Concept Note

Project Title: **Education for Green Engineering, Energy-efficient Networking, and Code Optimization in Higher Education**
Project Acronym: **GREENByte**
Programme: ERASMUS+ Key Action 2 – _Cooperation Partnership
Sector: **Higher Education**
Duration: 24 months
Budget: 400.000 EURO

Priorities
Environment and fight against climate change
Supporting digital and green capabilities of the higher education sector

Target Group:
Computer Science and Software Engineering
Computer Science Faculty
IT Departments

1. Background (Aims, objectives & needs)

Green coding is an ICT practice that allows developers to code in an environmentally sustainable way. It involves reducing the energy required to process lines of code, incorporating ways to improve overall energy use, and creating sustainable practices across the development team. Green coding must go hand in hand with other environmentally friendly practices in the development process, such as reducing energy consumption, minimizing waste, and using sustainable materials.
However, substantial gaps remain in incorporating these skills into educational curricula and professional practices. A **2023 survey by the Institution of Engineering and Technology (IET)** found that **technical IT skills focused on sustainability**, such as green coding and energy-efficient software design, are among the top three barriers preventing companies in Europe from achieving net-zero goals. Companies are increasingly prioritizing **energy-efficient software solutions** as part of their sustainability strategies, particularly in sectors like cloud computing and IoT. However, universities have yet to integrate such Tel.: +30 2410 532824 e-mail: info@innovationhive.eu Address: Venizelou 141, 412 22, Larissa

courses widely into **computer science curricula**, creating a gap between what the industry needs and what graduates offer.

According to the Association for Computing Machinery, energy consumption in data centers has doubled over the past decade, and computing **contributes between 1.8% and 3.9% of global greenhouse gas emissions.** Yet, **less than 20% of developers** are trained in energy-efficient programming methods such as "lean coding," modular systems, or sustainable DevOps practices (Educative). Educational institutions are slow to integrate green coding principles into their programs. **Only 10%-15% of computer science curricula globally** include sustainability-focused content, leaving students unprepared for the rising demand for environmentally conscious IT solutions (Educative). Moreover, many students are trained in languages like Python and Java, which are widely used but less energy-efficient compared to alternatives like Rust or C, which are underrepresented in most academic programs. Additionally, practices such as minimizing code bloat, optimizing hardware utilization, and leveraging microservices are either poorly understood or not applied. For example, redundant code in open-source libraries often leads to excessive resource consumption, amplifying emissions. This lack of focus on green coding results in IT graduates lacking critical skills to meet the sustainability demands of industries and global climate requirements.

The project will address these gaps by equipping computer science, IT, and software engineering students with the green coding skills necessary for a sustainable future. This includes promoting an understanding of **energy-efficient programming** techniques,**lean coding**, and tools optimized for minimizing energy consumption. Practical training will cover strategies like memory optimization, minimizing processing demands, and developing low-carbon applications.

In addition to providing technical expertise, the project will fill the curricular gap by creating a modular, interdisciplinary course integrating green coding principles with real-world applications. This will involve partnerships with industry and sustainability experts to ensure relevance and impact. Through hands-on workshops, hackathons, and collaborative projects, students will develop and implement solutions, such as optimized algorithms for data centers or low-energy cloud-based systems.

By bridging the gap between academia and the sustainability demands of the tech industry, this project will empower the next generation of software developers to lead the transition toward environmentally sustainable IT practices, contributing to global climate goals while enhancing their employability in a growing green economy.

WP1-Project Management

WP2- Green Code Curriculum

A1. Workforce Readiness and Green Coding Needs

Surveys and focus groups with industry, academics, and students to identify key green coding skills and address gaps in current education.

A2: Curriculum Design

Development of a modular course on energy-efficient programming, lean coding, sustainable DevOps, memory optimization, and low-carbon applications.

A3: Educational Content Development

Creation of learning materials, including textbooks, video tutorials, interactive modules, case studies, and practical coding exercises.

A4: KoM

A5: Green Coding Meetups

Interactive meetups with students, faculty, and industry experts to present and refine the curriculum, gathering feedback for continuous improvement.

WP3- GreenByte-Hub

A1: GreenByte-Hub Platform Architecture

Defining the platform structure, including content hosting, real-time collaboration tools, and an open-source library for sharing and refining green coding solutions. User interaction guidelines will be established to support collaborative development and knowledge exchange.

A2: Developing the GreenByte-Hub

Building a scalable, secure platform integrating educational materials.

A3: Launching Collaborative Features on GreenByte-Hub

Activating real-time collaboration tools, live chat, and an open-source library for sharing green coding solutions.

A4.TPM

A5: GreenCode Labs

Testing the platform with users to gather feedback and refine its design, functionality, and user experience.

WP4: Byte4Green Battle

A1: Byte4Green Battle Design

Design of the competition, defining themes, guidelines, and evaluation criteria, with involvement from industry experts and academic mentors.

A2: Development of the Projects

Teams develop software solutions focused on energy efficiency, low-carbon applications, and sustainable DevOps practices.

A3: Byte4Green Bootcamp

Designed to select the best performing teams for the next stage of the competition.

A4. TPM

A5: Mentorship Program

Industry and academic mentors provide technical guidance, feedback, and support for project development and pitching preparation.

A6: Byte4Green Battle

Teams present their solutions to industry experts, showcasing innovations and gaining feedback, networking, and potential opportunities.

A7: Awards & Post-Battle Report

Awards for top projects, with follow-up support for further development through industry partnerships and a final outcomes report. Tel.: +30 2410 532824 e-mail: info@innovationhive.eu Address: Venizelou 141, 412 22, Larissa

WP5: Dissemination & Policy Advocacy

A1: Developing a dissemination strategy

Develop a strategy to effectively communicate the objectives and results of the project, targeting academia, industry and policy makers through defined channels, branded materials and structured timelines.

A2: Policy brief

Create a policy brief with recommendations for integrating green coding into education and industry, collaborating with stakeholders and aligning with sustainability priorities for targeted distribution.

A3: Sustain-iTalks series

Organising talks involving experts, students and practitioners to explore green coding and its role in sustainable computing, promoting discussion on energy-efficient practices and industry innovations in all partner countries.

“Virtual Training for Applied Soft Skills”

Concept Note

Project Title: Virtual Training for Applied Soft Skills

Project Acronym: VIRTASK

Programme: Erasmus+

Key Action: KA220 – Cooperation Partnerships in Vocational Education and Training

Sector: Vocational Education and Training (VET)

Duration: 24 Months

Budget: 250.000 EUR

1. Background

Rapid digitalisation and automation have significantly transformed labour markets across Europe. In the ICT sector, technical competences alone are no longer sufficient; soft skills such as communication, teamwork, problem-solving, leadership and crisis management have become essential for employability and career development. However, current VET programmes in ICT primarily focus on technical skills, while soft skills are often addressed only theoretically and insufficiently.

Building on lessons learned from previous KA220 VET projects, this project introduces an innovative, VR-based learning model to strengthen soft skills in ICT vocational education. By combining labour market-driven content with immersive learning technologies, the project aims to enhance the relevance, effectiveness and sustainability of VET systems.

2. Project Objectives

- To improve key soft skills of ICT VET learners and ICT professionals
- To strengthen the capacity of VET providers to deliver innovative, VR-supported soft skills training
- To align ICT vocational education more closely with labour market needs
- To foster sustainable cooperation between VET institutions and the world of work

3. Project priorities

- Contributing to innovation in Vocational Education and Training
- Adapting VET to labour market needs
- Supporting digital transformation and innovative learning approaches

4. Target groups

- ICT VET learners
- ICT sector employees and professionals
- VET trainers and educators in ICT
- Employers and HR professionals in the ICT sector

5. Consortium (example)

- Coordinator: VET School
- Partner 1: VR & Digital Learning Technology Provider
- Partner 2: VET Training Organisation / VET center
- Partner 3: Higher Education Institution
-Partner 4: VET school

6. Work packages

WP1 – Project Management and Quality Assurance

Objective: To ensure effective coordination, quality implementation and timely delivery of the project.
Activities:
- Project coordination and partner communication
- Financial and time management
- Quality assurance and monitoring
- Risk management

WP2 – Sector Analysis and Training Content Design

Objective: To identify labour market-relevant soft skills in the ICT sector and design targeted training content.
Activities:
- Sector visits and employer interviews
- Local workshops with ICT VET learners and professionals

- Data analysis and needs assessment reporting
- Design of five soft skills training modules

Outputs:
- Sector Analysis Report
- Soft Skills Needs Analysis Report
- Five training module outlines

WP3 – Development of VR-Based Learning Materials and Digital Platform

Objective: To develop immersive VR learning scenarios and a digital learning platform.
Activities:
- Design of VR-based soft skills scenarios
- Technical development of VR simulations
- Development of an online learning platform
- Multilingual adaptation of training materials
- Training workshops for VET providers

Outputs:
- Five VR-based soft skills scenarios
- Online learning platform
- Digital user guide for trainers

WP4 – Dissemination, Exploitation and Sustainability

Objective: To maximise project visibility, impact and long-term use of results.
Activities:
- Online and offline dissemination activities
- National and international multiplier events
- Networking with employers and policy makers
- Sustainability and exploitation planning

Expected impact

- Improved employability of ICT VET learners and professionals
- Increased innovation capacity of VET institutions
- Stronger alignment between education and labour market needs
- Transferable and scalable training model at European level

KA220-ADU Concept Note

Project Title: Developing Adults' Key Competences by Improving their Socio-Scientific Literacy

Project Acronym: SSL4ADULTS

Programme: Erasmus+

Key Action: KA220 – Cooperation Partnerships in Adult Education

Sector: Adult Education

Duration: 24 Months

Background

Adults are increasingly confronted with complex and controversial socio-scientific issues such as climate change, public health crises, vaccination, genetically modified foods and technological risks. Addressing these issues requires critical thinking, evidence-based reasoning and responsible decision-making. However, misinformation, emotional bias and limited analytical skills often hinder adults' ability to engage effectively with such challenges.

Socio-scientific literacy refers to the ability to evaluate evidence, construct arguments, consider ethical perspectives and make informed decisions on science-related societal issues. Despite its importance, socio-scientific literacy and related transversal competences are insufficiently addressed in adult education. Adult educators often lack structured methodologies and digital tools to support learners in developing these skills.

SSL4ADULTS addresses this gap by introducing an inclusive, inquiry-based and digitally supported learning approach that strengthens socio-scientific literacy among adult learners and educators, empowering them to participate more actively and responsibly in society.

Project Objectives

To improve socio-scientific literacy and key transversal competences of adult learners
To strengthen adult educators' capacity to address socio-scientific issues

To enhance critical thinking, argumentation and evidence-based decision-making
To promote inclusive and innovative adult learning practices

Project Priorities

Improving the availability of high-quality learning opportunities for adults
Addressing digital transformation in adult education
Promoting active citizenship and lifelong learning

Target Groups

Adult learners, especially low-skilled adults and adults with fewer opportunities
Adult educators and trainers
Adult education providers and lifelong learning centres
Local communities and adult learning stakeholders

Work Packages

WP1 – Project Management and Implementation

Objective: To ensure effective coordination, quality implementation and monitoring.

Project coordination and communication
Financial and administrative management
Quality assurance and evaluation
Risk management and reporting

WP2 – Socio-Scientific Literacy Framework and Assessment

Objective: To develop a competence framework and assessment tools for socio-scientific literacy.

Research and analysis of socio-scientific literacy in adult education
Development of a step-by-step competence framework
Design of a self-assessment tool for learners and educators
Validation with experts and practitioners

WP3 – Learning Resources and Digital Environment

Objective: To develop open and accessible learning resources and an e-learning environment.

Development of open educational resources for adult learners
Creation of training toolbox materials
Development of an e-learning platform (LMS)
Pilot testing and refinement

WP4 – Capacity Building and Pilot Activities

Objective: To strengthen educators' competences and test project outputs.

Training activities for adult educators
Pilot implementation with adult learners
Monitoring and evaluation of learning outcomes
Adaptation of materials based on feedback

WP5 – Dissemination and Sustainability

Objective: To ensure visibility, impact and long-term sustainability.

Dissemination and communication activities

Multiplier events at national and European level
Stakeholder engagement
Sustainability and exploitation planning

Expected Impact

Improved socio-scientific literacy and critical thinking of adult learners
Enhanced pedagogical competences of adult educators
Stronger capacity of adult education providers to address societal challenges
Increased active citizenship and informed decision-making
Sustainable integration of socio-scientific literacy in adult education