

Sustainable Design and Digital Creativity in Foreign Languages. Learning Activities for Technological Pathways: Construction & Woodworking Manufacturing

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Abstract

This article presents an innovative pedagogical design implemented within the **TEACH4SD** project, aimed at integrating the GreenComp framework into vocational education and training (VET) for construction and Woodworking Manufacturing design. By blending ludic simulation through the "Objectif planète durable" / “Go Goals” game with digital creativity using Artificial Intelligence, the activity fosters a deep understanding of sustainability interdependencies. Students explore the transition from technical technicians to "World Citizens" by bridging the gap between classical French nature poetry and modern sustainable design principles. The results demonstrate how a multidisciplinary approach—combining Modern Languages (French as a Foreign language), technology, and ethics—can empower students to envision and act toward a sustainable future.

Introduction

The transition to a sustainable society requires not only technical skills but also a fundamental shift in values and mindset. For students in the technological stream, particularly those specializing in Construction and Interior Design, understanding the environmental footprint of their future

profession is crucial. This learning activity, titled "Sustainable Design and Digital Creativity," utilizes the European Sustainability Competence Framework (GreenComp) to structure a 4-hour immersive experience.

The project moves beyond traditional teaching by using a dual-layered approach:

1. Systemic Understanding: Through the "Objectif planète durable" simulation, students identify the complex cause-effect chains of resource management in their specific sectors.

2. Emotional and Ethical Connection: By engaging with the poetry of authors like Arthur Rimbaud, Victor Hugo, Guillaume Appolinaire and Émile Verhaeren, and comparing these human insights with AI-generated content, students develop a "Promoting Nature" mindset.

This integration ensures that future technicians are not just builders or designers, but conscious actors capable of individual and collective initiative in the face of global climate challenges.

Learning activities - General Information

- **Activity Title:** Sustainable Design and Digital Creativity: 4 Hours with GreenComp in Construction and Woodworking Manufacturing
- **Sector:** Other: Modern Languages (FLE) / Education for Sustainable Development (Applied to Construction & Woodworking Manufacturing Design)
- **Duration:** 4 hours (200 minutes)
- **Class / No. of Students:** Lower secondary high school, technological stream. Students from the following specializations: Construction and Installation Drafting Technician & Woodworking Manufacturing and Interior Design Technician.
- **Type of Education:** VET (Vocational Education and Training)
- **Activity Format:** Face-to-face / Online (hybrid elements for AI usage)
- **Location:** Classroom / Computer Lab (for the AI activity)

1. Targeted GreenComp Competencies

All 12 competencies are targeted, with a particular emphasis on Systems thinking, Exploratory thinking, Future literacy, Individual initiative, and Promoting nature.

Area	Targeted Competencies
Area 1 – Embodying sustainability values	Valuing sustainability, Supporting fairness, Promoting nature

Area 2 – Embracing complexity in sustainability	Systems thinking, Critical thinking, Problem framing
Area 3 – Envisioning sustainable futures	Future literacy, Adaptability, Exploratory thinking
Area 4 – Acting for sustainability	Individual initiative, Collective action, Political agency

2. Description

The activity integrates the content of Elective Course (Module 2 - focused on practical applications of Sustainable Development) with a ludic and digital creativity component, according to the optional French language course project "Écolos en vadrouille"/ "Eco-Explorers on the Trail".

Students in the fields of construction and Woodworking Manufacturing design will explore global sustainability challenges and goals (SDGs) through the game "Objectif planète durable," applying systems thinking principles to understand cause-effect chains in their professions (e.g., deforestation for Woodworking Manufacturing, construction waste). Subsequently, they will use Artificial Intelligence (AI) tools in the activity "La poésie de la nature par l'IA" to generate or analyze texts/images about nature, establishing an emotional and ethical connection between the natural environment and their professional impact (from technical drawing to interior design), transforming the concept of "Promoting nature" into concrete action.

3. Learning Objectives Correlated with GreenComp

- **LO1. Analyzing Cause-Effect and Interdependencies (Area 2: Systems Thinking):** Students will be able to analyze and identify at least three key interdependencies (cause-effect chains) between environmental, economic, and social factors in the Construction and Woodworking Manufacturing sectors through decision-making within the didactic game "Objectif planète durable". (GreenComp Correlation: Systems Thinking – recognizing complex interdependencies and relationships between social and natural systems).
- **LO2. Awareness of the Value of Nature and Resources (Area 1: Promoting Nature):** Students will be able to express and justify the intrinsic value of natural resources (wood, water, minerals) required for their profession by transforming AI-generated concepts (from "La poésie de la nature par l'IA") into specific ethical design principles. (GreenComp Correlation: Promoting Nature – appreciating biodiversity, ecosystem services, and the importance of the natural environment for human and non-human life).

- **LO3. Generating Visions and Alternative Scenarios (Area 3: Future Literacy & Exploratory Thinking):** Students will be able to conceive and describe in writing (in the form of "design principles") at least two alternative and sustainable visions for the future of their specializations, using digital creativity and exploring possibilities beyond current practices. (GreenComp Correlation: Future Literacy & Exploratory Thinking – visualizing and imagining positive, necessary, and possible future scenarios based on creative and speculative thinking).
- **LO4. Manifesting Agency and Initiative (Area 4: Collective Action & Individual Initiative):** Students will be able to participate actively in decision-making during the game (Collective action) and, based on reflection, formulate at least one concrete commitment (an eco-action) to apply as future technicians to contribute to sustainability goals. (GreenComp Correlation: Collective Action & Individual Initiative – acting individually and collectively for change, identifying barriers, and implementing solutions based on a sense of responsibility and commitment).

4. Activity Flow (200 minutes)

Stage	Duration	Activities and Methods	Targeted GreenComp Competencies
I. Introduction and Anchoring	30 min	1. Context (FLE): Brief recap of SD principles in French. Introduction of Sustainable Development Goals (SDGs). 2. Technical Connection: Guided discussion: "How does the profession of Construction Drafter and Woodworking Manufacturing Designer affect the environment (resources, waste, energy)?"	Area 1: Valuing sustainability. Area 2: Systems thinking.
II. Ludic Activity: "Objectif planète durable"	75 min	1. Instructions (Game): Explaining rules (role-playing/simulation for resource allocation/SDG goals).	Area 2: Systems thinking, Problem framing. Area 3: Adaptability.

		<p>2. Implementation: Group work focusing on SDG 9 (Industry, Innovation, and Infrastructure) and SDG 12 (Responsible Consumption and Production).</p> <p>3. Systems Analysis: Debriefing to identify interdependencies (e.g., cheap but polluting materials compromise fairness and nature).</p>	<p>Area 4: Collective action.</p>
<p>III. Digital Creative Activity: "La poésie de la nature par l'IA"</p>	<p>50 min</p>	<p>1. AI and Ethics: Discussion on the relationship between technology/AI and nature.</p> <p>2. Task 1 (Production/Analysis): Using AI (e.g., Google Gemini) to: a) Generate a poem about a resource (wood, water, ground) ; b) Compare it with classical French nature poetry (Rimbaud, Hugo, Apollinaire, Verhaeren) to understand the limits and richness of AI.</p> <p>Resources for the students:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Documentation sheets containing the verses of the poems selected by the teacher to be studied by the students. <input type="checkbox"/> AI Tools: Internet access and an AI assistant (e.g., Google Gemini) for the poetic creation activity, and an AI assistant (e.g., www.suno.com) for the musical creation activity. 	<p>Area 3: Future literacy, Exploratory thinking.</p> <p>Area 1: Promoting nature.</p> <p>Area 4: Individual initiative.</p>

		3. Task 2 (Future Vision): Reformulating AI verses into "sustainable design principles" (e.g., transforming metaphors into resource circularity goals).	
IV. Conclusions and Reflection	45 min	1. Presentation of Visions: Representatives share design principles obtained through poetry and technical integration. 2. Final Reflection (Journal/Short Essay): Answering how their role as a technician has changed into being a "World Citizen". Targets attitude transformation (Political agency).	Area 4: Political agency, Individual initiative. Area 2: Critical thinking.

5. Evaluation

- Formative Evaluation: Observation of participation in the "Objectif planète durable" game (decision-making under pressure and collaboration) and the quality of systems analysis discussions.
- Summative Evaluation: Evaluation of the Final Product: "Sustainable Design Principles". Criteria: 1. Linguistic accuracy in French (where applicable); 2. Depth of the conceptual connection between poetry (nature) and technical design (profession); 3. Application of at least 3 GreenComp competencies.

6. Resources: Selected French Poetry

Author	Poem Title	Main Theme (GreenComp Correlation)
Arthur Rimbaud	«Le Bateau ivre»	Escape, wild nature, journey /Promoting nature.

Arthur Rimbaud	«Le Dormeur du val»	The vitality and indifference of nature, the nature as a cradle that provides warmth /Promoting nature. The waste of a young life highlights the intergenerational injustice of violent systems. The brutal contrast between life and death, the absurdity and cruelty of war / Supporting Fairness. The "twist" ending reveals that peace is an illusion, mirroring how ecological damage is often hidden. / Critical thinking.
Victor Hugo	«La Source»	Nature as a source of life and purity, permanence / Promoting nature.
Victor Hugo	«Oceano Nox»	The sea, the loss, ephemerality of human life / Valuing sustainability.
Guillaume Apollinaire	«Le Pont Mirabeau»	The passage of time, flow of water, memory / Future literacy & Adaptability.
Émile Verhaeren	«Le Chant de l'eau»	Force and symbolism of water, the country landscape/ Systems thinking.

Conclusions

The integration of the GreenComp framework within vocational education and training (VET) proves that sustainability is not just an abstract concept but a practical necessity for future technicians in the Construction and Woodworking Manufacturing sectors. By moving from a purely technical perspective to one that encompasses Systems thinking and Promoting nature, students learn to recognize the deep interdependencies between their craft and the natural world.

The use of AI as a creative partner—contrasted with classical French poetry—allowed students to explore future visions and alternative scenarios while maintaining an ethical and human-centric approach to design. Ultimately, this pedagogical design empowers students to act as World Citizens, transforming their professional skills into individual and collective initiatives for a sustainable future.

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