Enhancing VET National Networks
through Eco-innovation

Measuring the Impact of Challenge-Based Learning in Social-Hackathon: Case Study Results from the ENNEPlus Eco-Digithon

Dr. Anna Aleksanyan, Priv.-Doz., Ph.D.
Lecturer and International Project Leader
FH Joanneum, Austria
University of Graz, Austria
anna.aleksanyan@fh-joanneum.at; anna.aleksanyan@uni-graz.at

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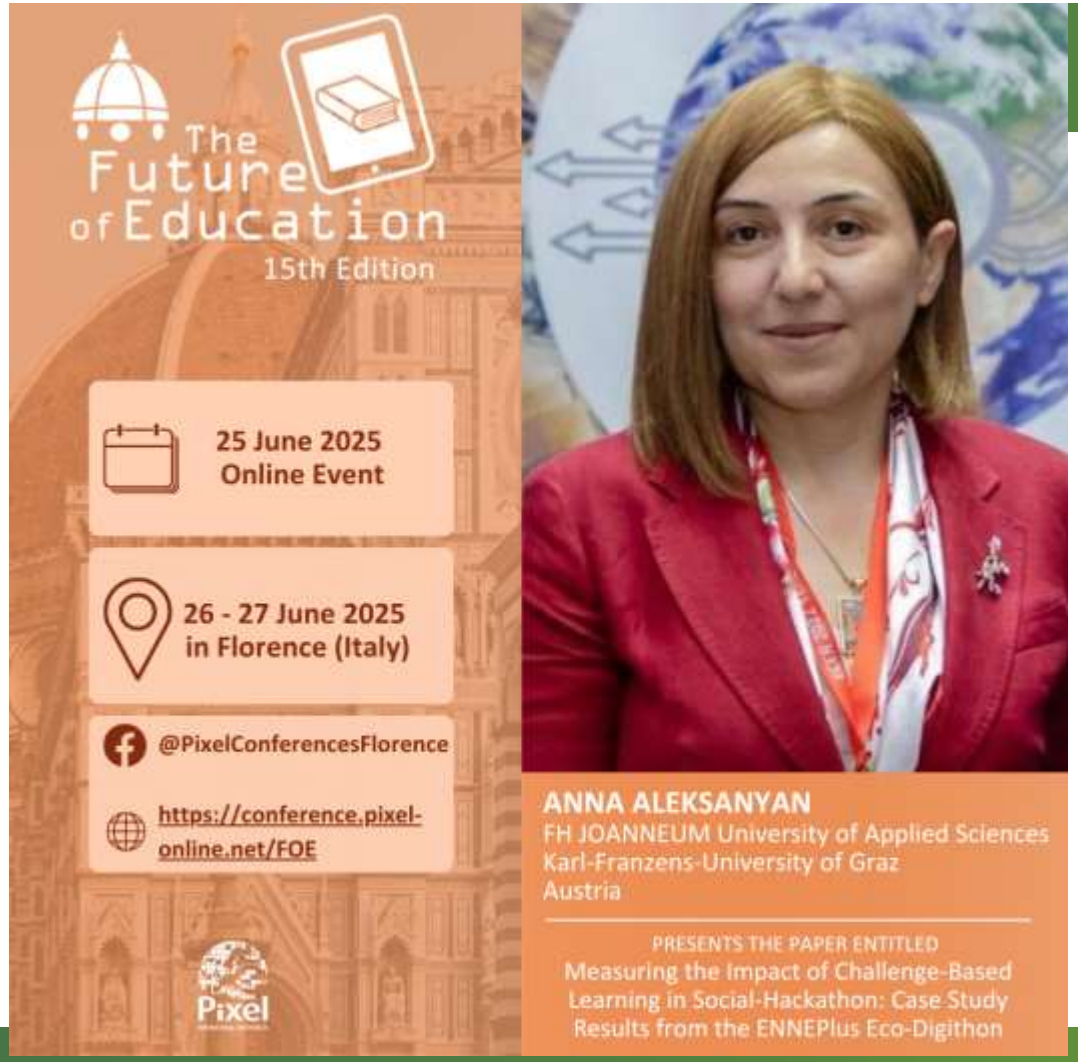
Let's connect!



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Why Sustainability Education?

The urgency of global environmental, social, and economic challenges necessitates a shift in how we prepare future professionals. Higher education must foster competencies like systems thinking, ethical reasoning, and real-world problem-solving (UNESCO, 2017).

Challenge-Based Learning (CBL) offers a flexible, experiential approach aligned with the UN Sustainable Development Goals, particularly SDG 4 (Quality Education) and SDG 11 (Sustainable Cities and Communities) (Gallagher & Savage, 2020).

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The Need for Competence-Driven VET In the 21st century

Vocational Education and Training (VET) must move beyond job-readiness toward preparing learners for complex societal roles. Learners need to acquire sustainability awareness, digital fluency, and transversal competencies. Challenge-Based Learning (CBL) offers a methodology to address this by engaging students in authentic, collaborative, problem-solving processes linked to global goals like the SDGs.

Kolb (1984); UN SDG Framework

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Theoretical Foundation – What is Challenge-Based Learning?

- **CBL is rooted in experiential learning theory (Kolb, 1984). It empowers students to tackle real-world challenges through active investigation, collaboration, and implementation.**

Key Principles:

- Real-world relevance,
- student autonomy,
- interdisciplinary teamwork,
- iterative reflection

Apple Inc. (2009); Gallagher & Savage (2020)

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Why Challenge-Based Learning (CBL)?

- CBL positions learners as active agents addressing complex problems collaboratively across disciplines (Leijon et al., 2021).
- Unlike project-based learning, which often focuses on predefined solutions, CBL starts with a global challenge and invites student-driven inquiry, increasing motivation and knowledge retention (Vilalta-Perdomo et al., 2020).

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CBL Cycle: Engage – Investigate – Act

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Comprehensive CBL Framework for Educators

Phases of Implementation:

- Engagement Phase: Identifying and contextualizing real-world sustainability challenges.
- Investigation Phase: Conducting interdisciplinary research to understand the complexities of the challenge.
- Action Phase: Developing and implementing actionable solutions with measurable outcomes.

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Methodology for Implementing CBL

- **Teacher Training and Professional Development:**
  - Structured programs focusing on facilitating CBL and integrating sustainability concepts.
- **Curriculum Design:**
  - Creation of interdisciplinary challenges that require application of knowledge across various subjects.
- **Digital and Community Integration:**
  - Utilization of digital platforms for collaboration and resource sharing.
  - Partnerships with community organizations to provide real-world contexts and mentorship.

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Case Study 1: GREENOVET Project

- **Overview:**
  - An international initiative integrating CBL into vocational education to promote green innovation.
- **Implementation:**
  - Students collaborate with industry partners on sustainability challenges, such as developing renewable energy solutions.
- **Outcomes:**
  - Enhanced student engagement and acquisition of practical skills relevant to the green economy.
  - Positive feedback from industry partners on the applicability of student-developed solutions (European Commission, 2023).

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Case Study 2: Sustainable Living Labs (SLL)

- **Overview:**
  - Experiential learning environments where students address sustainability challenges within their communities.
- **Implementation:**
  - Interdisciplinary student teams work on projects such as urban farming, waste reduction, and sustainable transportation.
- **Outcomes:**
  - Increased student awareness of local sustainability issues and development of actionable solutions.
  - Strengthened university-community partnerships leading to sustained environmental initiatives (Penn State Sustainability, n.d.).

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Integrating ENNEPlus Initiatives

- **ENNEPlus Project:**
  - A European network aimed at enhancing vocational education through international collaboration and innovation.
- **Eco-Digithon:**
  - A digital hackathon focused on developing eco-friendly technological solutions.
  - Provides a platform for students to engage in CBL by tackling real-world environmental challenges using digital tools.

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Challenges and Solutions in CBL Implementation

- **Challenges:**
  - Aligning CBL activities with standardized curricula and assessment methods.
  - Ensuring equitable access to resources and community partnerships.
- **Solutions:**
  - Developing flexible curricular frameworks that accommodate CBL methodologies.
  - Establishing networks among educational institutions, industries, and communities to support resource sharing and collaboration.

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Measuring the Impact of CBL

- **Assessment Tools:**
  - Utilization of both qualitative and quantitative metrics to evaluate student learning outcomes.
- **Student Feedback:**
  - Gathering reflections on the learning experience and perceived skill development.
- **Performance Indicators:**
  - Tracking progress on specific competencies related to sustainability and problem-solving.

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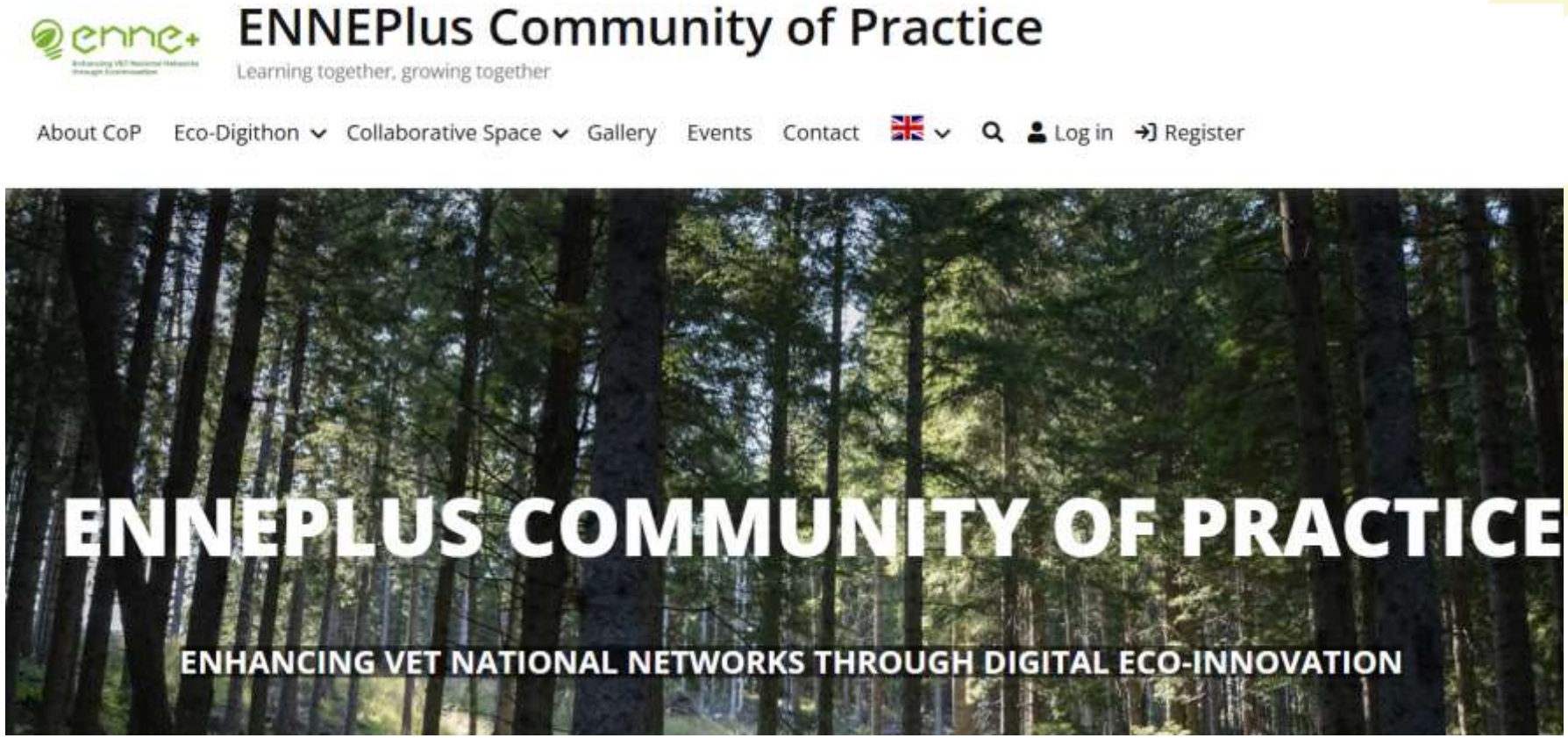
ENNEPlus Community of Practice | VET Teams Eco-Digithon



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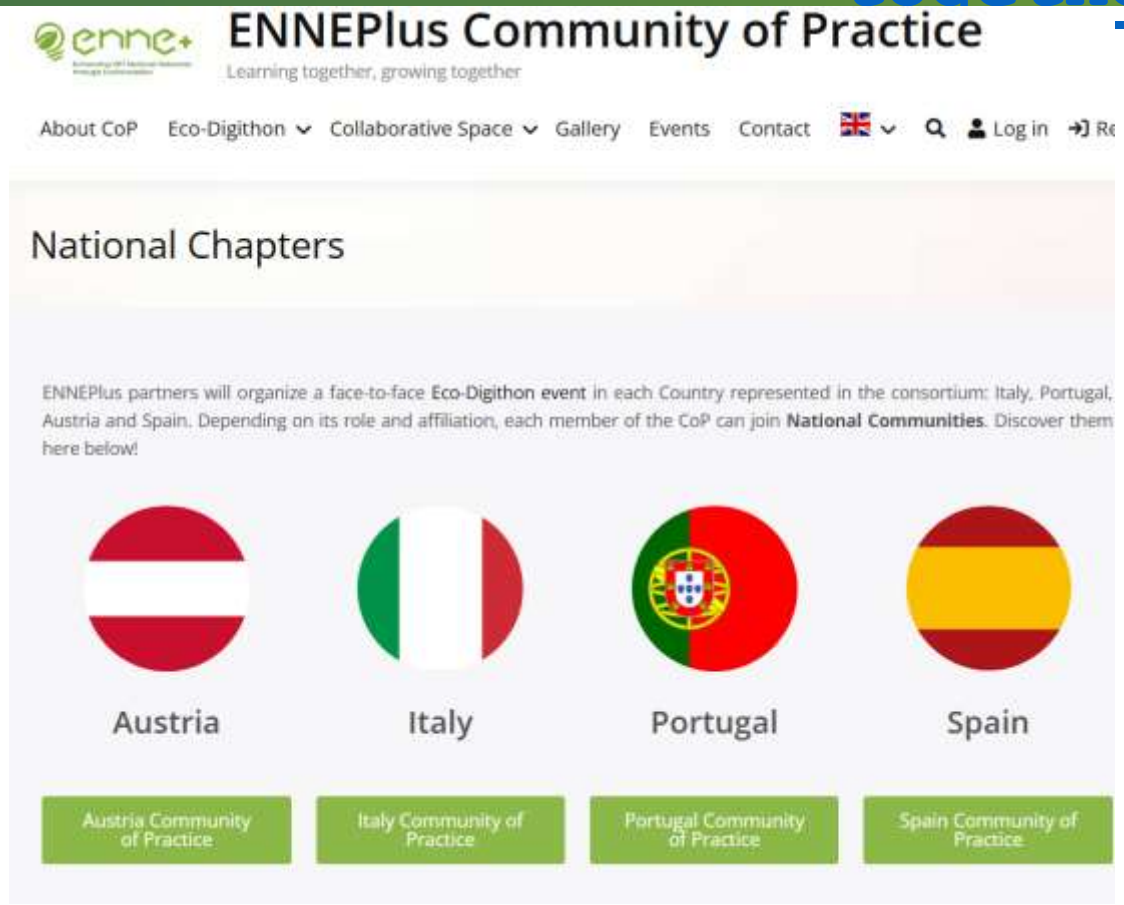
National Chapters | Learning together, growing together



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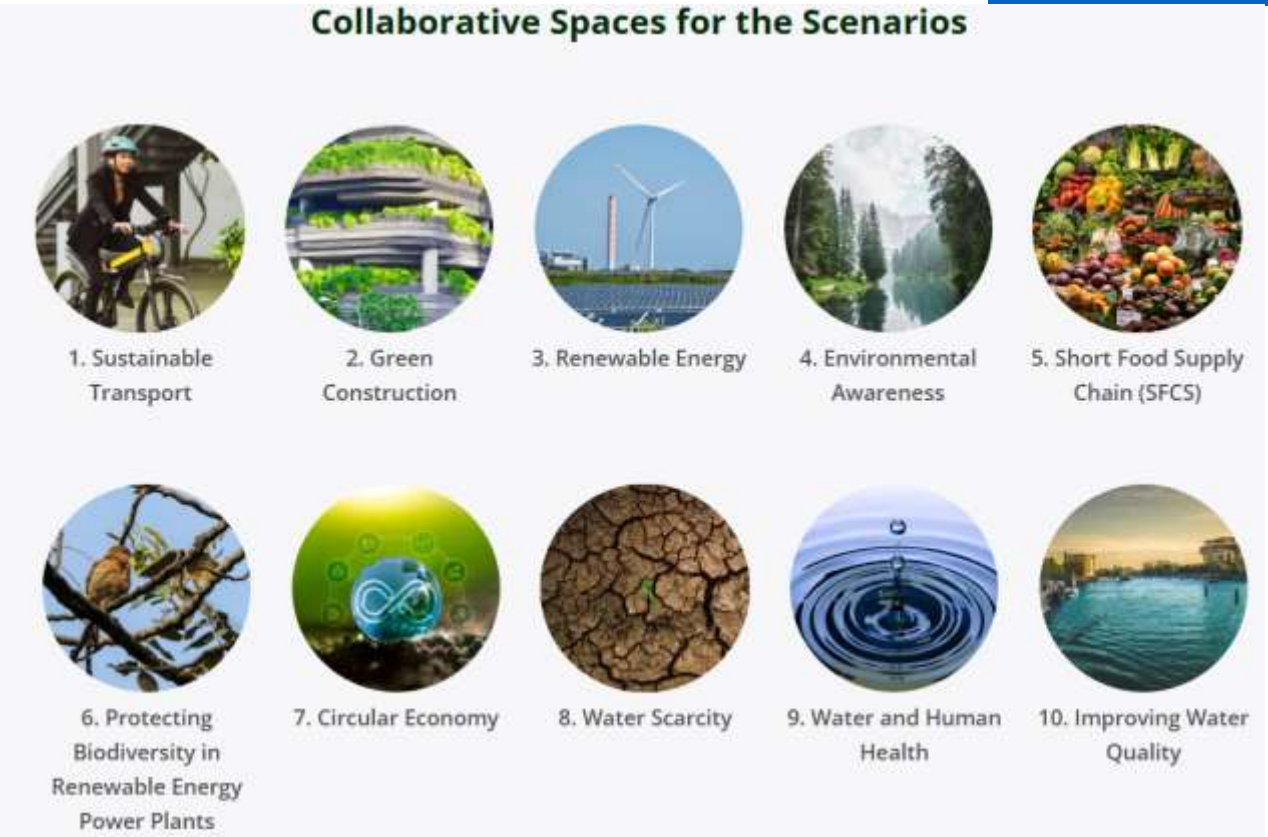
Learning Scenarios | Learning together, growing together



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ENNEPlus Project ENNEPlus (2024–2027) is a transnational Erasmus+ project targeting the integration of eco-innovation and CBL into VET systems.

- Countries: Austria, Italy, Spain, Portugal
- 31 participating VET institutions
- Over 620 students and 80 educators engaged
- Creation of a Community of Practice (CoP)
- Goal: Embed sustainability and digital challenge-solving in formal VET.

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What is the Eco-Digithon?

The Eco-Digithon is a social hackathon format co-developed by ENNEPlus to apply CBL in real contexts. It enables students to design solutions to environmental problems relevant to their communities.

Key features:

- **Thematic focus on SDGs (e.g., mobility, energy, food systems)**
- **Multinational teams**
- **Structured mentoring and industry collaboration**

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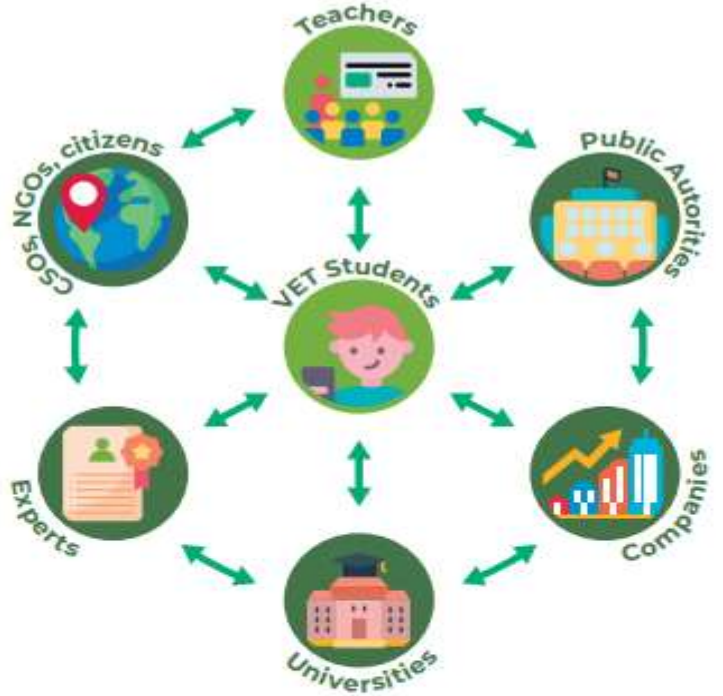
THE DEFINITION

The **Eco-Digithon** is an **educational marathon** primarily targeting Vocational Education and Training (VET) centers, focused on **creating and prototyping innovative digital and technological solutions to real societal and local problems**.

It involves a competition within and among VET centers and/or VET teams on environmental and sustainability challenges. Indeed, the solutions developed are aligned with the Sustainable Development Goals (SDGs), ensuring a global perspective on local challenges.

It also **promotes grassroots innovation through a participatory and multidisciplinary approach** as it engages not only VET centers but also stakeholders, policy-makers, companies, members of the academia and experts coming together for social hacking.

TARGET GROUPS AND PHASES



The process starts with the selection of one challenge related to the Sustainable Development Goals of the UN Agenda 2030, and the creation of the related community

Participants collaborate and start to prototype an innovative, digital and technological solution for a real societal problem. This phase foresees capacity building activities of VET students.

The Eco-Digithon competition is the final phase of the educational experience of all those involved in the co-design of the innovative, digital and technological solutions.

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Research Objective

- The primary aim of this research is to understand how structured CBL activities influence VET learner development.

Research Question:

- To what extent does participation in Eco-Digithons, using structured CBL scenarios and toolkits, influence VET learners' development of sustainability competencies and digital collaboration skills?

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Methodological Framework Design: Mixed-Methods Case Study (Creswell & Plano Clark, 2018)

Instruments:

- Pre- and post-event student surveys
- Teacher reflection journals
- Semi-structured student interviews

Analysis:

- Quantitative: Descriptive and comparative trends
- Qualitative: Thematic content analysis (Mayring, 2014)

- **Data Sources: 31 schools, 620+ students, 80+ educators**

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Preliminary Outcomes (To Be Presented) Empirical findings are currently under final review and will be presented during the session.

Focus areas:

- Learner motivation and engagement
- Skill development in digital collaboration
- Critical reflection and self-regulated learning
- Teacher and institutional feedback

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Key Reflections and Lessons Learned

- CBL increases learner agency and collaboration
- Mentoring and partnerships enhance authenticity
- Flexibility and co-ownership by educators is critical
- Community of Practice supports professional exchange and resource adaptation

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Looking Ahead

- Deeper data analysis (cross-country comparison)
- Toolkit refinement based on field results
- Model replication in additional VET systems
- Future collaborations between academia and industry

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Conclusion ENNEPlus shows that social hackathons like Eco-Digithons, grounded in CBL, can foster meaningful learning in sustainability and digital collaboration. The model offers strong potential for broad implementation in VET reform.

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