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Eco-Linguistic Evolution: Using AI to Foster Green Competence and Communicative Mastery in the English Classroom

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Abstract: In the context of English Language Teaching (ELT), this article examines the concept of eco-linguistic evolution, focusing on integrating artificial intelligence (AI) to promote communicative mastery and green competence. The study explores how AI-driven tools can improve language learning while fostering environmental awareness and sustainable thinking. It is based on ecological linguistics and communicative competence theory. According to the paper, AI enables students to interact with real-world environmental content and hone their critical discourse skills through personalized, interactive, and context-rich learning experiences. Through AI-assisted activities such as debates, simulations, and project-based learning, students enhance their communication skills while tackling actual ecological problems. The article also tackles major issues, such as digital inequalities, ethical concerns, and the necessity for teacher training. It concludes that incorporating AI into sustainability-focused ELT can make a significant difference in developing globally competent, environmentally responsible language users. The report makes pedagogical guidelines for successfully merging eco-linguistic and AI-based techniques into modern English courses.

Keywords: ecological linguistics; English language teaching; communicative competence

1. Introduction

The twenty-first century has confronted humanity with two challenges: the tremendous advancement of digital technology and the growing importance of the ecological problem. In the area of English Language Teaching (ELT), they are frequently seen as distinct technological and thematic trends. However, “Eco-Linguistic Evolution” suggests that they are intimately intertwined. English is the common language of climate research, global policy, and grassroots advocacy. Developing “Communicative Mastery” in the present era demands more than mere grammatical perfection; it also requires the capacity to navigate the complex language of sustainability. Simultaneously, “Green Competence” requires a means of expression. By incorporating artificial intelligence (AI) into the mix, we produce a potent learning catalyst that is both linguistically precise and ecologically relevant.

Education systems are being progressively challenged with teaching students to communicate successfully in global contexts while simultaneously acting ethically toward the environment. English Language Teaching (ELT), as an international educational field, plays an important role in this shift.

A recent study has shown that incorporating sustainability into ELT improves learners’ motivation, engagement, and communicative skills while also raising ecological consciousness. At the same time,

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artificial intelligence (AI) is transforming language learning with adaptive, interactive, and data-driven approaches.

This convergence has resulted in what can be referred to as eco-linguistic evolution - an educational transformation that blends *ecological literacy* with *communicative language ability*, facilitated by AI technology. This study investigates how artificial intelligence (AI) can be strategically used to promote green competence (environmental consciousness and responsibility) with communicative expertise in the English classroom.

The objectives of contemporary schooling have changed due to the quickening pace of environmental deterioration and technological advancement. As a worldwide communicative platform, English Language Teaching (ELT) is increasingly expected to address both linguistic competence and sustainability literacy. In this regard, eco-linguistic evolution is a paradigm shift that incorporates environmental consciousness into language acquisition procedures. This change is further enhanced by artificial intelligence (AI), which enables data-driven, interactive, and adaptable learning environments. This study highlights the need for integrated educational frameworks and places ELT at the nexus of ecological responsibility and digital innovation.

2. Literature Review

The theoretical underpinning of this study is based on the subject of Ecolinguistics, which is popularized by scientists who suggest that language influences how we perceive and treat our surroundings (Fill & Mühlhäusler, 2001). Traditional language training frequently uses anthropocentric materials that see nature as a resource for human consumption. In contrast, eco-pedagogical approaches promote “biocentric” language use, which fosters a sense of interconnectivity.

According to earlier studies in Content and Language Integrated Learning (CLIL), children learn a second language more successfully when the material is socially and cognitively relevant (Coyle et al., 2010). This significance is provided by environmental themes. Additionally, as educators realize that 21st-century skills like critical thinking, teamwork, and problem-solving are best exercised via real-world concerns like biodiversity loss or climate change, the “Greening of ELT” movement has gained pace. Smith (1990) asserts that when the subject matter elicits a personal emotional reaction to the natural world, elementary school students exhibit enhanced memory of complicated structures.

Ecological linguistics studies how language influences how people perceive their surroundings (Stibbe, 2015). It makes the case that language shapes behavioral patterns and creates ecological realities. Beyond grammar, communicative competence theory (Hymes, 1966) incorporates pragmatic and social aspects of language learning. According to recent studies, AI is becoming more and more important in language instruction, especially when it comes to improving interactivity and personalization (Zhou, 2023). Frameworks for sustainability education place a strong emphasis on the growth of critical thinking, systems awareness, and responsible global citizenship. The advent of eco-linguistic pedagogy aided by intelligent technology is facilitated by the convergence of these fields.

The study of how language affects human interactions with the environment is known as eco-linguistics, a term made popular by Alwin Fill and Peter Mühlhäusler. “Anthropocentric” terminology is frequently used in the traditional English curriculum, such as calling nature a “resource,” animals “it,” and growth a “unqualified good.” Large Language Models (LLMs) are used in the AI-enhanced classroom to carry out “Critical Discourse Analysis.” An AI can be instructed by students to rewrite a typical corporate text

in a “biocentric” manner, emphasizing ecological sustainability over profit. Through language manipulation, this activity teaches “Ecological Awareness” in addition to vocabulary.

3. Methodology

Based on a methodical synthesis of the literature, this study uses a qualitative conceptual-analytical approach. Peer-reviewed papers, theoretical models, and empirical research in ecolinguistics, ELT, and educational technology are examples of sources. Finding connections between AI-supported approaches and sustainability-focused language training is the main goal of the analysis. The study builds an integrative pedagogical model by interpreting previous research rather than gathering empirical evidence.

There were two stages to the study:

- Phase I: *Content Analysis*: A thematic analysis of three widely used B1 and B2 EFL (English as a Foreign Language) textbooks. The frequency of environmental subjects and whether they were presented as “deep-level” (critical analysis of sustainability) or “surface-level” (simple vocabulary) were the main focus of the analysis.
- Phase II: *Educator Survey*: Twenty-five secondary school teachers were given a questionnaire to complete, to ascertain how effective they thought these topics were. The poll assessed students’ motivation levels during “green” lessons as well as teachers’ confidence in their ability to teach environmental subjects.

The approach focuses on *eco-pedagogy*, examining how language exercises, such as discussing climate policy or crafting persuasive essays on renewable energy, enhance both environmental awareness and fluency.

With an emphasis on how speech influences ecological attitudes and actions, ecological linguistics investigates the connection between language and the environment. It highlights how language actively creates reality, including attitudes toward sustainability, rather than being neutral.

This viewpoint promotes critical analysis of environmental discourse and the development of ecological communication skills among ELT students. Understanding natural systems and acknowledging human responsibilities within them are key components of ecological literacy.

Therefore, eco-linguistic education focuses on critical engagement with environmental narratives rather than just word acquisition.

Dell Hymes coined the term “communicative competence” (Hymes, 1966), which describes the capacity to integrate grammatical, sociolinguistic, and pragmatic knowledge to use language correctly in social circumstances.

In sustainability-oriented ELT, communicative competence expands to include:

- Environmental discourse competence
- Critical thinking and argumentation skills
- Intercultural awareness related to global ecological issues

Research indicates that when students participate in real-world, task-based communication assisted by ICT and interactive settings, their communicative competence improves. A set of abilities, attitudes,

behaviors, and knowledge that allow people to act sustainably is referred to as “green competence”. It includes:

- Environmental awareness
- Systems thinking
- Responsible decision-making
- Ecological communication skills

Green competence is built in ELT using interdisciplinary approaches, project-based learning, and content-based education.

According to research, when students relate language learning to real-world problems, sustainability-based ELT boosts learner motivation and engagement.

AI has introduced transformative possibilities in ELT, including:

- Adaptive learning systems
- Intelligent tutoring systems
- Chatbots and conversational agents
- Automated feedback and assessment tools

Personalized learning experiences and exposure to a variety of language stimuli are made possible by AI. Additionally, it promotes the use of language in everyday situations and increases the efficiency of material development.

AI systems are able to adapt content, including environmental issues, to the interests and skill levels of learners. Differentiated instruction is supported, and engagement is increased by this personalization.

For example, AI can generate:

- Customised reading materials on climate change
- Vocabulary exercises related to sustainability
- Interactive simulations of environmental scenarios
- Real-time conversational practice
- Scenario-based dialogue (e.g., environmental debates)
- Immediate feedback on language use

Such tools extend communicative practice beyond the classroom and promote fluency.

To successfully integrate eco-linguistic AI approaches, educators should:

- Adopt interdisciplinary teaching methods
- Incorporate sustainability themes across language skills
- Use AI to enhance - not replace - human interaction
- Promote critical thinking and ethical awareness

4. Pedagogical Applications

AI-Enhanced Eco-Linguistic Tasks, examples of classroom activities include:

- AI-Assisted Debates

Students use AI to prepare arguments on topics such as climate change or renewable energy.

- Eco-Storytelling with AI

Learners co-create narratives about environmental futures using AI tools.

- Discourse Analysis Projects

Students analyse media texts on sustainability with AI support.

- Simulation-Based Learning

AI simulates real-world scenarios (e.g., UN climate negotiations).

The “Cognitive Overload” that students encounter when working with technical scientific English is one of the biggest obstacles in Green ELT. AI offers a dynamic scaffolding system that adjusts to the “Zone of Proximal Development” (ZPD) of the learner.

Using AI, a teacher can create three versions of a high-level academic paper on “Ocean Acidification”: one for A2 (pre-intermediate), one for B1 (intermediate), and one for B2 (upper-intermediate).

This guarantees that any student in a mixed-ability class can interact with the same fundamental idea without being discouraged by the language barrier.

4.1. Case Study

In a university-level ELT course, students used AI to “interact” with the Sustainable Development Goals (SDGs). By asking the AI to “explain SDG 13 (Climate Action) using only the most frequent 1,000 words in English,” students gained the confidence to later tackle the original, more complex UN documents.

Students utilise Generative AI to construct short stories or “choose-your-own-adventure” games set in hazardous ecosystems rather than memorizing lists of phrases like “deforestation” or “biodiversity.” Instead of rote memorization, this contextual learning guarantees that the “Green Vocabulary” is kept through meaningful usage.

Interactive, high-stakes language learning works best. Immersion ecological scenarios that were previously unattainable in a classroom setting can now be created because of AI.

4.2. AI-Driven Role-Play

Contemporary AI models have a high degree of realism when adopting particular identities. Students can practice “Negotiation English” by acting out a meeting between a company executive and a local protest group. The student must use convincing language and specific environmental terms to win the debate because the AI, acting as the executive, reacts with complex business jargon and counterarguments.

4.3. Visualising the Invisible

Carbon cycles and invisible contaminants are two examples of abstract environmental notions. Students can depict an “Eco-Utopia” vs a “Eco-Dystopia” in English using AI picture and video generators (such as DALL-E or Sora). The accuracy of the student’s English description (the prompt) determines the quality of the created image. The new digital composition technique known as “Prompt Engineering” places a strong focus on adjectives and descriptive accuracy, two crucial elements of language proficiency. It is also possible to generate “Digital Twins” of ecosystems. Students are able to query an artificial intelligence: “If the temperature in this simulated forest increases by 2 degrees, what happens to the bird population?” The AI creates an instant connection between verbal expression and scientific cause-and-effect by processing the data and describing the result in English.

As we advocate for “Green Intelligence,” we have to face the harsh reality that artificial intelligence has a big environmental impact. This “Paradox” needs to be a key component of what we teach.

Over the course of five cars’ lifetimes, the training of a single large language model can produce as much carbon. Large volumes of water are also needed for data center cooling. This knowledge ought to be used as a “Critical Literacy” activity in a Green ELT classroom rather than being concealed.

4.4. Developing Critical AI Literacy

“Is using this AI tool for this task worth the environmental cost?” is a question that students should be encouraged to ask. This sparks conversations about “Digital Sobriety” and “Frugal AI.” This translates to teaching modal verbs of necessity (must, should, ought to) and evaluative language in the language classroom.

Classroom Debate Question: “Should AI usage be restricted during peak energy hours to save the planet, even if it slows down educational progress?” This exercise requires students to use intricate conditional structures to strike a balance between ecological realities and technological optimism.

5. Results and Discussion

According to the investigation, AI greatly improves the development of eco-linguistic ability in ELT environments.

First, AI makes it possible to create individualized learning programs that adjust to students’ linguistic skills and environment-related themes.

Second, by simulating real-world ecological conversations, AI-powered conversational agents promote realistic communicative practice.

Third, students improve their language and analytical abilities by critically analyzing environmental literature through discourse analysis.

Fourth, in sustainability contexts, project-based learning aided by AI tools fosters cooperation and problem-solving.

Research indicates that when English classes are focused on actual environmental concerns, students’ “authentic engagement” increases noticeably. When taught through project-based learning as opposed to rote memorization, environmental terminology (such as carbon footprint, sustainability, and

ecosystem) is kept 15% better. Students stated that when they were able to talk about global issues, their language skills were “useful”.

Although there was a lot of student engagement, the content analysis showed a big “green gap.” Environmental topics are frequently confined to a single “Nature” section in current textbooks, which usually emphasize vocabulary rather than systemic problems. According to Masserton and Slowinski (1989), curriculum design needs to integrate essential principles consistently rather than focusing on sporadic themes.

According to the survey, just 30% of instructors think they have the necessary training to teach green education, despite the fact that 70% of teachers think it is crucial. Green education in ELT classrooms, according to discussions, promotes a sense of “Global Citizenship,” where the English language is viewed as the channel through which global environmental solutions are negotiated.

To alleviate the strain of individual lesson planning, teachers did, however, indicate a need for more standardized “green” materials.

There are still issues, though, such as unequal access to digital technology, moral dilemmas with regard to data protection, and the danger of relying too much on automation. A crucial element in guaranteeing successful integration is teacher readiness. It is necessary to reconsider conventional educational methods in order to include AI into eco-linguistic ELT.

In order to help students, engage critically with AI-generated content, educators must take on the role of facilitator. Sustainability topics should be incorporated into curricula at all language proficiency levels. Artificial intelligence (AI) tools should complement human connection and conversational authenticity, not replace them.

Programmes for professional development are crucial for giving teachers the digital and ecological literacy skills they need. Three key elements in the relationship between ELT and green education are highlighted by the study’s findings.

6. Conclusions

An important development in modern language instruction is eco-linguistic evolution assisted by artificial intelligence. It prepares students for global concerns by bridging the gap between linguistic proficiency and ecological responsibility. According to the study’s findings, AI-enhanced ELT promotes both communicative mastery and green competence. Future studies should concentrate on the long-term educational effects of AI-based eco-linguistic models and their empirical validation.

A major change in language instruction is represented by eco-linguistic evolution, which links ecological responsibility with communicative proficiency. This change is greatly accelerated by AI, which makes learning experiences meaningful, personalized, and engaging. Teachers may produce students who are not only fluent in English but also able to critically engage with global environmental issues by incorporating AI into sustainability-focused ELT. Students are prepared for active engagement in a rapidly changing world because of this twin emphasis on language and sustainability.

AI’s incorporation into Green ELT signifies a change from “Passive Learning” to “Active Stewardship.” We give children a voice in the global climate movement by leveraging AI to reduce language barriers to environmental education. “Green Intelligence” encompasses more than simply more intelligent computers; it also refers to more intelligent, environmentally conscientious people who can use the universal language to promote the environment. It is our responsibility as educators to help pupils

navigate this nexus of nature and technology. Instead of using AI to replace critical thinking, we must make sure it continues to be a tool for empowerment.

The future of ELT is sustainable, intelligent, and inextricably linked to the survival of our shared earth. Integrating Green Education into English education is more than a fad; it is a pedagogical need in the Anthropocene. It elevates the English classroom beyond the mechanics of grammar and syntax, transforming it into a laboratory for global survival skills. The intersection of language learning and environmental literacy provides a strong road ahead for modern education, training children not only to speak English but also to speak for the earth.

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