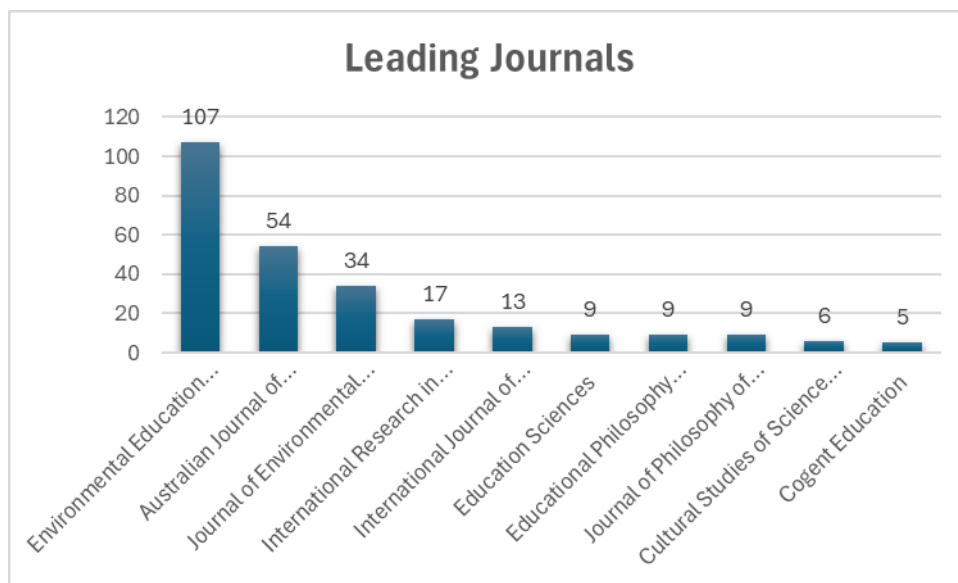


Figure 4. Top 10 Leading Journals

The Most Productive Authors

Figure 5 presents the list of the top 10 leading productive authors in ecopedagogy from 2014 to 2024. Annette Gough (e.g. *Education and the Environment*) and Nicole M. Ardoin (e.g. *Environmental education and K-12 student outcomes: A review and analysis of research*) are the most productive authors in this field, with 11 and 10 publications each. Professor Annette Gough is working at Science and Environmental Education in the School of Education, RMIT University, Melbourne, Australia whereas Nicole Ardoin is an Associate Professor of Environmental Behavioral Sciences in the Environmental Social Sciences Department of the Stanford Doerr School of Sustainability (SDSS). These two researchers have contributed a lot to ecopedagogy, putting strong encouragement on the integration of environmental education. Much of their work has focused on the interdisciplinary approach, combining ecological literacy and sustainability education. Their contribution has shaped both the theoretical and practical frameworks that guide ecopedagogy in various fields encompassing teaching English as a foreign language around the world.

Apart from these researchers, a number of other influential productive scholars have given their valued contribution. Other important researchers like Jan Cincera (e.g. *Social learning in teacher professional development for environmental and sustainability education*), Sean Blenkinsop (e.g. *Six actions we can take towards a more ecological, holistic and imaginative education*.) and Chris Earnes (e.g. *An evaluation of the practice of environmental education in New Zealand schools*) have contributed to ecopedagogy with 9 and 7 publications, respectively. Other prominent contributors include Philip Payne, Ramsey Affifi, David Rousell, who have published 6 works each in the field. Payne (e.g. *Environmental education and the critical social sciences*) is especially known for his critical perspective on environmental education, often questioning popular approaches and calling for more radical and transformative pedagogies that better reflect the seriousness of the environmental crisis. Affifi (e.g. *The ecology of sublimity: Education between existence and the ungraspable*) has been heavily involved with teacher education in terms of the exploration of a spectrum of ideas, located at the intersection of education, philosophy, and ecology. Equally valuable contributions by a researcher like David Rousell (e.g. *A systematic review of climate change education: Giving children and young people a 'voice' and a 'hand' in redressing climate change*) have added to the knowledge base that influences how educators approach integrating environmental subjects within education. Moreover, Bruce Johnsson's (e.g. *Outdoor environmental education in the contemporary world*) contributions have an important place in the literature, who has conducted several research on environmental issues all around the world. Taking these together, the researchers have shaped not only the theoretical underpinning of ecopedagogy but also those very practical insights into how educators can actually frame and deliver environmental education.

In a nutshell, the authors represented in this research are a diverse group with regards to disciplinary background and institutional affiliation. Whereas there are some who have authored over one book or monograph on matters of ecological literacy and education, the bibliometric analysis also reveals diversity in terms of frequency and thematic focus of publications. Contributions by these researchers have been instrumental in developing a fuller understanding of how foreign language education can act as a springboard for sustainability, environmental awareness, and action-works indispensable to the future of education in general and ELT pedagogy.

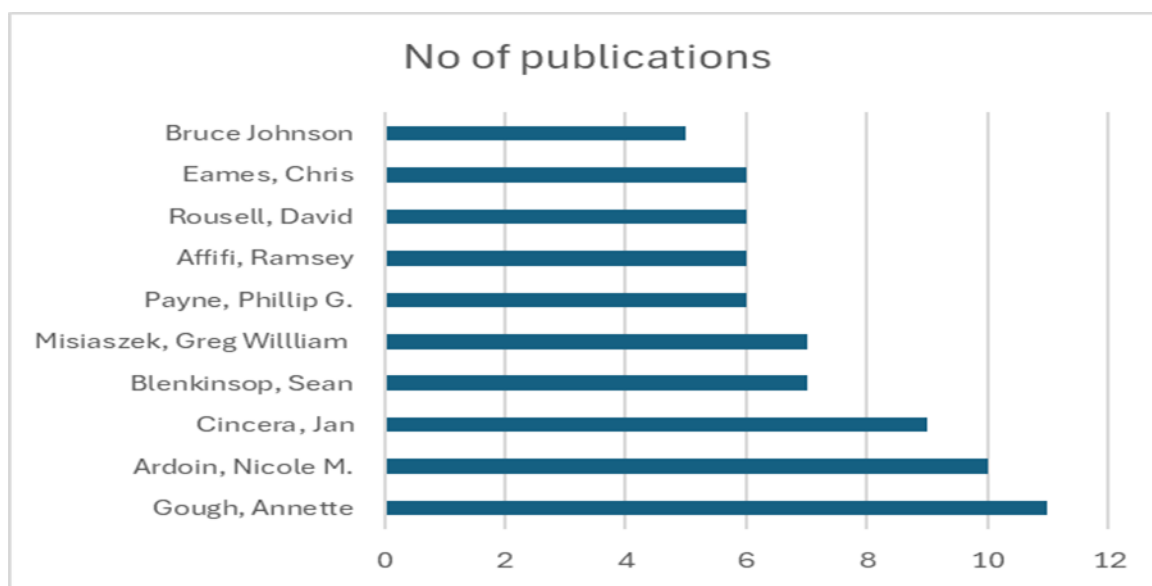


Figure 5. Top 10 productive authors

Keywords Analysis

VOSviewer was employed to map the author's keywords in this study. Figure 6 shows a network visualization of the authors' keywords, in which the relationship between terms is depicted through color, circle size, font size, and the thickness of connecting lines. The total number of authors' keywords was 1,197. Of these, 33 keywords appeared at least 5 times. The size of circles, color groups, font size, and thickness of connecting lines represent prominence and interrelatedness of terms. From this network visualization, three main clusters may be identified, with each pointing toward another focused area within ecopedagogy.

The first cluster, colored in purple revolves around the central idea of "environmental education," and it is considered significant in shaping educational practices aimed at developing consciousness for sustainability. It has also strongly related keywords, such as "education for sustainable development," "environmental sustainability," "environment," and "science education," stressing the interdisciplinary nature of environmental education.

The red cluster engages "sustainability education," "outdoor education," "place-based education," and "environmental literacy," telling the importance of experiential and community-based learning. This cluster suggests that engaging students in authentic, real-world contexts-such as outdoor activities, eco-projects, or community service learning-can deepen their understanding of sustainability while enhancing communication skills. Based on these theoretical foundations, ELT educators can offer engaging learning experiences, promoting both language development and environmental stewardship, by integrating environmental topics into language tasks, such as debates, presentations, and reflective writing. The call for "community" offers hope for collaborative projects that connect students to local environmental issues, creating civic engagement and global citizenship.

The blue cluster revolves around "climate change," "climate change education," and "global warming," announcing the ascending relevance of climate change-related topics. Given its reference to "experiential learning," this suggests a further shift to new pedagogies that actively engage learners in environmental issues through problem solving, critical thinking, and real-life applications. In ELT contexts, this could be achieved by the integration of issues of climate change into reading selections, discussions, and writing tasks, facilitating the students' engagement with environmental issues while constructing the academic language.

This network visualization of keywords makes apparent the multidimensionality of ecopedagogy within educational research, from foundational theorizing to classroom and systemic application. Such mapping offers insights into emerging themes and trends that might be taken up in future research, to further explore points of nexus between language education and environmental sustainability.

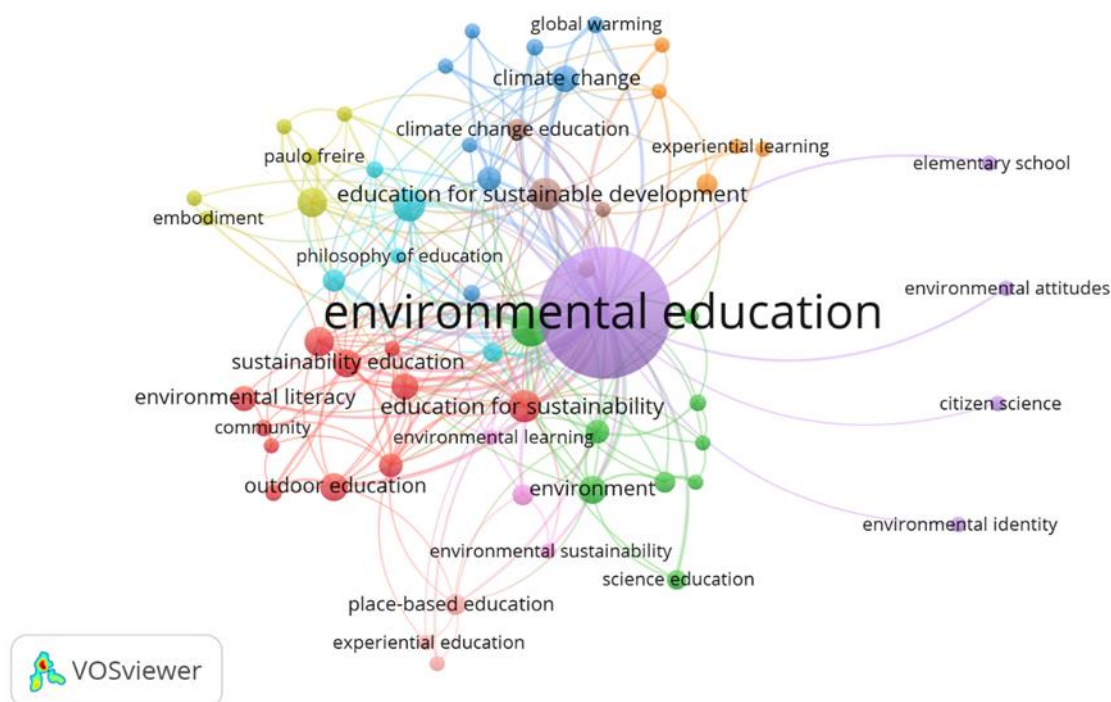


Figure 6. Visualization of authors' keywords

Title and Abstract Analysis

In this analysis, we use VOSviewer to count frequent words in the title and abstract of the publications based on the number of occurrences and co-occurrences. The co-occurrence network was built in this study using a binary counting technique. According to Van Eck and Waltman (2017), who developed VOSviewer, the use of a binary counting technique indicates that the frequency with which a noun phrase appears in a publication's title and abstract is irrelevant when determining its significance (Van Eck & Waltman, 2017). The analysis shows there are 7,669 words found in the title and abstract. Figure 7 presents the networking map of 87 words that appeared

30 times in the title and abstract. The thickness of the connecting lines represents the strength of the association between the terms, while the size of the nodes represents the significance of the occurrence of the terms. Words of the same color tend to occur together because they are semantically related.

This network presentation underlines the key terms "environmental education," "sustainable development," and "attitude" and presents their close link to each other and to the center of the network. That is, these terms are in core position when the discourse of the field is defined, which in turn means that these concepts are closely linked to each other and important in research about environmental education. These strong interrelationships support the hypothesis that these concepts have been addressed together so far, and "environmental education" forms the foundational discussions leading to "sustainable development" and "attitude." That underlines the importance of educational work within the sustainability-enhancement effort and attitude-shaping processes of learners regarding environmental matters, emphasizing the same orientation toward developing both ecological literacy and behavioral modification through education. Network visualization hence maps the interconnected nature of the themes in a way that shows how closely they are linked in the corpus of research.

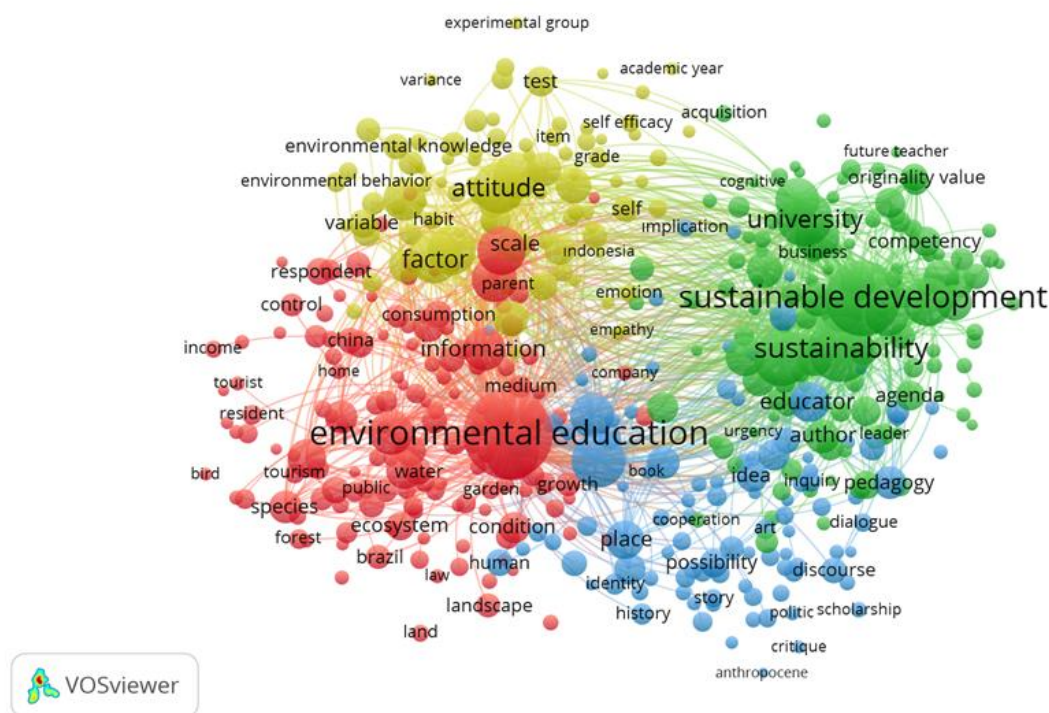


Figure 7. Visualization of words from titles and abstracts

DISCUSSION & CONCLUSION

Discussion

The present bibliometric analysis underscores essential developments and insights in the growing area of ecopedagogy, as well as its importance for transforming education into greater environmental and social equity. Ecopedagogy—a fusion of ecological literacy and critical pedagogy- is a fundamental approach that facilitates a holistic educational experience for students to become empowered change agents fighting environmental degradation, social injustice, and unsustainable practices (Misiąsek, 2023). The goal of ecopedagogy, is to encourage students' activism, empathy, and ecological consciousness. Fundamentally, it invites students to consider the interrelationships between society, the environment, and their community (Boetto & Bell, 2015). Teacher education programs that have integrated ecopedagogy guided students to acquire the knowledge, thinking skills, ethical comprehension, and civic capacity which are necessary for sustainable development. (Misiąsek, 2020). Also, in the context of accelerating environmental change and growing global inequalities and injustices across borders, ecopedagogical approaches might facilitate a co-creative response to environmental challenges. It is important to acknowledge that ecopedagogy mostly evolved based on the principles of critical pedagogy and environmental education through research in educational disciplines with limited direct research specifically in the field of ELT. This situation indicates that there is a significant gap in the literature regarding research on

ecopedagogy in ELT. However, the present bibliometric research highlights the potential benefits of interdisciplinary borrowings where ELT may adapt these ecopedagogical principles.

This growing tendency of ecopedagogy-related publications in the field of education reflects a scholarly interest in enhancing ecological thinking and sustainability. This increase in the volume of publications is well-timed, as global concern about environmental crises gathers momentum and begins to drive researchers and educators into investigating how education can contribute towards generating increased levels of environmental responsibility. The spike in research output as the most productive years are 2020 and 2024, illustrating an increasing academic response towards ecological aspects and the role of education within nature. In part, it can be seen as a response to the pressing nature of environmental issues generally — but also in tandem with global policy discourse now making convergence between educational objectives and foreign frameworks such as those outlined by the United Nations' Sustainable Development Goals (SDGs). This has further emphasized the need for environmental concerns to be integrated into educational practices, as reflected in SDG 4 (Quality Education) and SDG13 (Climate Action). This is where the concept of ecopedagogy can be a powerful resource for teaching languages, allowing teachers to engage with sustainability concerns at multiple levels that connect more deeply and resonate across diverse sociocultural contexts.

An obvious sign of sustainability's growing popularity in education is the attention that major journals place on ecopedagogy. This bibliometric analysis reveals that ecopedagogy research within the specific field of ELT is in its initial stages. However, it becomes clear that language instruction promotes ecopedagogy and sustainability by teaching students social responsibility and ecological literacy (Sterling, 2021). In this perspective, language education encompasses a method through which students may attain those critical thinking abilities and ethical perspectives which will be used in grappling with real world global sustainability issues (Gadotti, 2008). Further, these works focus on how language education can serve as a platform for advocacy in which themes of environmental sustainability and responsible global citizenship create more socially conscious language learners. In this regard, such a movement away from more traditional forms of language instruction toward a more integrated and ecocentric model enables the development of critical thinking, problem-solving skills, and understanding of the interconnected relationships among language, culture, and the physical environment. While it is a continuously developing field, we are likely to see more interdisciplinary collaboration on issues regarding the integration of ecopedagogical practices in international contexts of education. In short, these journals contribute not only to the advance of theoretical discussions but also to practical applications of ecopedagogy in educational settings including ELT, thus helping educators find innovative ways to bring sustainability into language education. In doing so, they signal the contribution of language education to sustainable development and prepare learners for participation in global solutions to environmental sustainability. However, while ecopedagogical research gains momentum in educational research, the number of journals specifically in language teaching remains limited. Although the leading journals on the topic do not directly belong to the ELT domain, they offer valuable insights that can guide language teaching practices. ELT practitioners also benefit from these studies by adapting the critical perspectives and pedagogical models into their practices.

The keyword analysis done using VOSviewer provides an insight into the various dimensions of ecopedagogy within educational research by classifying terms in clusters related to foundational theories and classroom practices as well as other educational contexts. Under the terms of environmental education, which is present in the first cluster as well, the analysis helps to reveal more evidently how much theoretical commitment makes up ecopedagogy at its roots focusing on promoting a general understanding in nature with responses relating to ecological dilemmas (Gadotti, 2008). In this sense, the cluster represents a connection to ecopedagogy advocacy (Hungerford et al., 1994), offering an invitation toward articulating ecological awareness and values as grounding dynamics within the design practices that extend inwardly into degree programs and outward in global ways beyond course-based venues where necessary (Sterling, 2021). The whole cluster indicates that integrating the agricultural principles of sustainability into language curricula will contribute to the development of pupils' communicative competence, nurture their critical thought, and ensure their environmental literacy. The key words identified here including sustainability, environmental literacy and climate change are highly relevant to language teaching. Considering this, among other methods, through content-based instruction, project-based learning, and task-based approaches, the ELT educator can create lessons promoting transformative learning while allowing students to think critically about global environmental issues and develop their language command. The second cluster is more practical with words such as sustainability education, outdoor education, place-based education, and environmental literacy. This area highlighted a growing trend in the creation of curricula that build on ecolinguistic awareness through hands-on practices. A third cluster (climate change, climate change education,

and global warming) points to the importance of experiential learning which engages learners with real world problems and encourages them to take action against environmental problems. It also highlights the importance of diverse types of educational opportunities for widening and deepening ecopedagogical practices. The varied pedagogical applications of ecopedagogy and its alignment with different modes of instruction make it a promising transformative approach to developing language abilities in connection with environmental consciousness (UNESCO, 2017).

The co-occurrence network generated by VOSviewer in this study allows us to capture the connections between important terms for ecopedagogy and environmental education research, such as attitude-related words, or even those that relate to sustainable development. Together, with its prominence and close linkages to these words it could be argued for environmental education as a gateway in creating sustainable attitudes or behaviors (Hungerford & Volk, 1990). This aligns with the literature which states that environmental education improves ecological literacy, and this changes the attitudes of learners towards the environment (Tilbury, 2011). The relationship between environmental education and sustainability emphasizes the need for guiding students to change their values and attitudes towards the environment in a positive way (Gadotti, 2008). This is also related to the idea that sustainability education addresses the development of a particular kind of consciousness and action to become responsible actors for more sustainable futures (Van Eck & Waltman, 2017).

Conclusion

This bibliometric analysis indicates substantial trends and insights into the growth of the field of ecopedagogy within educational research. The work underlines the fact that ecopedagogy in teaching is not an abstract exercise, but a framework needed for equipping future generations with the potential to manage key global issues such as biodiversity loss, environmental justice, and climate change. As such, integration of ecopedagogy into English language teaching is imperative because language is one of the most powerful means of gaining perspective on critical ecological consciousness and an urge to action in the face of environmental and social justice issues.

These findings, and especially the limited incidence of ecopedagogical discussion within ELT publications and the prevalence of contributions from non-ELT fields, indicate the necessity for more profound integration of ecopedagogical theory within English language teaching and into relevant curricular domains. It could provide the educators with some kind of guidelines on how to stimulate ethical responsibility, environmental knowledge as well as a critical perspective towards environmental issues. The main principle of ecopedagogy is that teachers are not only supposed to teach but also develop ecological literacy and work on sustainable practices. In other words, when an ecopedagogical dimension enters teacher training, it equips the teachers with skills and information to tackle environmental issues in the classroom. Given the complexity of ecological problems, this calls for increased interdisciplinary collaboration among the fields of pedagogy, environmental science, social studies, and languages. The collaboration with diverse viewpoints and approaches can realize the enhancement of ecopedagogical research (Monem, 2024).

The research topics that require more investigation in underrepresented fields are highlighted by bibliographic studies in regional and thematic coverage. The analysis of the present study indicates that the impact of ecopedagogical techniques on students' learning outcomes in various cultural and socioeconomic contexts requires more research to obtain a more comprehensive understanding of its efficacy on a worldwide basis. Ecopedagogy encourages learners to take an active role in social and environmental issues. This leads to empowerment of students to become more active learners and to use the language to promote social justice and sustainability in their communities.

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