



ENGINEERS EUROPE

Fédération Européenne d'Associations Nationales d'Ingénieurs
European Federation of National Engineering Associations
Föderation Europäischer Nationaler Ingenieurverbände

The Importance of Developing and Validating the Hidden Credentials of Engineers

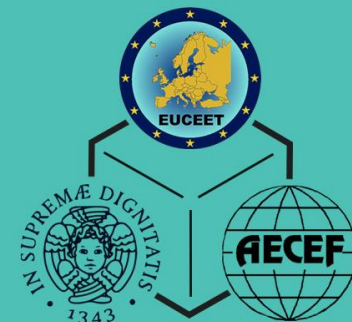
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The role of interactive teaching/learning approaches in the development of soft skills for Civil Engineering Education

2nd joint International Conference of EUCEET & AECEF

19-20 October 2023
Pisa- Le Benedettine
University of Pisa Congress Centre



INTRODUCTION - STRUCTURE

2nd EUCET and AECEF
Joint Event

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- I. Hidden Credentials : What are they ?
 - Benefits
 - Examples
- II. Engineers 4 Europe (E4E) project
 - Goals and Objectives
 - European Engineering Skills Council
 - Research Results
- III. Questions

I. HIDDEN CREDENTIALS : WHAT ARE THEY ?

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Hidden credentials relate to :

- Skills, knowledge and abilities that are not easily observable or quantifiable.
- Acquired through:
 - Practical experience
 - Informal learning
 - Personal qualities that are not captured by formal education or traditional certifications

I. HIDDEN CREDENTIALS : WHAT ARE THEY ?

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Hidden credentials are crucial in addressing real-world engineering challenges and **prepare engineers for complexities and uncertainties** in their professional careers. Examples of such credentials are :

- Problem-solving abilities
- Adaptability
- Creativity
- Communication skills

I. HIDDEN CREDENTIALS : BENEFITS

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- Validating hidden credentials helps in building **trust and credibility** within the profession.
- They help engineers to demonstrate their **expertise and capabilities**.
- They enhance the **confidence** of clients, employers and the general public in the abilities of the engineer.
- Recognizing hidden credentials promotes **diversity and inclusion** within the profession.

I. HIDDEN CREDENTIALS : EXAMPLES

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1. Leadership Skills

- To communicate effectively
- To delegate tasks
- To motivate team members
- To make informed decisions

2. Adaptability

- To think on their feet
- To be flexible
- To quickly adjust their approach

I. HIDDEN CREDENTIALS : EXAMPLES

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3. Problem-solving Abilities

- To think outside the box
- To analyse data
- To apply critical thinking skills to arrive at innovative solutions

4. Communication Skills

- To effectively convey complex ideas in a clear and understandable manner
- To bridge the gap between technical and non-technical individuals

I. HIDDEN CREDENTIALS : EXAMPLES

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5. Collaboration & Teamwork

- Effectively work with others
- Contribute to productive discussions
- Build positive working relationships

6. Project Management Abilities

- Overseeing planning, execution, completion of projects
- Organization
- Time management
- Ability to coordinate resources and teams

I. HIDDEN CREDENTIALS : CONSTRUCTION GRADUATES

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Which are the skills the **construction graduates** are lacking?

- Foreign language skills
- Ability to read and write documentation
- Knowledge of interpretation of financial and managerial indicators
- Knowledge of cost calculation and management
- Management skills

Survey from 2015, by Tallinn Technical University (TTU)

I. HIDDEN CREDENTIALS : IN CONCLUSION

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Developing and Validating Hidden Credentials of engineers is crucial for :

- Unlocking untapped talent
- Addressing complex societal challenges
- Building trust amongst stakeholders
- Fostering diversity withing the profession

II. ENGINEERS 4 EUROPE (E4E) PROJECT : GOALS

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- Shortage of Engineers in Europe and Shortage of Skills (hidden credentials)
- ERASMUS+ : ENGINEERS EUROPE with www.engineers4europe.eu
- Bridge the gap between Academia and Industry : develop micro-credential courses
- Set up a European Engineering Skills Council to develop a European Engineering Skills Strategy



ENGINEERS 4 EUROPE

II. ENGINEERS 4 EUROPE (E4E) PROJECT : CONSORTIUM

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Industry & Profession



Accreditation



Higher Education & Training



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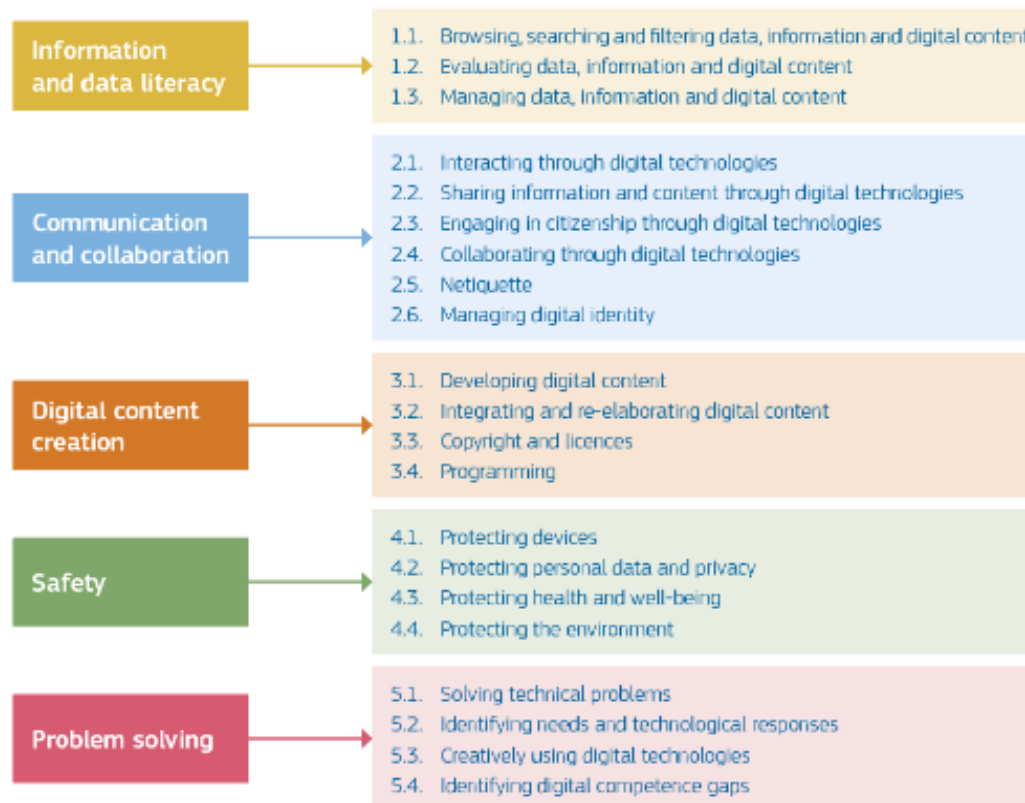


- 13 partners from 8 countries
- Identifying trends in engineering education
- Development of micro-credentials in line with Competence Frameworks EU : LifeComp (2019), DigComp (2022), EntreComp (2016), GreenComp (2022)

II. ENGINEERS 4 EUROPE (E4E) PROJECT : DigComp

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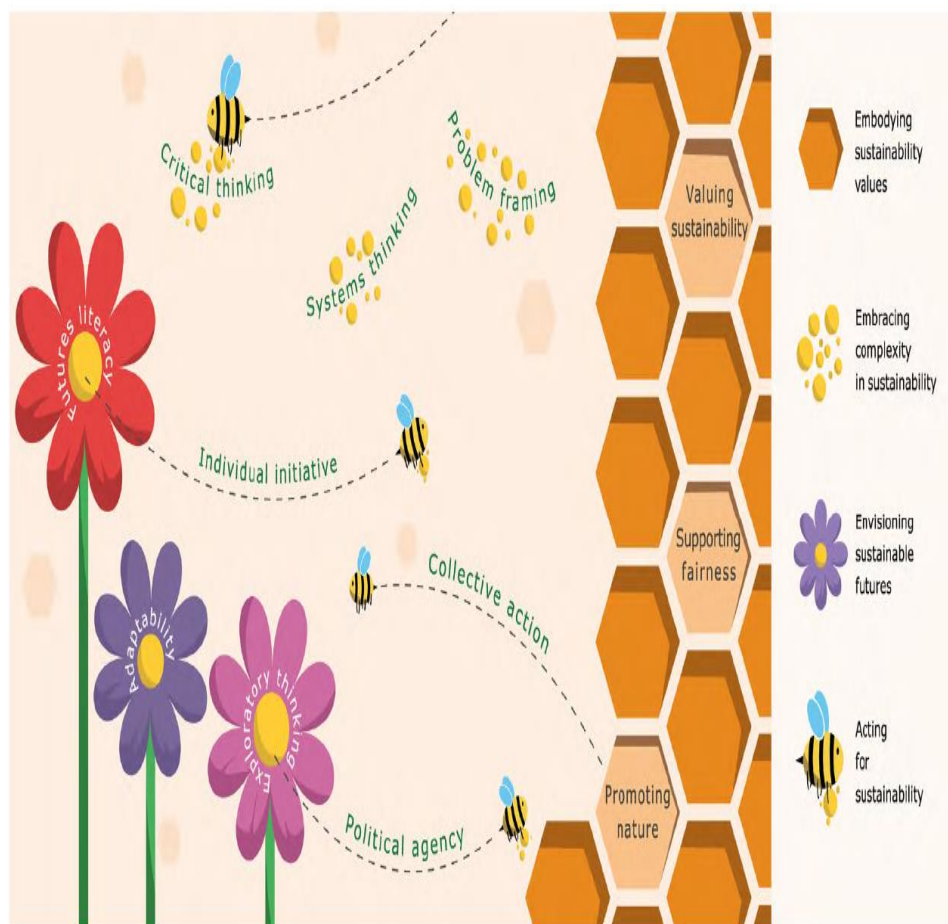


https://joint-research-centre.ec.europa.eu/digcomp/digcomp-framework_en

II. ENGINEERS 4 EUROPE (E4E) PROJECT : GreenComp

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AREA	COMPETENCE	DESCRIPTOR	AREA	COMPETENCE	DESCRIPTOR
1. Embodying sustainability values	1.1 Valuing sustainability	To reflect on personal values; identify and explain how values vary among people and over time, while critically evaluating how they align with sustainability values.	3. Envisioning sustainable futures	3.1 Futures literacy	To envision alternative sustainable futures by imagining and developing alternative scenarios and identifying the steps needed to achieve a preferred sustainable future.
	1.2 Supporting fairness	To support equity and justice for current and future generations and learn from previous generations for sustainability.		3.2 Adaptability	To manage transitions and challenges in complex sustainability situations and make decisions related to the future in the face of uncertainty, ambiguity and risk.
	1.3 Promoting nature	To acknowledge that humans are part of nature; and to respect the needs and rights of other species and of nature itself in order to restore and regenerate healthy and resilient ecosystems.		3.3 Exploratory thinking	To adopt a relational way of thinking by exploring and linking different disciplines, using creativity and experimentation with novel ideas or methods.
2. Embracing complexity in sustainability	2.1 Systems thinking	To approach a sustainability problem from all sides; to consider time, space and context in order to understand how elements interact within and between systems.	4. Acting for sustainability	4.1 Political agency	To navigate the political system, identify political responsibility and accountability for unsustainable behaviour, and demand effective policies for sustainability.
	2.2 Critical thinking	To assess information and arguments, identify assumptions, challenge the status quo, and reflect on how personal, social and cultural backgrounds influence thinking and conclusions.		4.2 Collective action	To act for change in collaboration with others.
	2.3 Problem framing	To formulate current or potential challenges as a sustainability problem in terms of difficulty, people involved, time and geographical scope, in order to identify suitable approaches to anticipating and preventing problems, and to mitigating and adapting to already existing problems.		4.3 Individual initiative	To identify own potential for sustainability and to actively contribute to improving prospects for the community and the planet.

<https://publications.jrc.ec.europa.eu/repository/handle/JRC128040>

II. ENGINEERS 4 EUROPE (E4E) PROJECT : EntreComp

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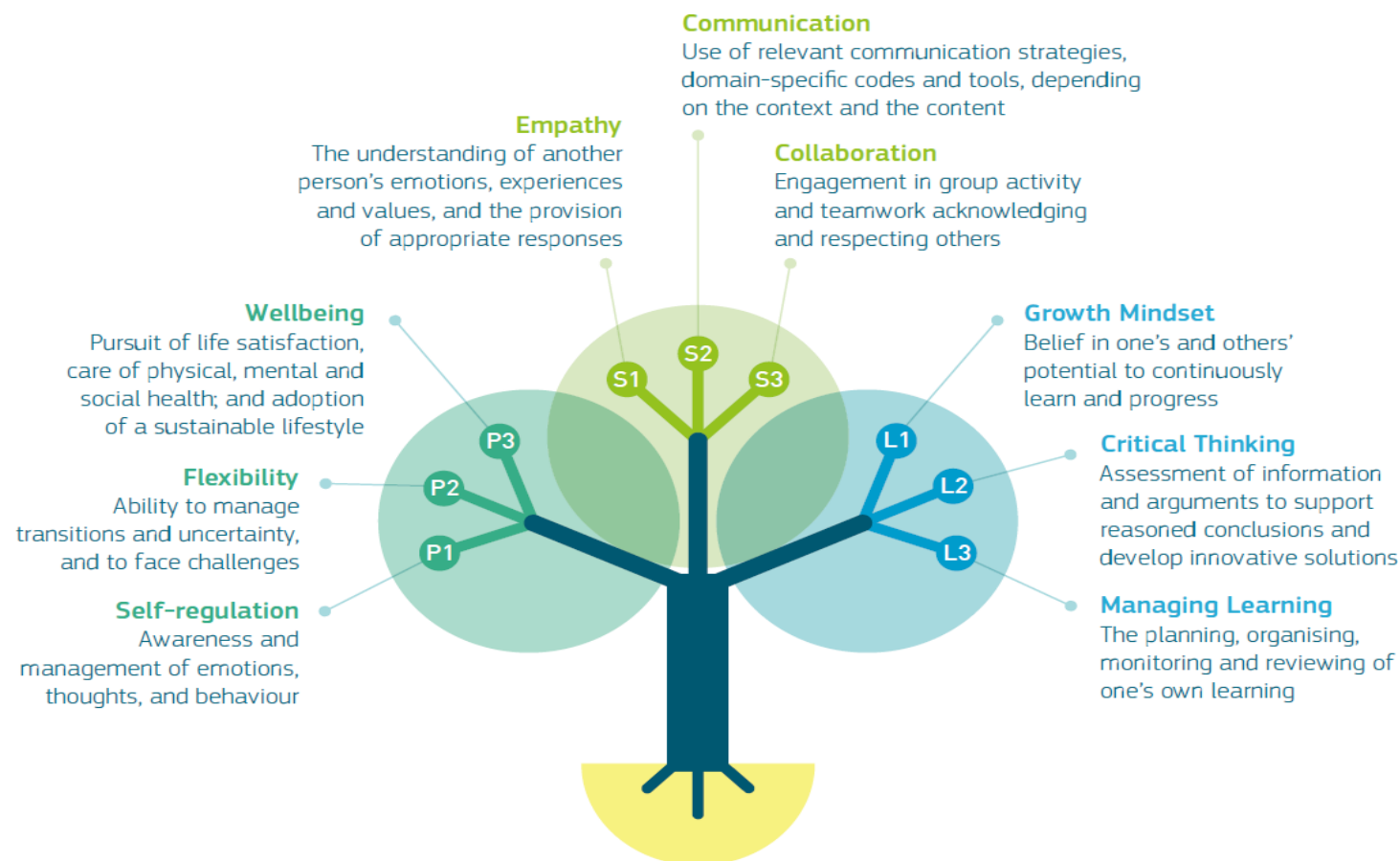


<https://ec.europa.eu/social/main.jsp?catId=1317&langId=en>

II. ENGINEERS 4 EUROPE (E4E) PROJECT : LifeComp

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https://joint-research-centre.ec.europa.eu/lifecomp_en

II. ENGINEERS 4 EUROPE (E4E) PROJECT

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- First Round of Primary and Secondary Research (May-July 2023)
- Available on E4E website www.engineers4europe.eu
- 14 Conclusions and Recommendations
- Input to the E4E Skills Council to develop a European Skills Strategy



WELCOME TO THE ENGINEERS FOR EUROPE (E4E) PROJECT

Project

- > Research Results for the E4E Skills Strategy
- > Skills Council Rules of Procedure
- > Project Introduction

Dissemination

- > Published articles

Gallery

- > Tel Co Meeting, 30 March 2023
- > Tel Co Meeting, 7 November 2022
- > Kick Off Meeting - 22/23 September 2022
- > First Skills Council & Second E4E Meeting Brussels, 21-22 September 2023

II. ENGINEERS 4 EUROPE (E4E) PROJECT : RESEARCH

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1. **Strong positioning statement** about the profession (to improve the image) is required in public communication: making clear why engineering matters.
2. Engineers are best served with **Competency-based Learning** and by an **Assessment of their Learning Outcomes** (knowledge, skills and wider competences or attitudes).
3. Increased emphasis on **Sustainability and Environmental concerns** + greater use of **Automation and AI** will be the most important changes over the next five years. **Renewable Energy and Green Infrastructure** are seen as major areas for innovation and development. Engineers will require a better understanding of **Sustainable Design and Circular Economy**.

II. ENGINEERS 4 EUROPE (E4E) PROJECT : RESEARCH

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4. **Incorporation of sustainability principles in formal engineering education** is paramount to better prepare engineers for the 21st century. Changes in education curricula and CPD to bring SDGs into everyday practice + more practical experience (intern- & apprenticeships).
5. Formal/informal curriculum needs to be developed to **better align with the needs of the job market** = task for universities, technical schools and industry; businesses have a role to play in programs of re- & upskilling.
6. Most significant soft skills are identified as: **critical thinking, collaboration and communication skills.**
7. Focus on promotion of **“diversity and inclusion policies”** and encouragement of experimental and problem-based learning opportunities to develop ethical decision-making skills.

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8. **Mentorship** and diversity/inclusion training need to attract more talent from diverse and/or under-represented groups.
9. Engineers have a major role in **promoting sustainable practices**.
10. Newly created jobs will arise in completely new occupations or existing occupations will undergo **significant transformations in job content**.
11. Engineering disciplines with future shortage are identified in **electrical/electronic-, ICT and agronomic engineering**.

II. ENGINEERS 4 EUROPE (E4E) PROJECT : RESEARCH

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12. **Skills gaps** in the local labor markets are seen as a bigger barrier to business transformation, than a shortage of investment capital.

13. **Partnerships between industry and educational institutions** together with investments & increased funding in R&D in emerging technologies, are seen as effective tools to address digital, green, resilience and entrepreneurial skill shortages.

14. **Entrepreneurship** is a key competence in improving European competitiveness + focus of R&D on development of a social and green economy. Professional Engineering Organizations can encourage this mindset and promote entrepreneurship through **interdisciplinary collaboration**.

II. ENGINEERS 4 EUROPE (E4E) PROJECT : CONSORTIUM PARTNERS AND EUROPEAN ENGINEERING SKILLS COUNCIL

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II. ENGINEERS 4 EUROPE (E4E) PROJECT : AECEF

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E4E Press Release AECEF

AECEF in Brussels for the launch of the “Engineers for Europe” project co-funded by the Erasmus+ Programme

AECEF, represented by the president Prof. Nicolaos Theodossiou, visited Brussels for the Kick Off Meeting of the “Engineers for Europe” (E4E) project, co-funded by the Erasmus+ programme of the European Union.

E4E is an Alliance for Innovation bringing together 13 partners from eight European countries representing the different facets of the engineering profession. The E4E project has three main pillars of institution building, strategic foresight and training to sustain the competitiveness of the engineering profession.

FEANI, the European Federation of National Engineering Associations, is the coordinator of the E4E project and will work with partners in the next 36 months to establish the European Engineering Skills Council, identify future trends and needs in skills and competences for engineers and develop innovative training on transversal skills for the profession.

AECEF will play a crucial role in education and training in upskilling and reskilling engineers, mainly in the areas of Civil Engineering, while:

Assessing the landscape of the engineering profession to identify challenges and opportunities in Continuing Professional Development;

Contributing to the Skills Strategy for the European engineering profession

Improve Sustainability competences of engineers.

More information about “Engineers for Europe” and about AECEF are available at www.aecef.net.



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III. QUESTIONS AND ANSWERS ?

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