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Language to Sustainability: Positioning ELT as a Tool for Eco-social Innovation in Higher Education

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Abstract
This research examines how English Language Teaching (ELT) in higher education can be revitalised as a transformative tool for sustainable development through the integration of technology, innovation and eco-social engagement. Instead of limiting ELT to the acquisition of language, the paper probes the way it can nurture ecological awareness, ecological consciousness, social responsibility and future-ready competencies among learners. The study employs an observatory and qualitative approach. It draws on document analysis and reflections from sustainability-oriented projects done in a skill university in Odisha. Case illustrations are projects on food waste management, smart agriculture and renewable energy, where ELT served as a medium for interdisciplinary learning and real-world problem-solving. The integration of technological tools such as Artificial Intelligence , the Internet of Things and renewable energy systems within ELT frameworks enhances student engagement and learning outcomes. When infused within eco-social pedagogy, these innovations foster critical thinking, collaboration and communication skills, while grounding education in ecological ethics and social justice. In spite of its potential, the strategy has challenges like technological barriers and curriculum limitations. However, through policy backing, teacher training and cross-cultural partnership, ELT can become a positive force for sustainability education. The paper urges a paradigm shift in education, with ELT positioned not just as a language-learning tool but also as a vehicle for sustainable development.

Keywords: Technology, Innovation, Eco-social, SDG4, English, Language, Teaching

1. Introduction

The Language is more than a means of communication; it is a way of shaping thought, identity, and social change. In the context of higher education, English Language Teaching (ELT) has traditionally been viewed as a tool for academic and professional advancement. However, with the world facing growing ecological crises, widening inequalities and a growing call for ethical responsibility, the scope of ELT must expand. English, as a global lingua franca, carries immense potential to connect learners with global sustainability discourses while also empowering them to articulate local realities.

We now live in what scholars describe as the Anthropocene, a geological epoch in which human actions profoundly shape the Earth's systems. This has placed education at the center of global

responses to ecological and social crises. As Sterling (2010) fights sustainability requires not only new knowledge but also new ways of learning-ones that encourage critical reflection, systemic thinking and moral responsibility. Similarly, Wals (2015) and UNESCO (2017) stress that higher education must foster *transformative competencies* that help learners respond ethically and collaboratively to complex global challenges. Within this context, ELT becomes more than a linguistic enterprise. It becomes a site where students learn to communicate across disciplines, cultures and systems-developing what Canagarajah (2005) calls "critical communicative competence." Scholars such as Kumaravadivelu (2012) and Freire (1970) remind us that language teaching can be a form of empowerment, enabling learners to question and reshape their social realities. When sustainability themes are embedded in English curricula, students do not simply learn grammar and vocabulary; they engage with real-world issues—food waste, energy transition, ethical consumption-through the language of global dialogue.

In recent years, studies in eco-pedagogy and sustainability education have highlighted the potential of language classrooms as spaces for *eco-social participation*. Cates (1990) pioneered the idea of "global education" in ELT, suggesting that language learning can cultivate awareness of peace, justice and environmental stewardship. Building on this, contemporary researchers such as Ngo and To (2025) and Nakamura and Fujimoto (2024) have shown how integrating digital and sustainability tools like AI and IoT can make ELT a powerful medium for critical engagement. These approaches align with Kalsum et al. (2024), demonstrated that Eco-ELT frameworks combining environmental literacy and communication practice promote empathy and social responsibility among learners. Barriers persist-curricular rigidity, teacher preparedness and unequal digital access (Filho et al., 2018). Overcoming these requires institutional innovation and a shift in how language is valued in education. English must be placed not merely as a subject for linguistic proficiency but as a vehicle for sustainability communication—an enabling force that bridges disciplines, cultures, and knowledge systems.

2. ELT as Eco-Social Innovation

The conceptual grounding of this study is built on the belief that English Language Teaching (ELT) can move beyond a linguistic domain to become a *socially transformative practice*. Within sustainability education, language is understood not merely as a code system but as an action-a way of seeing, connecting, and reconstructing the world. This aligns with Freire's (1970) view of education as a dialogic process through which learners develop awareness of their capacity to change their reality. Language pedagogy should cultivate critical consciousness, enabling students to question systems and engage ethically with global issues (Kumaravadivelu, 2012 and Canagarajah, 2005 From this perspective, the present framework conceptualises ELT as Eco-Social Innovation, functioning through three dynamic and interconnected layers: language as practice, sustainability as context and transformation as outcome. These layers are mutually reinforcing-language activities generate awareness, sustainability content provides purpose and reflection leads to transformation.

2.1. Language as Practice

Language as practice recognises that learning English is most powerful when it involves purposeful communication. When students compose essays on food waste, translate Internet of things based agricultural manuals, or present stories on renewable energy adoption, they use language as a vehicle for meaning. In doing so, they develop vocabulary, argumentation and stylistic awareness within real sustainability contexts.

2.2.Sustainability as Context

Sustainability as context situates English learning within lived ecological and social realities. This approach mirrors Sterling's (2010) concept of sustainable education, where disciplinary boundaries dissolve and learners engage with authentic, problem-based situations. Through class projects and interdisciplinary collaboration, students encounter systems thinking-the understanding that environmental, social and technological dimensions are interconnected.

Transformation as outcome captures the cognitive, affective and behavioural shifts observed among learners. Transformation occurs when students re-evaluate their values and develop competencies for collective action Wals, (2015). In the ELT classroom, such change is visible when a student begins to view persuasive writing not only as an academic task but as a form of eco-ethical advocacy.

2.3. Agent of Change in ELT: Technology

In the evolving landscape of sustainability education, technology no longer functions as a mere support tool-it acts as a game changer that reshapes communication, collaboration, and cognition. Within the ELT–Eco-Social framework, the integration of digital tools such as Artificial Intelligence, the Internet of Things and renewable energy systems has altered how students think, speak and act about global issues. It enables learners to collect, interpret and disseminate sustainability-related data in English, turning language classrooms into platforms of applied learning and ethical reflection. Ngo and To (2025) highlight that virtual and augmented reality applications can simulate environmental contexts in ELT classrooms, allowing students to experience sustainability scenarios while practicing communication. Similarly, Nakamura and Fujimoto (2024) find that technology-enhanced ELT improves both ecological literacy and language proficiency, particularly when students engage in problem-solving through authentic digital tasks. These findings support the argument that AI and IoT tools can deepen learning when embedded within communicative practice rather than treated as external aids. Technology facilitates a triple dialogue: between disciplines, between people and between humans and systems. As Akkaya (2024) and Kalsum et al. (2024) argue, such integrated approaches build competencies in critical thinking, collaboration and systems awareness—skills essential for future-ready graduates. Viewing pedagogically, technology in ELT acts as a learning accelerator. It reduces the gap between technical and social communication, enabling learners to apply their linguistic skills to complex sustainability narratives. Students do not passively receive knowledge; they create meaning by producing reports, digital content and community narratives that merge science, ethics, and expression. This synergy transforms ELT from a subject of linguistic repetition to a medium of technological and ecological participation.

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This paper explores how ELT, when integrated with technological and sustainability frameworks, can act as a tool for eco-social innovation in higher education. It draws on evidence from a skill-based university in Odisha, India, where students engaged in sustainability-oriented projects that linked English communication with technological application.

3. The Objectives of the Study

This present research was guided by two central objectives. First, it sought to explore how English Language Teaching (ELT) in higher education can transcend its conventional linguistic boundaries and act as a catalyst for eco-social innovation through sustainability projects at a private University in Odisha, Second, it aimed to design a pedagogical and ethical framework to embed sustainability within English learning curriculum for transformation.

4.Methodology

This study employed an observatory, qualitative, interpretive approach as outlined by Yin, (2018) and guided by principles of eco-pedagogy and sustainability-oriented English language teaching (ELT). Three cases -Food Waste Management, Smart Agriculture and Renewable Energy from a multisector state private University in Odisha were selected to showcase 'how' sustainability projects can be embedded within the English curriculum.

5. Case Description

The study shows that the ELT becomes a site for ecological citizenship and ethical innovation when reconceptualized through the triadic framework of Language as Practice, Sustainability as Context and Transformation as Outcome. It illustrates three cases: Food Waste Management, Smart Agriculture and Renewable Energy. These case studies collectively support Wals's (2015) and UNESCO's (2017) call to create transformative education that incorporates reflection, empathy, and action.

5.1. Food Waste Management and Ethical Communication

This project exemplifies ELT as an ethical and reflective practice. Students examine cafeteria food waste through interviews, presentations and reports in English, therefore illustrating ELT as an ethical and reflective practice guided by Freire's (1970) critical pedagogy. The exercise turns writing into moral exploration as students proposed solutions using reports, posters and artificial intelligence tools Reduction tactics. Emotional involvement grew as empathy and social responsibility were conveyed via communication. Wals's (2015) concept of education for sustainability-through reflection, discussion and behavioural change-here connected language learning to action.

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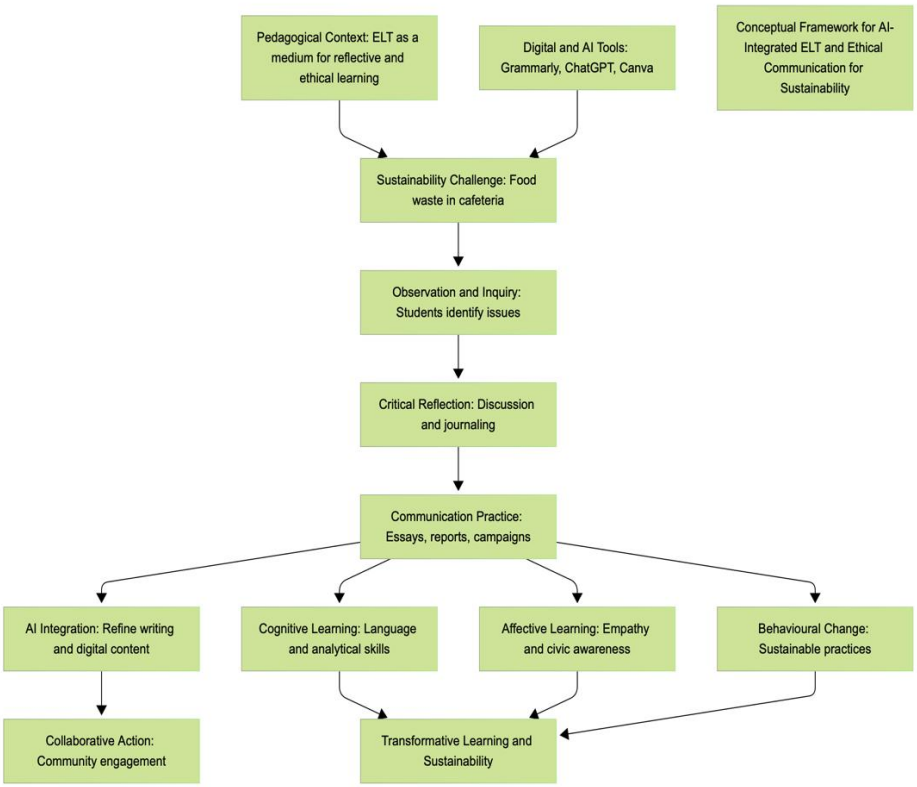

Fig 1. ELT & Ethical Communication for Sustainability (Author's Compilation)

5.2. Smart Agriculture and Interdisciplinary Literacy

In this project, ELT acted as a connection between technology and making things fair for everyone. Students worked together with the agriculture and engineering departments to make information about Internet of things -based irrigation easier for farmers to understand. By using technical writing, bilingual word lists, and digital tools to summarize, they created what Nakamura and Fujimoto (2024) call interdisciplinary literacy, which means being able to change science into communication that people can relate to. English turned into a way for everyone to get involved, helping students become guides for sustainable technology. This change affected both thinking and social connections, showing how language can bring together different fields and communities.

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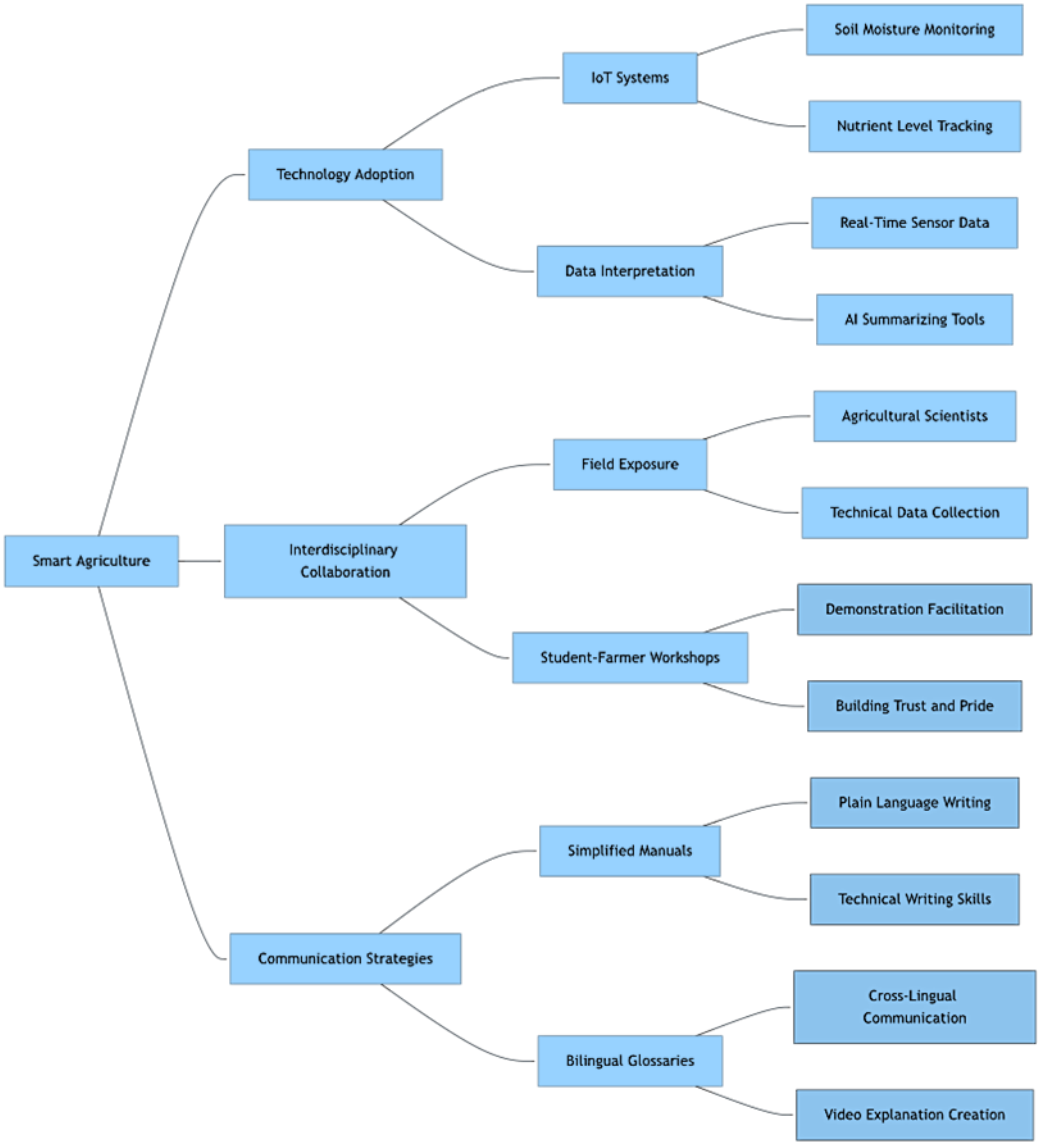

Fig 2. Communication & Interdisciplinary Approach (Author's Compilation)

5.3. Renewable Energy and Civic Storytelling

Projects on renewable energy is an example to show how English Language Teaching can be a way to take action in the community. Students wrote bilingual plays, poems, and digital stories that encouraged the use of solar energy in schools and rural areas. The process of storytelling mixed together data, understanding feelings, and designing, which changed language skills into participation in the community. Following Sterling's idea of transformative learning from 2010, English served as a tool for raising awareness and working together. The outreach resulted in real changes, with two schools starting to use solar lights-showing that communication can brighten both people's minds and their communities.

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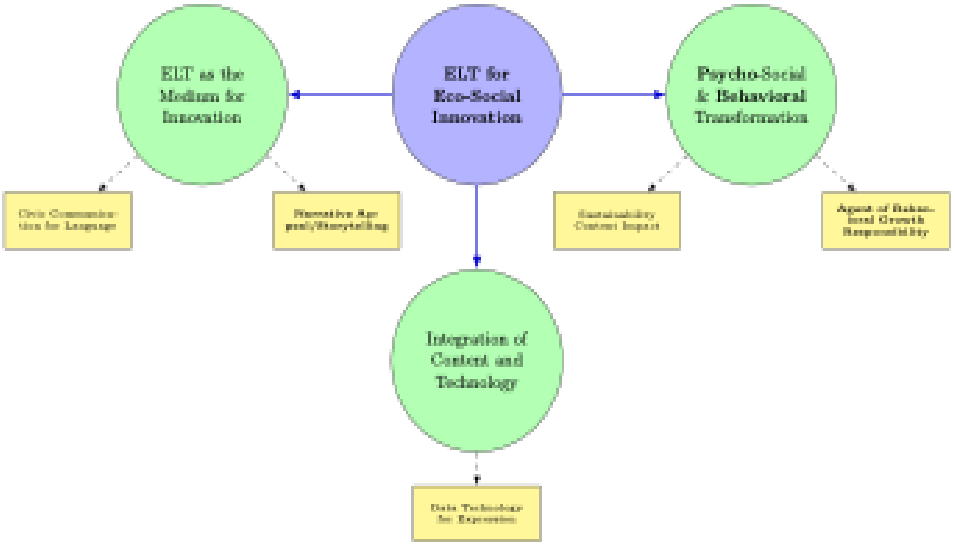

Fig 3. ELT for Eco-social Innovation (Author's Compilation)

The three case illustrations-Food Waste Management, Smart Agriculture-and Renewable Energy-collectively demonstrate that English Language Teaching (ELT), when consciously integrated with technology and sustainability themes, can evolve from a linguistic exercise into a practice of social transformation. The projects validated the conceptual framework outlined in this paper, where Language as Practice, Sustainability as Context and Transformation as

6. A Significant Change as Outcome

Outcome function as mutually reinforcing elements. Across all three cases, Language as Practice emerged as the connective thread. English became the medium through which students gathered information, negotiated ideas and communicated solutions. In the Food Waste Management project, persuasive essays and digital posters sharpened rhetorical precision and vocabulary while strengthening empathy and moral reasoning. The Smart Agriculture initiative required technical translation—students had to simplify Internet of things-based data for farmer communication, embodying the notion of "English for access" rather than "English for prestige." In the Renewable Energy project, storytelling and advocacy presentations provided authentic spaces for spoken fluency and creative expression. These experiences reflect Freire's (1970) argument that language gains meaning when used for liberation and dialogue rather than rote performance. The model (Fig.4) draws theoretical support from global frameworks of Education for Sustainable Development (ESD) advocated by UNESCO (2017), which emphasise cross-disciplinary, action-oriented learning. It also resonates with emerging research on Eco-ELT and Sustainability-Integrated Language Pedagogy (Kalsum et al., 2024; Ngo & Le-Khanh, 2025), both of which stress that language teaching can nurture environmental literacy and intercultural empathy. The relationship between the three components-practice, context and transformation-forms the

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conceptual core of this study. Together, they present ELT as an open, participatory space that links communication with ethical and technological innovation.

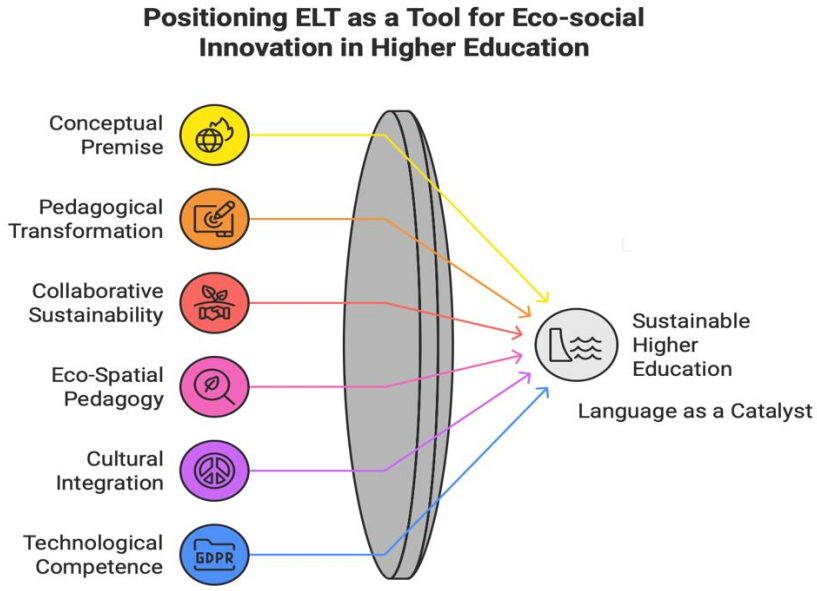

Fig.4 . Pedagogical and ethical framework to embed sustainability within English learning curriculum (Author's Compilation)

7. Recommendations and Policy Implications

The findings from the three case illustrations reveal that English Language Teaching, when linked with sustainability and technology, can become a powerful medium for ethical learning and community participation. However, realizing this vision requires systemic change at pedagogical, institutional and policy levels.

7.1.The Pedagogical and Curricular Reform

ELT curricula in higher education should focus on project-based learning that connects communication skills with sustainability issues. Courses should involve real projects where students use English to create campaigns, write policy briefs, document processes, or interview community members. Assessments should prioritize effective communication over grammar accuracy. Additionally, technology should be purposefully integrated to enhance digital skills and ecological awareness, using tools like Artificial Intelligence and simulations for active learning about sustainability.

7.2.Institutional and Policy Backing

Meaningful change in education relies on the commitment of institutions. Universities should recognize and reward teamwork between English Language Teaching (ELT) faculty and technical departments to enhance education. Collaboration helps teachers rethink their roles. Policies should connect ELT outcomes with Sustainable Development Goals, especially in Quality Education and Partnerships. Furthermore, universities need to fund professional development that trains ELT

faculty in eco-social teaching and technology, offering workshops on sustainability and intercultural teamwork.

7.3.Addressing Barriers

Sustainability-oriented English Language Teaching (ELT) faces challenges, especially due to technological inequality in rural areas. Universities should ensure equal access to digital resources for all students. Public–private partnerships can provide necessary tools and support. Cultivating epistemic humility is crucial; recognizing local knowledge as valuable. This approach can change students from "problem solvers" to co-learners, enhancing education. These ideas suggest a need for a new vision of ELT to promote eco-social innovation.

8. Conclusion

This study highlights how English Language Teaching (ELT) can shift from a focus on language to a tool for sustainability education. Universities can make English learning more meaningful by incorporating eco-social and technological aspects into lessons. The study explored three projects: Food Waste Management, Smart Agriculture, and Renewable Energy Advocacy, which helped students gain language skills, ecological awareness and civic responsibility. The qualitative study showed that learning English becomes significant when used to address real issues. Technology played a key role, with AI tools improving writing and digital devices making sustainability concepts clear. Students noted a greater sense of responsibility towards the environment and society. The paper suggests positioning ELT as a tool for Eco-social Innovation in Higher Education

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