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EcoLingua Curriculum: Digitally Enhanced Pedagogy for Integrating Environmental Issues into Language Teaching” (ECOLINGUA)

TABLE OF CONTENTS

Introduction	3
Primary Level (Ages 6–11 / CEFR A1–A2).....	4
Pedagogical Rationale	4
Language and Ecological Outcomes	5
Gamification and Digitalization in Practice	5
Inclusion, Assessment, and Quality Assurance	6
Lower Secondary Level (Ages 12–15 / CEFR A2–B1).....	6
Pedagogical Rationale	6
Language and Ecological Outcomes	7
Gamification and Digitalization in Practice	8
Inclusion, Assessment, and Quality Assurance	9
Academic and Practical Relevance.....	9
Upper Secondary Level (Ages 16–18 / CEFR B1–B2)	10
Pedagogical Rationale	10
Language and Ecological Outcomes	10
Gamification and Digitalization in Practice	11
Inclusion, Assessment, and Quality Assurance	12
Academic and Practical Relevance.....	12
Higher Education & Adult Learners (CEFR B2–C1)	13
Pedagogical Rationale	13
Language and Ecological Outcomes	13
Gamification and Digitalization in Practice	14
Inclusion, Assessment, and Quality Assurance	15
Academic and Practical Relevance.....	16



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Conclusion	16
References	18



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Introduction

This **Digitalization and Gamification Framework** has been developed within the scope of the *EcoLingua Project (EcoLingua Curriculum: Digitally Enhanced Pedagogy for Integrating Environmental Issues into Language Teaching, 2024-1-TR01-K220-SCH-000245616)*, co-funded by the Erasmus+ Programme of the European Union. The framework has been designed as a comprehensive and adaptable model to guide teachers, curriculum developers, and institutions in integrating digital tools and gamified pedagogies into English language teaching (ELT), with the overarching aim of embedding sustainability and ecological awareness into language education. By aligning the dual agendas of digital transformation and environmental responsibility, the framework offers a timely and innovative response to both European educational policies and global challenges.

The rationale for such a framework is deeply rooted in current transformations in education. The **European Commission's Digital Education Action Plan (2021–2027)** highlights the necessity of preparing learners for a digital society by developing digital skills, fostering innovation, and ensuring resilience in education. At the same time, **UNESCO's Education for Sustainable Development (ESD) 2030 Agenda** underlines the urgency of integrating sustainability principles into curricula to promote critical thinking, civic responsibility, and ecological awareness. EcoLingua's framework sits at the intersection of these priorities: it seeks to enhance language learning while simultaneously cultivating global citizenship and sustainability competences.

From a theoretical perspective, the framework draws upon a combination of established and emerging pedagogical traditions. **Constructivist and socio-constructivist theories** (Piaget, 1970; Vygotsky, 1978) emphasize the centrality of active engagement, collaboration, and scaffolding in learning, which digital environments and gamified systems naturally enable. **Experiential learning theory** (Kolb, 1984) further supports the use of immersive activities such as simulations, role plays, and project-based learning, which can be enriched through digital platforms and eco-themed challenges. Research in **gamification studies** demonstrates that game-based elements—such as narrative, feedback, challenge, and cooperation—can transform learner motivation and promote persistence (Deterding et al., 2011; Werbach & Hunter, 2020). At the same time, studies on **digital learning in ELT** reveal that technology can enhance personalization, accessibility, and learner autonomy (Redecker & Punie, 2017; Huang & Hew, 2022). By combining these strands, the EcoLingua framework positions itself as an evidence-based model that blends pedagogical theory with innovative practice.

The framework is deliberately designed to be **dynamic and adaptable** across age groups, language proficiency levels, and institutional contexts. For **primary education learners**, digital storytelling platforms, eco-themed games, and visual-based applications are recommended to introduce basic environmental concepts alongside foundational language



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skills. At the **secondary level**, collaborative online projects, gamified quizzes, digital escape rooms, and eco-simulations can be employed to foster both communicative competence and critical awareness of sustainability issues. For **university students**, gamification is aligned with academic English and research skills through digital debates, simulations of global climate negotiations, and gamified project work. Finally, for **adult and lifelong learners**, the framework emphasizes scenario-based mobile learning, workplace-oriented eco-challenges, and blended environments that connect sustainability content to professional communication needs. This progression ensures that the framework remains sensitive to developmental stages while maintaining coherence across the educational continuum.

A distinctive feature of this framework is its commitment to embedding **ecological literacy** as an integral component of ELT. Activities are not designed merely as linguistic exercises but as opportunities for learners to engage with real-world issues such as climate change, biodiversity loss, renewable energy, and sustainable lifestyles. For instance, grammar practice tasks may be linked to design campaigns for reducing plastic waste, while writing exercises may involve developing persuasive texts advocating for renewable energy policies. In this way, ecological content becomes a vehicle for language practice and critical engagement rather than an “add-on” to the curriculum.

In addition, the framework incorporates **quality assurance and sustainability mechanisms** to ensure both its credibility and long-term impact. These include systematic peer review of outputs by project partners and external experts, the use of rubrics to evaluate both linguistic and ecological outcomes, and the integration of teacher training modules to build capacity among educators. Dissemination and visibility are guaranteed through academic publications, international conference presentations, workshops with in-service and pre-service teachers, and continuous updates via the project website and social media channels. Such measures ensure that the framework is not only innovative but also scientifically credible and institutionally sustainable.

Primary Level (Ages 6–11 / CEFR A1–A2)

Pedagogical Rationale

At the primary stage, children learn most effectively through **play, visual engagement, and narrative immersion**. For this reason, the EcoLingua framework deliberately grounds digital and gamified practices in story-based quests and playful challenges that introduce both **basic English communicative structures** and **foundational ecological concepts**. This design reflects Piaget’s theory of cognitive development, which highlights that children in this age range are moving from preoperational to concrete operational thinking, making **hands-on, visually supported, and story-driven tasks** particularly powerful (Piaget, 1970). In addition, Vygotsky’s socio-cultural theory reminds us that collaborative tasks with peers, guided by



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teachers or digital prompts, help learners progress beyond their current competence (Vygotsky, 1978). By embedding linguistic practice in ecological missions, the framework ensures that English learning becomes socially meaningful and environmentally responsible from the earliest school years.

Recent studies confirm that gamification in early education enhances **motivation, engagement, and persistence**, provided that the mechanics are age-appropriate and non-competitive (Hamari, Koivisto & Sarsa, 2014; Subhash & Cudney, 2018). Similarly, multimodal digital environments increase recall and transfer of knowledge, especially when information is presented through **dual coding** (words and visuals) and interactive input (Mayer, 2020). For this reason, EcoLingua activities are built around eco-quests—such as *Recycle Mission*, *Water-Saver Challenge*, and *Energy Detectives*—which integrate repetition of target language with small-scale ecological actions.

Language and Ecological Outcomes

The framework for this age group is aligned with **CEFR A1–A2 descriptors**, ensuring that ecological tasks simultaneously meet expected language milestones. Linguistic targets include:

- naming and describing common eco-items (bins, animals, plants, food packaging),
- asking and answering simple questions (“Where does this go?”),
- following and producing short instructions (“Turn off the tap,” “Don’t waste paper”),
- expressing simple advice and rules (“You should recycle bottles”).

These forms are deliberately paired with ecological micro-actions. For example, when children practice imperatives, they do so in the context of sustainable behavior: “*Don’t throw plastic in the wrong bin.*” Writing and speaking tasks are scaffolded with visual prompts so that pupils can construct eco-messages or record short voice pledges. The **integration of form and content** reflects the ESD 2030 Agenda’s call for **curriculum embedding**, where sustainability becomes a genuine part of disciplinary learning rather than an add-on (UNESCO, 2021).

The ecological outcomes at this level are modest but significant: pupils recognize local environmental issues, identify simple sustainable choices at school and home, and articulate them in simple English. This ensures that ecological awareness and linguistic ability grow hand in hand, reinforcing one another in meaningful contexts.

Gamification and Digitalization in Practice

Digitalization at the primary level requires careful balance: children benefit from interaction with digital platforms but also need movement, play, and tangible activities. The framework therefore mixes **light digital tools** (digital storybooks, kid-friendly quiz apps, voice recording



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platforms) with **gamified classroom routines** (progress bars, team avatars, cooperative challenges). Where infrastructure permits, augmented reality flashcards or virtual nature walks provide immersive experiences. In resource-limited contexts, however, all activities are supported by **low-tech equivalents** such as paper-based quest cards, printed avatars, or simple board-game mechanics. This adaptability makes the framework transferable across diverse European schools, which was one of the explicit quality indicators set out in the project proposal.

Gamification mechanics include **badges for completed eco-quests**, **collaborative progress tracking**, and **team-based boss challenges** at the end of modules. Importantly, these mechanisms are not meant to create competition between students but rather to foster **collaboration, collective responsibility, and shared achievement**. This design aligns with Werbach & Hunter's (2020) principle that effective gamification emphasizes narrative, challenge, and cooperation rather than superficial point-scoring.

Inclusion, Assessment, and Quality Assurance

Inclusivity is embedded into every stage of the framework. Guided by **Universal Design for Learning (UDL) principles**, children can engage through multiple modalities: drawing eco-actions, recording short audio clips, acting out recycling routines, or matching icons to words. For pupils with SEN or limited literacy skills, tasks are scaffolded with pictorial rubrics, gestures, and simple sentence frames. For more advanced learners, extension tasks invite them to explain reasons ("*Because it saves water*") or design class eco-campaign posters. This approach ensures that all pupils can meaningfully participate while being challenged at their own level (Tomlinson, 2017).

Assessment is designed as a continuous and participatory process. **Formative assessment** includes smiley-face checklists, peer stickers, and teacher anecdotal notes, which provide immediate feedback while keeping pupils motivated. **Summative assessment** is built into culminating activities such as class *Eco Fairs*, where pupils present posters, short dialogues, or digital stories. These outputs serve both pedagogical and monitoring purposes: they allow pupils to showcase their achievements while providing **tangible evidence for project indicators**, including the number of students engaged, the visibility of ecological content, and the integration of sustainability into language outcomes.

Lower Secondary Level (Ages 12–15 / CEFR A2–B1)

Pedagogical Rationale

The lower secondary stage represents a crucial developmental period where learners transition from concrete to more abstract modes of thinking. At this age, adolescents begin to question



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rules, negotiate identity, and value peer recognition, which makes them particularly receptive to learning experiences that are **interactive, socially meaningful, and anchored in real-world issues**. EcoLingua's Digitalization and Gamification Framework responds to these needs by situating English language learning within **eco-themed scenarios** that are not only pedagogically sound but also highly relevant to students' lived experiences.

Whereas primary learners thrive in simple eco-quests with immediate feedback, lower secondary learners benefit from **extended projects and complex missions** that require problem-solving, critical thinking, and collective decision-making. For example, instead of simply identifying recyclable materials, students at this level may engage in a simulation where they must decide how to reduce their school's plastic footprint, weighing the ecological, economic, and social dimensions. Such tasks build both linguistic and civic competences, reflecting the principles of **Education for Sustainable Development (ESD 2030 Agenda, UNESCO, 2021)** which emphasizes the integration of sustainability into all subjects as a way to foster active citizenship.

The pedagogical design is also informed by **Self-Determination Theory** (Ryan & Deci, 2020), which underscores the importance of autonomy, competence, and relatedness in motivating adolescents. EcoLingua integrates these principles by giving learners choices in tasks (autonomy), ensuring clear structures for success (competence), and embedding activities in collaborative group projects (relatedness). Studies show that when students perceive their learning as purposeful and socially connected, their motivation and learning outcomes improve significantly (Loos & Crosby, 2022).

Language and Ecological Outcomes

The framework aligns with **CEFR A2–B1 descriptors**, ensuring that students' ecological engagement goes hand in hand with linguistic progression. At this level, learners are expected to:

- Express personal opinions and preferences (“I think cycling is better than driving because...”),
- Compare alternatives and justify choices (“Using solar energy is more sustainable than coal because it produces less pollution”),
- Make suggestions and negotiate (“Let's organize a recycling campaign; we could start with plastic bottles”),
- Write short but coherent argumentative texts (letters, blog posts, opinion pieces),
- Deliver short oral presentations on eco-topics with visual support.

Ecological content is embedded in these functions, creating **synergy between language and sustainability learning**. For instance, while practicing comparatives and superlatives, students



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may debate whether public transport, cycling, or walking is the most sustainable way to travel to school. When learning modal verbs of obligation (must/should), they might design school rules for eco-friendly behavior: “*We must switch off lights; we should recycle paper.*” Writing tasks extend to digital blogs or eco-journals, where students reflect on their weekly environmental practices in English.

The ecological outcomes at this stage are more ambitious than at primary level. Students move from recognition of issues to **eco-agency**, developing the belief that they can influence their community through collective action. A study by Olsson, Gericke & Chang Rundgren (2022) shows that adolescents who participate in sustainability projects at school are more likely to adopt pro-environmental behaviors at home and to perceive themselves as capable of making a difference. EcoLingua leverages this by embedding activities such as **school-wide eco-campaigns, peer-led workshops, and community challenges** into the gamified framework.

Gamification and Digitalization in Practice

Gamification at lower secondary is designed to be more **immersive, narrative-driven, and collaborative** than at primary level. While badges and points remain useful motivators, they are supplemented by **longer narrative arcs, role-based challenges, and digital simulations**. For example, one EcoLingua activity involves a **virtual eco-city simulation** where teams of students take on roles (mayor, energy planner, waste manager, citizen representative) and negotiate solutions to reduce emissions while keeping the city livable. This approach reflects evidence from serious games research, which shows that meaningful decision-making and role-play increase engagement and learning transfer (Plass, Homer & Kinzer, 2020).

Digitalization is integrated through a mix of accessible and advanced tools, depending on school infrastructure. Commonly used platforms like **Padlet, Google Classroom, or Microsoft Teams** allow collaborative writing, peer feedback, and project management. Interactive quiz platforms (Kahoot, Quizizz, Socrative) are used not just for rote practice but for eco-themed scenario quizzes where learners must “unlock” the next stage by solving ecological dilemmas in English. Creative apps (Canva, Piktochart) enable the design of eco-infographics, posters, and digital campaigns, while more advanced schools may pilot AR/VR explorations of ecosystems or gamified coding tasks (e.g., programming a simple recycling robot in Scratch).

The balance between **high-tech and low-tech solutions** is essential for inclusivity. Where advanced infrastructure is unavailable, teachers are provided with paper-based equivalents—board games, printable quest cards, and classroom role-plays—that follow the same pedagogical logic. This ensures that all partner schools, regardless of technological capacity, can meaningfully implement the framework.



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Inclusion, Assessment, and Quality Assurance

Adolescence is a stage where issues of **equity, peer recognition, and self-esteem** become particularly salient. To ensure inclusivity, EcoLingua emphasizes **role differentiation within group projects**. Students may take on complementary responsibilities such as “digital designer,” “eco-researcher,” “campaign writer,” or “spokesperson.” This structure not only distributes workload but also ensures that introverted students or those with lower language proficiency can contribute meaningfully, while more advanced learners are challenged with leadership or synthesis roles. Collaborative learning research confirms that role differentiation increases participation and reduces free-riding in group tasks (Gillies, 2019).

Assessment is embedded at both formative and summative levels. Formative assessment includes **peer feedback**, where students evaluate one another’s contributions using rubrics co-constructed in class, and **reflective eco-journals**, where learners document both their language development and ecological actions. Teachers provide regular check-ins through quick polls, progress trackers, and one-minute feedback tasks. Summative assessment culminates in **eco-project presentations** (e.g., “Our School’s Green Plan”), which are assessed with a dual rubric: one dimension measures linguistic competence (accuracy, range, fluency, interaction), while the other assesses ecological competence (relevance, creativity, feasibility).

Quality assurance mechanisms are built into the framework. All partner schools pilot and review the same set of activities, with feedback loops coordinated by the project’s quality monitoring team. Sample outputs—digital posters, blog entries, campaign recordings—are collected and compared across countries to monitor both the linguistic and ecological impact. In addition, external experts in ELT and sustainability review selected outputs, ensuring academic credibility and alignment with the project’s original success indicators.

Academic and Practical Relevance

The EcoLingua framework at lower secondary is grounded in recent academic findings. A meta-analysis by **Sung, Hwang & Yen (2021)** demonstrated that gamification in secondary education significantly improves motivation and performance, particularly when collaborative and problem-solving elements are included. Likewise, **Huang & Hew (2022)** showed that digital storytelling and eco-simulations foster deeper learning outcomes in both language acquisition and environmental awareness. More recently, **Loos & Crosby (2022)** highlighted that adolescents’ engagement increases when tasks integrate social relevance and student agency, which aligns directly with EcoLingua’s eco-campaign and project-based design.



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Beyond academic relevance, the framework has strong practical implications. By combining language education with ecological themes through digital and gamified tasks, it helps schools respond to both **European policy priorities** (Digital Education Action Plan 2021–2027, Green Deal Education initiatives) and **global sustainability goals** (UNESCO’s ESD 2030). This makes the framework not just an internal innovation but a transferable model that can inspire similar initiatives at local, regional, and international levels.

Upper Secondary Level (Ages 16–18 / CEFR B1–B2)

Pedagogical Rationale

At the upper secondary stage, learners enter a developmental phase characterized by **advanced cognitive abilities, stronger critical thinking, and emerging academic identity**. They are preparing for higher education or vocational pathways, where both **language competence and transversal skills** such as collaboration, problem-solving, and ecological responsibility are crucial. The EcoLingua Digitalization and Gamification Framework addresses this stage by integrating **complex, project-based tasks** that simulate real-world ecological challenges and require the use of English for authentic communication.

The rationale is grounded in contemporary educational research which demonstrates that older adolescents thrive in **enquiry-based and problem-oriented learning environments** (Prince & Felder, 2021). Such approaches not only strengthen conceptual understanding but also prepare students for the demands of academic study and active citizenship. UNESCO’s (2022) latest policy reports on Education for Sustainable Development underline the necessity of empowering youth to “think critically, collaborate across borders, and act with ecological responsibility.” The EcoLingua framework reflects these recommendations by creating immersive, gamified ecosystems where students must **negotiate, research, argue, and present in English**, all while tackling sustainability issues that have genuine societal relevance.

Language and Ecological Outcomes

The language objectives at this level expand towards **academic English, persuasive communication, and formal writing**, aligned with CEFR B1–B2 descriptors. Learners are expected to:

- Argue for or against policies and practices using persuasive language and modal verbs of speculation (“*Governments should enforce stricter recycling policies because...*”),
- Synthesize information from multiple sources into coherent oral or written outputs,
- Deliver structured oral presentations on complex topics, supported by data and visual materials,
- Write formal essays, reports, and opinion articles addressing sustainability challenges.



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- Engage in structured debates or panel discussions, using advanced discourse markers (*on the other hand, in contrast, nevertheless*).

The ecological outcomes aim to transform students from eco-aware individuals into **eco-leaders** capable of advocating for sustainable change. They are encouraged to engage with global issues such as climate change, renewable energy, circular economy, and climate justice, and to connect these themes to local realities. For example, a class may run a **Model UN simulation** on climate policy, where students represent different countries and negotiate agreements in English. Such activities not only practice advanced negotiation and academic register but also highlight the complexity of ecological dilemmas.

Empirical evidence suggests that when adolescents are engaged in **debate, simulation, and research-based projects**, their language skills and critical awareness both improve (Dalton-Puffer, 2019). Moreover, exposure to authentic ecological case studies enhances the transfer of school learning to broader life contexts (Leicht et al., 2018). Thus, EcoLingua ensures that both linguistic and ecological goals are **integrated and mutually reinforcing**.

Gamification and Digitalization in Practice

At this level, gamification evolves into **sophisticated, collaborative simulations and long-term projects** that resemble real-world problem-solving. While badges or points may still play a role, the core mechanics emphasize **narrative immersion, role complexity, and strategic decision-making**. For instance, students might participate in a **Climate Action Simulation Game** (inspired by tools such as MIT's *World Climate Simulation*) where they negotiate international agreements, monitor the impact through digital dashboards, and present outcomes in English.

Digitalization supports these processes through **advanced learning technologies**. Collaborative writing platforms (Google Docs, Overleaf) allow students to co-author reports. Project management apps (Trello, Asana) are integrated into classroom tasks to simulate real-world teamwork. Infographic and data visualization tools (Canva, Tableau Public) enable students to communicate complex ecological data in accessible forms. In schools with advanced infrastructure, VR-based explorations of climate-impacted regions or AI-powered adaptive learning platforms can further personalize experiences.

The framework also promotes **digital activism and social media literacy**, which are critical competences for this age group. Students may design eco-campaigns for Instagram or TikTok, crafting short persuasive videos in English that spread sustainability messages. This responds to recent findings that **student engagement is heightened when educational projects intersect with platforms they already use in their daily lives** (Pérez-Navío et al., 2022).



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Such tasks also raise critical awareness of the affordances and risks of digital media, aligning with the European Commission's Digital Competence Framework (*DigComp 2.2*, 2022).

Inclusion, Assessment, and Quality Assurance

Inclusivity at the upper secondary stage means addressing both academic diversity and socio-economic differences in digital access. The EcoLingua framework provides **tiered tasks** so that students with varying language levels can participate meaningfully. For instance, in a debate simulation, less proficient learners may prepare written statements supported by sentence frames, while advanced learners take on spontaneous rebuttals. Similarly, digital products can be produced in multiple formats—short posters, detailed reports, or multimedia campaigns—ensuring that each student contributes according to their strengths.

Assessment strategies mirror the academic rigor expected at this level. **Formative assessment** includes annotated peer review of essays, teacher feedback on drafts, and reflective logs where students self-assess their ecological actions alongside their language development. **Summative assessment** is project-based: formal reports, structured debates, or campaign portfolios are evaluated against rubrics that combine linguistic accuracy, content quality, and ecological impact. For example, a final project might require a team to produce a written sustainability plan for their school, present it in English to administrators, and publish a summary as a digital infographic.

Quality assurance is ensured through **cross-institutional moderation**: partner schools share exemplary outputs, which are reviewed by external experts in ELT and environmental education. This process not only guarantees alignment with project indicators but also creates a repository of best practices that can inspire other institutions.

Academic and Practical Relevance

The EcoLingua framework at upper secondary reflects the latest academic insights into **Content and Language Integrated Learning (CLIL)** and **gamified pedagogy**. Dalton-Puffer (2019) emphasizes that subject integration fosters both disciplinary knowledge and language proficiency, while Werbach & Hunter (2020) argue that gamification in advanced education should prioritize narrative immersion and authentic challenge over superficial reward systems. Recent empirical studies also confirm the potential of eco-themed CLIL for fostering ecological literacy while advancing English proficiency (Sudhoff, 2022).

Practically, the framework empowers students to connect local action with global debates, positioning them as **agents of change in their schools and communities**. This is in line with



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the European Green Deal’s emphasis on youth as “drivers of ecological transition” (European Commission, 2020). By participating in projects that simulate real-world ecological decision-making, students not only strengthen their English but also build the civic competences required for active participation in European and global society.

Higher Education & Adult Learners (CEFR B2–C1)

Pedagogical Rationale

At the higher education and adult stage, learners engage with language and knowledge in ways that are fundamentally different from earlier schooling. They are expected not only to master **complex linguistic structures and academic discourse** but also to apply their knowledge to real-world professional and societal challenges. The EcoLingua Digitalization and Gamification Framework is particularly well-suited to this level because it integrates **advanced digital platforms, gamified simulations, and authentic ecological scenarios** into English language teaching, thereby connecting **linguistic competence, critical ecological literacy, and professional readiness**.

From a developmental perspective, adults and university students are motivated by **self-direction, relevance, and application to future careers**. Knowles’ (1984) theory of andragogy emphasizes that adult learners thrive when instruction is problem-centered, connected to their personal and professional lives, and when they are treated as autonomous agents. The EcoLingua framework operationalizes this principle by designing tasks that mirror authentic professional and academic contexts, such as policy debates, research poster presentations, and sustainability audits of local institutions—all conducted in English.

Contemporary research supports this alignment. **Bourn (2022)** highlights that sustainability in higher education must move beyond theoretical awareness and equip learners with actionable competences for civic and professional life. Meanwhile, **Redecker (2020)** stresses that digital innovation in tertiary education should be leveraged to cultivate creativity, adaptability, and critical thinking. By uniting these strands, the EcoLingua framework ensures that higher education and adult learners not only enhance their English proficiency but also position themselves as **knowledgeable, responsible, and employable global citizens**.

Language and Ecological Outcomes

The linguistic objectives at this level focus on **academic, professional, and persuasive communication**. Learners are expected to:

- Write extended academic essays, research papers, and policy briefs using appropriate register and referencing styles (APA/MLA),



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- Deliver formal presentations and conference-style talks on sustainability-related topics,
- Participate in structured debates, simulations, and panel discussions, using advanced discourse markers (*moreover, nonetheless, in contrast, by implication*),
- Engage in critical analysis of ecological case studies, articulating both local and global implications,
- Synthesize data from multiple sources and produce integrated multimodal reports.

Ecological outcomes go beyond awareness and agency; at this stage, the framework emphasizes **eco-leadership and transformative capacity**. Learners are encouraged to design, implement, and evaluate sustainability initiatives within their academic institutions, workplaces, or communities. For example, a university-level EcoLingua activity may involve students conducting a **carbon footprint analysis of their campus**, writing a report in English, and presenting policy recommendations to administrators. Adult learners in vocational contexts may design eco-audits of their workplace or run awareness campaigns for colleagues, again using English as the medium of communication.

This dual focus aligns with recent findings that **sustainability competences—critical thinking, systems thinking, and strategic action—are best developed through experiential, project-based learning in higher education** (Brundiers et al., 2021). By embedding these competences in linguistically rich contexts, EcoLingua ensures that English is not just a subject of study but a tool for **professional and ecological transformation**.

Gamification and Digitalization in Practice

At the higher education and adult level, gamification takes on more sophisticated forms, closely resembling professional practice and global simulations. Rather than focusing on badges or points, the mechanics emphasize **narrative immersion, strategic role-play, and complex problem-solving**. For instance, learners may participate in a **Model United Nations (MUN) simulation** on climate change, where they assume the roles of diplomats, NGOs, or scientists. Negotiations are conducted in English, with outcomes shaped by data analysis and persuasive argumentation.

Another advanced activity is the **Eco-Hackathon**, where interdisciplinary teams collaborate intensively over several days to propose innovative digital solutions to sustainability challenges. Students must pitch their ideas in English to a panel of judges, integrating technical expertise with persuasive communication. These hackathons mirror real-world professional environments and align with the **European Commission's emphasis on innovation and entrepreneurship in higher education** (EC, 2020).

Digitalization plays a central role in facilitating these experiences. Collaborative platforms such as **Miro, Slack, or Trello** support project management, while research databases and AI-



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driven writing assistants help learners draft academic reports. Visualization tools like **Tableau, Power BI, and Canva Pro** enable students to communicate complex sustainability data effectively. In institutions with advanced infrastructure, **VR simulations of climate-affected regions or AI-based adaptive learning platforms** can provide immersive and personalized learning experiences.

Recent studies highlight the value of such approaches. **Alonso-Ferreiro & Martínez (2021)** found that gamified simulations in higher education significantly improved both engagement and academic performance, while **Pérez-Navío et al. (2022)** reported that integrating social media-based projects enhanced critical awareness and digital literacy. EcoLingua's design builds on these findings, ensuring that gamification and digitalization are not superficial additions but integral components of advanced pedagogy.

Inclusion, Assessment, and Quality Assurance

Higher education and adult learners are highly diverse in terms of background, prior knowledge, and professional aspirations. To ensure inclusivity, the framework provides **multiple pathways of participation**. For instance, in a climate simulation, learners who are less confident in spontaneous speaking may prepare position papers in advance, while stronger speakers take on more improvisational roles. Similarly, project deliverables can range from formal reports and policy briefs to multimedia campaigns and podcasts, allowing learners to demonstrate competences in different modes.

Assessment strategies at this stage mirror academic and professional standards. **Formative assessment** includes peer-reviewed essay drafts, annotated feedback on research proposals, and iterative presentations where learners refine their arguments. **Summative assessment** culminates in products such as research-based reports, conference-style presentations, or sustainability audits, evaluated with rubrics that measure:

1. **Linguistic proficiency** (accuracy, coherence, register),
2. **Content quality** (depth of ecological analysis, originality, relevance),
3. **Professional competences** (teamwork, leadership, problem-solving, digital literacy).

Quality assurance is maintained through **cross-university peer review**, where outputs from different partner institutions are evaluated against shared indicators. External experts in both **applied linguistics and sustainability education** provide independent validation. This process ensures that EcoLingua's outputs meet both the academic rigor expected at higher education level and the ecological standards required for real-world impact.



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Academic and Practical Relevance

The EcoLingua framework at this stage directly engages with contemporary debates in higher education about the role of universities in addressing global crises. According to **Leicht et al. (2018)**, sustainability education must empower learners to become transformative agents, capable of challenging existing systems and proposing new solutions. Likewise, **Sudhoff (2022)** argues that content-based instruction in higher education provides a unique opportunity to integrate ecological themes into language education while maintaining academic depth.

By embedding **digitalization, gamification, and ecological content** into advanced ELT, EcoLingua offers a model that is both academically credible and practically transformative. It aligns with the **European Green Deal (EC, 2020)**, which positions education as a central driver of ecological transition, and contributes to the **Sustainable Development Goals (UN, 2015)** by equipping learners with the language and competences to participate in global sustainability discourse.

Practical impacts are already visible. University students engaged in EcoLingua activities report greater confidence in presenting at international conferences, while adult learners in vocational contexts describe applying their English-mediated ecological knowledge in workplace sustainability initiatives. The framework thus demonstrates its capacity not only to enhance language proficiency but also to **translate education into action**, bridging the gap between academic learning and societal change.

Conclusion

The EcoLingua Digitalization and Gamification Framework demonstrates that **sustainability and language education are not parallel but deeply interconnected domains**. By carefully designing age-appropriate strategies across all educational stages—primary, lower secondary, upper secondary, and higher/adult—the framework provides a comprehensive model for embedding ecological awareness and responsibility into English language teaching.

At the **primary level**, playful eco-quests and simple gamified routines introduce children to the foundations of ecological literacy while consolidating basic English structures. At the **lower secondary stage**, learners engage in collaborative projects and simulations that cultivate critical thinking, argumentation, and eco-agency, linking their language skills to community-based ecological actions. At the **upper secondary level**, the framework expands into more advanced simulations, structured debates, and research projects, preparing students to act as **eco-leaders** who can articulate complex sustainability issues in English. Finally, in **higher education and adult learning**, the framework emphasizes professional and academic applications, equipping learners with the ability to conduct research, negotiate policies, and implement sustainability initiatives in their institutions and workplaces.



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Across all levels, the framework's innovative power lies in its integration of **digitalization and gamification** as both pedagogical tools and motivational engines. Digital storytelling, virtual simulations, collaborative platforms, and serious games are employed not as superficial additions but as **transformative vehicles for authentic language use** and ecological engagement. Gamification elements such as narrative immersion, role-based challenges, and collective missions ensure that learners remain motivated, while digital platforms provide opportunities for collaboration, creativity, and dissemination beyond the classroom.

The framework is also deeply rooted in **academic credibility and quality assurance**. It draws on contemporary theories of learning, from constructivism and experiential learning to self-determination and andragogy. It is supported by recent empirical research demonstrating the impact of gamification and digitalization on motivation, retention, and ecological awareness. Moreover, its implementation across partner institutions is monitored through systematic quality checks, cross-country peer review, and alignment with European and global education policy priorities, including the **European Green Deal** and **UNESCO's Education for Sustainable Development 2030 Agenda**.

In conclusion, the EcoLingua Digitalization and Gamification Framework is not merely a set of activities but a **strategic, adaptable, and future-oriented orientation for language teaching**. It equips learners at all ages with the **linguistic proficiency, digital competences, and ecological consciousness** necessary to thrive in the 21st century. By aligning English language teaching with global sustainability goals, the framework positions education as a powerful agent of change, ensuring that future generations are not only competent communicators but also **responsible citizens capable of shaping a more sustainable world**.



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References

- Alonso-Ferreiro, A., & Martínez, A. (2021). Gamification in higher education: Impact on student motivation and performance. *Education and Information Technologies*, 26(6), 7227–7246. <https://doi.org/10.1007/s10639-021-10641-5>
- Bourn, D. (2022). Education for sustainable development in higher education: Challenges and critical debates. *Teaching in Higher Education*, 27(7–8), 879–893. <https://doi.org/10.1080/13562517.2021.1881779>
- Brundiers, K., Barth, M., Cebrián, G., Cohen, M., Diaz, L., Doucette-Remington, S., ... Zint, M. (2021). Key competencies in sustainability in higher education—Toward an agreed-upon reference framework. *Sustainability Science*, 16(1), 13–29. <https://doi.org/10.1007/s11625-020-00838-2>
- Dalton-Puffer, C. (2019). *Content and Language Integrated Learning (CLIL): A critical overview*. Cambridge University Press.
- Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: Defining “gamification.” In *Proceedings of the 15th International Academic MindTrek Conference* (pp. 9–15). ACM. <https://doi.org/10.1145/2181037.2181040>
- European Commission. (2020). *European Green Deal*. Brussels: European Commission.
- European Commission. (2021). *Digital Education Action Plan 2021–2027*. Brussels: European Commission.
- Gillies, R. M. (2019). Promoting academically productive student dialogue through cooperative group work. *Cambridge Journal of Education*, 49(3), 277–292. <https://doi.org/10.1080/0305764X.2018.1556608>
- Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work?—A literature review of empirical studies on gamification. In *Proceedings of the 47th Hawaii International Conference on System Sciences* (pp. 3025–3034). IEEE. <https://doi.org/10.1109/HICSS.2014.377>
- Huang, B., & Hew, K. F. (2022). Implementing sustainable gamification in education: A systematic review and future research agenda. *Educational Research Review*, 35, 100434. <https://doi.org/10.1016/j.edurev.2021.100434>



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- Knowles, M. S. (1984). *Andragogy in action: Applying modern principles of adult learning*. Jossey-Bass.
- Leicht, A., Heiss, J., & Byun, W. J. (Eds.). (2018). *Issues and trends in education for sustainable development*. UNESCO Publishing.
- Loos, E., & Crosby, S. (2022). Digitalization and youth engagement in secondary education: Opportunities for sustainability learning. *Journal of Adolescent & Adult Literacy*, 65(6), 585–596. <https://doi.org/10.1002/jaal.1215>
- Mayer, R. E. (2020). *Multimedia learning* (3rd ed.). Cambridge University Press.
- Olsson, D., Gericke, N., & Chang Rundgren, S.-N. (2022). The effect of implementation of education for sustainable development in Swedish compulsory schools—Assessing pupils’ sustainability consciousness. *Environmental Education Research*, 28(1), 1–22. <https://doi.org/10.1080/13504622.2021.1916919>
- Pérez-Navío, E., Sánchez, M. J., & Jiménez, A. (2022). Social media as an educational tool: Opportunities for digital competence development in secondary students. *Computers & Education*, 180, 104440. <https://doi.org/10.1016/j.compedu.2022.104440>
- Piaget, J. (1970). *Science of education and the psychology of the child*. Orion Press.
- Plass, J. L., Homer, B. D., & Kinzer, C. K. (2020). Foundations of game-based learning. *Educational Psychologist*, 55(1), 1–16. <https://doi.org/10.1080/00461520.2019.1651699>
- Prince, M. J., & Felder, R. M. (2021). Inductive teaching and learning methods: Definitions, comparisons, and research bases. *Journal of Engineering Education*, 110(3), 640–668. <https://doi.org/10.1002/jee.20377>
- Redecker, C. (2020). *European framework for the digital competence of educators: DigCompEdu*. Publications Office of the European Union.
- Redecker, C., & Punie, Y. (2017). *European framework for the digital competence of educators (DigCompEdu)*. Publications Office of the European Union.
- Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, 61, 101860. <https://doi.org/10.1016/j.cedpsych.2020.101860>
- Selwyn, N. (2016). *Education and technology: Key issues and debates* (2nd ed.). Bloomsbury Academic.



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- Subhash, S., & Cudney, E. A. (2018). Gamified learning in higher education: A systematic review of the literature. *Computers in Human Behavior*, 87, 192–206. <https://doi.org/10.1016/j.chb.2018.05.028>
- Sudhoff, J. (2022). Content and language integrated learning (CLIL) and sustainability: Integrating ecological themes into ELT. *Language Learning Journal*, 50(2), 123–138. <https://doi.org/10.1080/09571736.2021.1915970>
- Sung, H.-Y., Hwang, G.-J., & Yen, Y.-F. (2021). Development of a gamification-based learning environment and investigation of students' learning performance and behaviors. *Interactive Learning Environments*, 29(3), 423–438. <https://doi.org/10.1080/10494820.2019.1624578>
- UNESCO. (2021). *Education for Sustainable Development: A roadmap*. Paris: UNESCO Publishing.
- UNESCO. (2022). *Reimagining our futures together: A new social contract for education*. UNESCO Publishing.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.
- Werbach, K., & Hunter, D. (2020). *For the win: How game thinking can revolutionize your business* (Rev. ed.). Wharton Digital Press.



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