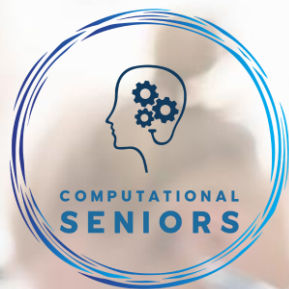




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MODULE 2

*Why is it important to teach Computational Thinking?
Challenges and opportunities in promoting computational thinking in low-qualified adult education*



WELCOME TO MODULE 2

In this module, we explore why teaching Computational Thinking is not just relevant but necessary when working with adults, particularly those with low formal qualifications.

CT can play a powerful role in improving lifelong learning opportunities, boosting confidence, and fostering inclusion in an increasingly digital society.

You'll examine the challenges that adult educators face in this context, as well as the potential that CT holds when applied through accessible and engaging strategies.

Use this module to rethink how we teach and make learning more meaningful, relevant and motivating for adults in a fast-changing world.



STRUCTURE OF THE MODULE

Unit 1. Understanding the context: adult learning challenges in Europe

- Labour market and education data in the EU
- Gaps in access to upskilling opportunities
- Trends in adult learning fields

Unit 2. Understanding the meaning of CT in 21st century

- Importance of CT in a digital and AI-driven society
- Applications of CT across education and diverse industries
- CT and cognitive development: Bloom's Taxonomy and levels of thinking

Unit 3. Challenges and opportunities in promoting CT in adult education: adopting engagement strategies

- Barrier's adult learners face
- Importance of engagement and inclusion
- Practical strategies to promote CT effectively

Unit 4. The impact and potential of CT on low-qualified adults

- Enhancing employability through CT-related skills like problem-solving and critical thinking
- Promoting digital inclusion and AI literacy through CT
- Applying CT principles in daily life for personal and professional empowerment

Unit 5. Case studies and activities

- Real-world examples of CT
- Interactive exercises to explore and apply what you have learn in this unit

At the end of the course, the learner will be able to...

Learning outcomes

Describe the importance of Computational Thinking (CT) in the 21st Century.

Determine challenges faced by low-qualified adults in accessing and applying CT in real-world scenarios.

Distinguish opportunities for the CT integration into adult education to enhance employability.

Acknowledge the strategies by promoting CT in adult education contexts.

Demonstrate impact and potential of CT on low-qualified adults.

MODULE AIM and OBJECTIVES

AIM: to provide knowledge about the importance of CT integration into adults education process by evaluating the challenges and opportunities, disclosing the impact and potential.

OBJECTIVES:

1. To justify the meaning of CT in the 21st century.
2. To present challenges and opportunities in promoting CT, emphasizing the strategies of learners' engagement.
3. To disclose the impact and potential of CT on low-qualified adults.



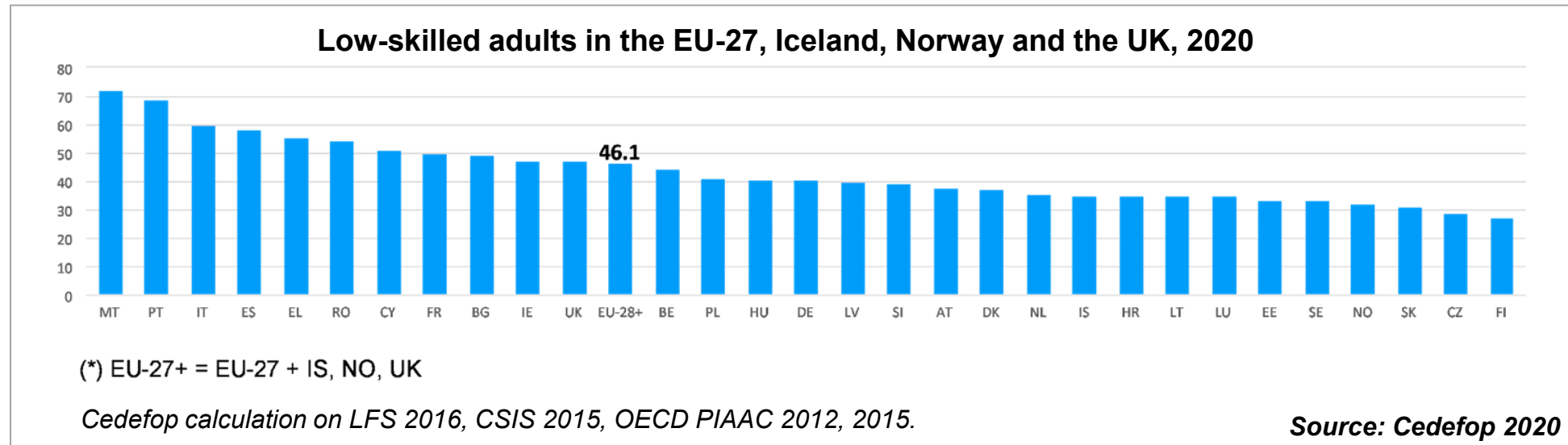
The background image shows an elderly woman with short brown hair and black-rimmed glasses, wearing a light grey cardigan over an orange top. She is seated at a white table, holding a white pen and writing on a tablet. In the background, a man with dark hair, wearing a white shirt, is also seated at a table, looking down at some papers. The setting appears to be a bright, modern library or study area with bookshelves visible in the background.

UNIT 1

*Understanding the
context: adult
learning challenges
in Europe*

46% of adults could upskill. Are we ready to meet the challenge?

According to 2020 Cedefop, 128 million adults in the UK, Iceland, Norway and the EU-27 Member States have the capacity to reskill and upskill, which is nearly half (46.1%) of the adult population in all of these countries.



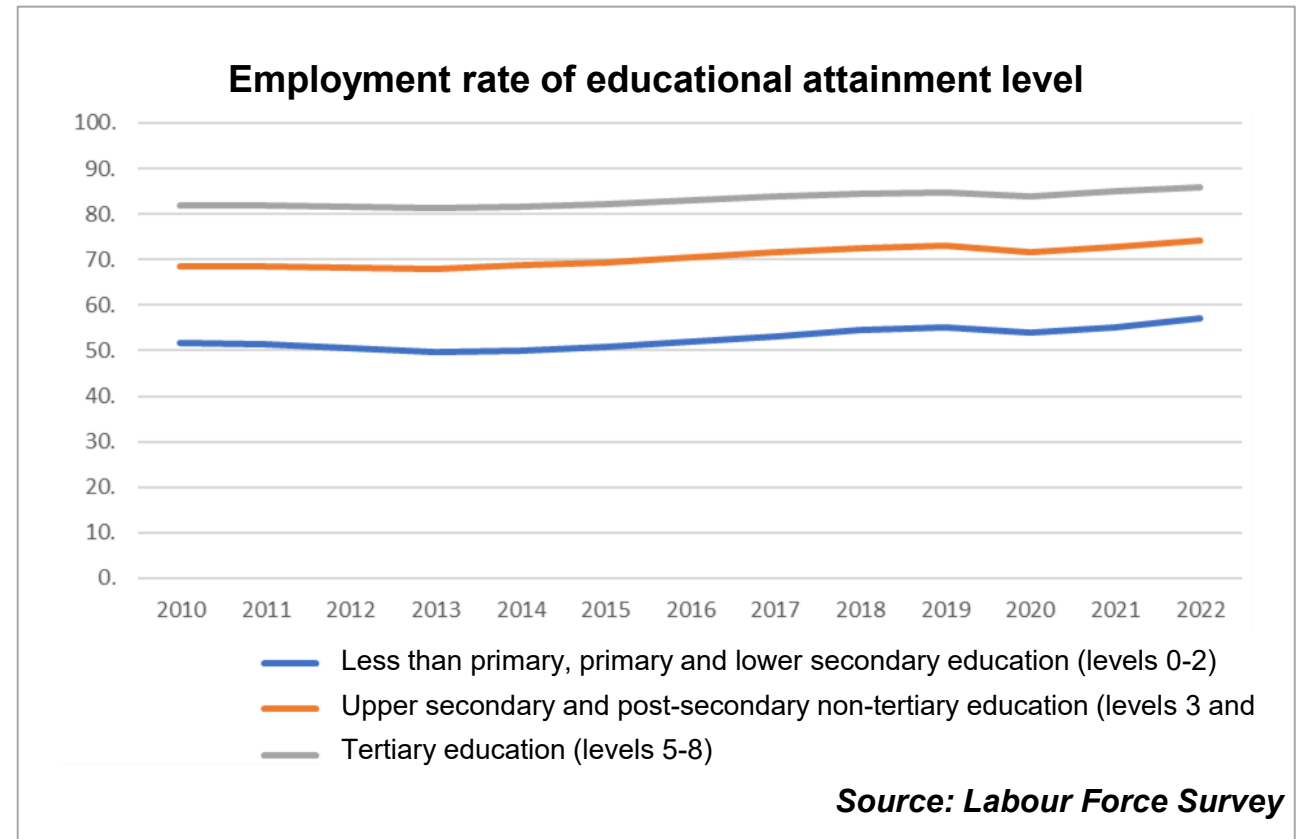
This highlights the scale of adults who could benefit from digital skills and structured problem-solving methods like CT.

Is education the key to employment?

Low-skilled adults are at risk of unemployment, yet they benefit the least from upskilling and re-skilling opportunities.

Labour market data reveals a clear gap: adults with low qualifications consistently show much lower employment rates compared to those with higher education levels.

This makes it essential to develop training strategies that actively reach and engage those most at risk of being left behind.



Nearly half of EU adults are learning but ... in what fields?

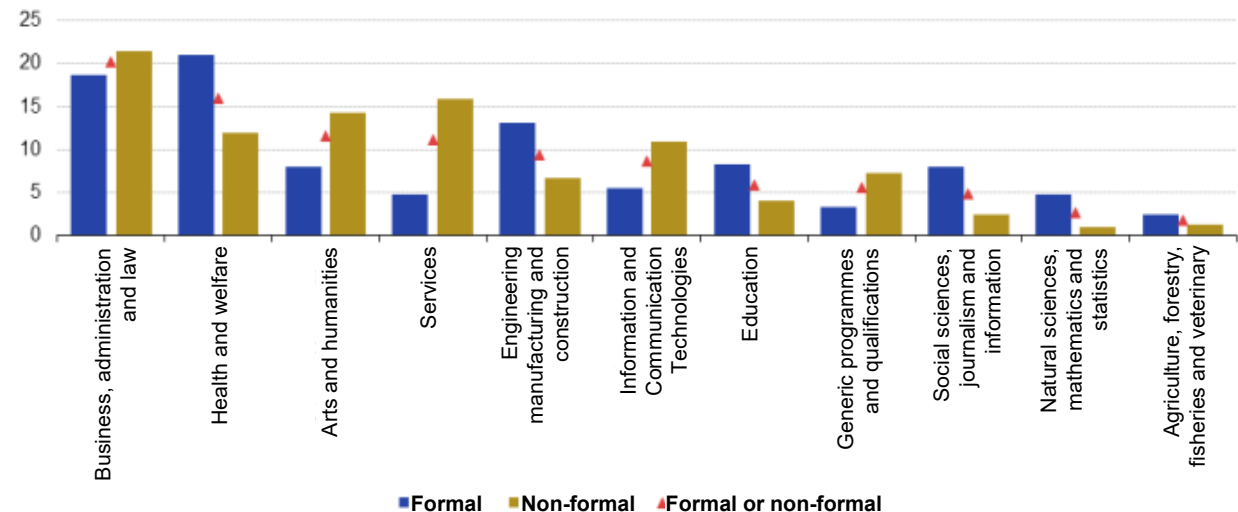
The proportion of adults aged 25 to 64 years in the EU who participated in education or training during the previous 12 months was 46.6 %.

The main fields are:

- Business, administration and law
- Health and welfare accounted
- Arts and humanities
- Services
- Engineering, manufacturing and constructions
- ICT
- Generic programmes and qualification

Distribution of fields of education of adult learning, by type of instruction, EU, 2022

(% of instruction hours spent by adults aged 25-64 on the corresponding type of instruction)



Source: Eurostat

The background image shows an elderly woman with short brown hair and black-rimmed glasses, wearing a light-colored cardigan over an orange top. She is seated at a white table, looking down at a tablet device. In the background, a man with dark hair, wearing a white shirt, is also seated at a table, looking down at a tablet. The setting appears to be a library or a study area, with bookshelves visible in the background.

UNIT 2

*Understanding the
meaning of CT in
21st century*

This unit “Understanding the meaning of CT in 21st century” presents the significance of Computational Thinking in adult education, emphasizing its relevance in today's digital society or, currently called, AI-driven society.

It begins by establishing the importance of CT, highlighting its role in fostering problem-solving, adaptability and analytical skills essential for navigating technological advancements.

While often associated with the IT sector, CT is widely applied across various industries. This unit presents its practical applications in fields such as business and finance, agriculture, supply chain management and others, demonstrating how CT helps solve real-world challenges.

Additionally, the development of CT knowledge is framed within Bloom's Taxonomy, focusing on cognitive skills such as remembering, understanding, applying, analyzing, evaluating, and creating. These competencies enable adult learners to critically assess information, develop innovative solutions, and effectively integrate CT methods into professional and everyday life.

CT in education: expanding the reach

What is Computational Thinking, and why has it become so important in modern education?

Let's explore how CT is used in schools and why it's time to bring it into adult learning too.

CT has become an essential part of K–12 education because of its usefulness. It introduces learners to a structured approach to problem-solving that includes basic programming concepts, logical thinking and mathematical reasoning.

CT also helps students understand how to break down complex systems into smaller parts, including abstract ones like components of a robot, encouraging creativity and analytical thinking.



Generated with Firefly



Generated with Firefly

CT has become a common element in educational robotics and STEAM learning. These fields often rely on CT principles to help learners experiment, create and solve real-world problems through hands-on activities.

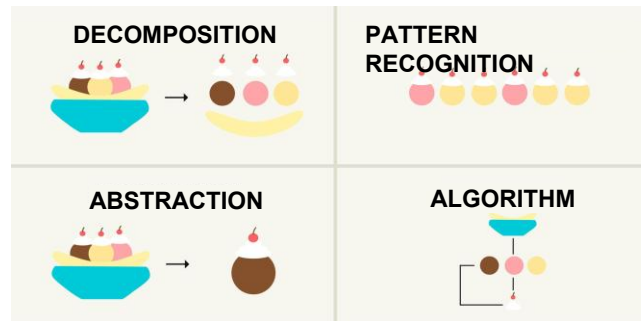
However, while CT is widely applied in school settings, its use in adult education remains limited. This is especially true for low-qualified adults, where there is still a lack of practical strategies and knowledge on how to integrate CT effectively into their learning pathways.

Why CT matters and how it works

Importance

- CT enhances adaptability, critical thinking and decision-making skills across various professions.
- CT is essential for navigating technological advancements and solving real-world problems in education, daily and professional life.
- CT is important for workforce development, digital literacy and lifelong learning in 21st century.

Main concepts



“CT represents a universally applicable attitude and skillset everyone, not just computer scientists, would be eager to learn and use” (Wing, 2006).

Meaning

- CT is a cognitive framework for problem-solving or decision making using such components as decomposition, abstraction, pattern recognition, and algorithms.
- Problem-solving or decision making process can be represented as computational steps and algorithms.
- CT is like a hybrid thinking paradigm that must accommodate different mental models that help understand and use technology.

CT across industries

CT is already making an impact across many fields. The following examples show how it drives innovation and efficiency in industries from medicine to space exploration.



Medical Industry

Utilizing algorithms and data analysis enables medical professionals to diagnose diseases more accurately, interpret medical images efficiently, and detect patterns in patient data, leading to improved treatment outcomes.

Supply Chain Management

Algorithms process data to optimize shipping routes, forecast supply and demand, and enhance inventory management for maximum efficiency.

Agriculture & Farming

This is related to strategic decisions about planting, herd management, crop rotation, irrigation, pest and disease of the plants control and more.

Finance & Business Industry

A data-driven business strategy uses pattern recognition, modeling, and risk assessment to determine the most effective approaches for achieving objectives. These analytical methods and models are grounded in the principles of computational thinking.

CT across industries



Environmental protection

CT helps to analyze ecological data, monitor wildlife populations, and formulate strategies for conserving natural habitats.

Energy Industry

CT helps to enhance energy distribution efficiency. In the green energy sector helps to the design and development of wind, solar, natural gas, and geothermal energy systems.

Meteorology

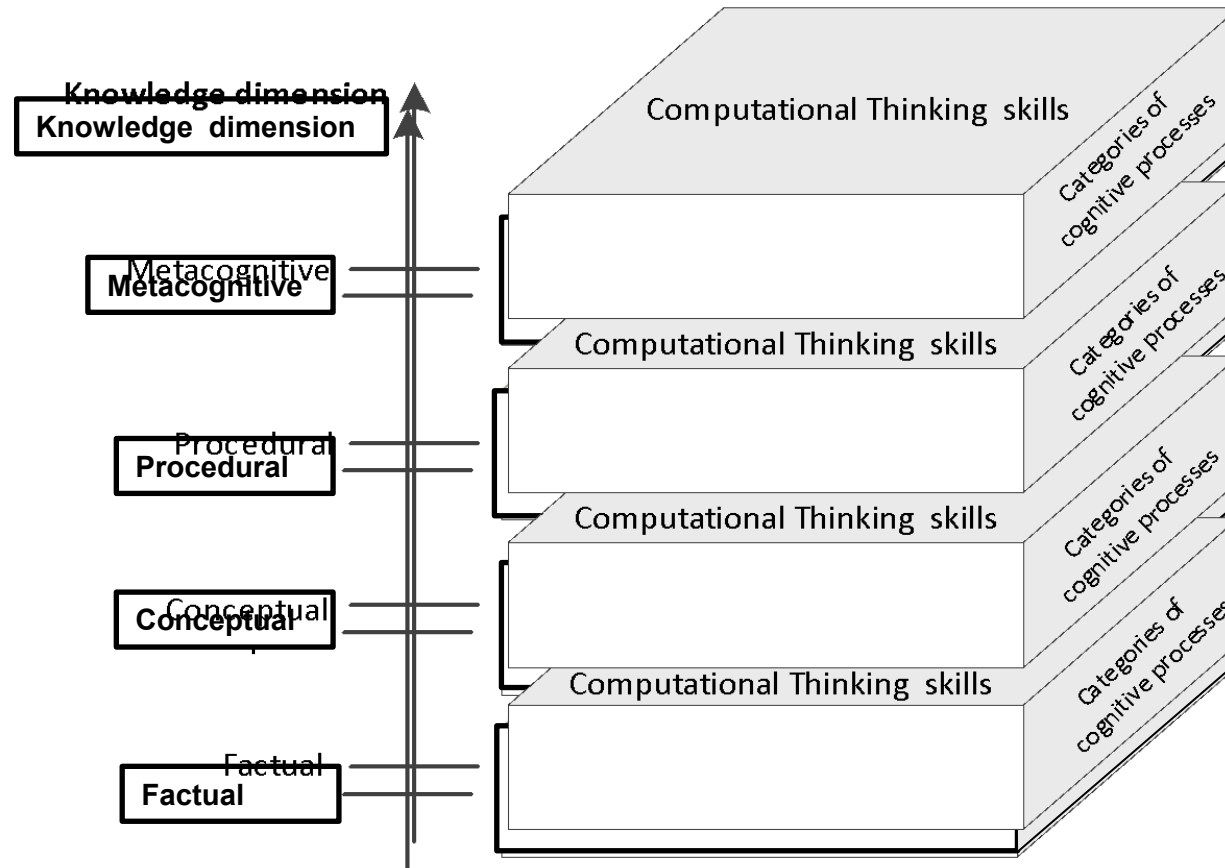
CT enables the simulation and prediction of weather patterns by utilizing advanced algorithms that process extensive atmospheric data to generate precise forecasts.

Space Exploration

Space agencies, for example, NASA, use CT to plan missions, calculate trajectories and analyze data obtained from satellites and probes.

The learning framework of CT

The model shows the relation among CT skills, knowledge dimensions and categories of cognitive processes.





Levels of thinking in learning

Learning involves a range of thinking skills, from basic recall to complex creation.

This model shows how these skills build on each other, supporting learners as they move from understanding information to applying, analyzing, and creating with it.

These cognitive processes are important when designing meaningful and effective learning experiences.

	Category	Cognitive processes
	Remembering – retrieving relevant knowledge from long-term memory.	Recognizing Recalling
A lower order thinking skills	Understanding – determining the meaning of instructional messages, including oral, written, and graphic communication.	Interpreting, Exemplifying Classifying, Summarizing Inferring, Comparing Explaining
	Applying – carrying out or using a procedure in a given situation.	Executing Implementing
	Analyzing – breaking material into its constituent parts and detecting how the parts relate to one another and to an overall structure or purpose.	Differentiating Organizing Attributing
An upper order thinking skills	Evaluating – making a judgement based on criteria and standards.	Checking Critiquing
	Creating – putting elements together to form a novel, coherent whole or make an original product.	Generating Planning Producing

The focus: any learning objective can be represented in two dimensions Cognitive Process and Knowledge.



UNIT 3

*Challenges and opportunities
in promoting CT in adult
education: adopting
engagement strategies*

This unit, "Challenges and opportunities in promoting CT in adult education: adopting engagement strategies" provides the understanding about key players in the educational process, including trainers, learners, and other relevant stakeholders.

It explores the multifaceted challenges associated with CT integration in adult education, emphasizing the necessity of a collaborative seeking to solve effectively barriers and develop sustainable solutions. By fostering cooperation among educators, learners and stakeholders, the implementation of CT can be optimized to enhance educational outcomes.

Additionally, this unit presents the learners engagement strategies in the CT education process. Following them adult trainers can integrate CT according diverse needs of adult learners, ensuring accessibility, motivation and meaningful participation in the learning process.

Despite the fact, that democratic space should be ensured, the teacher-centered approach during the trainings can be applied as well.

Challenges in promoting CT for adults

The challenges of promoting CT in adult education arise from different perspectives:

- **Trainer-Centric Perspective:** Adult trainers often face a lack of pedagogical guidelines on effectively integrating CT into their teaching. They may struggle with limited access to appropriate learning materials and insufficient skills to facilitate CT-based trainings.
- **Learner-Centric Perspective:** Many adult learners, particularly those with lower qualifications, encounter obstacles such as a lack of motivation, internal barriers, and limited resources. Negative past educational experiences may also contribute to reluctance or anxiety toward learning new concepts. Trainers should understand these aspects.
- **Stakeholders role:** Seeking to implement successfully CT in adults education, it is essential to engage all relevant stakeholders, who will help to ensure the inclusive educational process, provide equipment or space and will help to relate to real life problem solutions.



Opportunities in promoting CT for adults

Despite the challenges, **promoting CT in adult education opens opportunities** for transformation and inclusion.

- The integration of CT into adult education presents significant opportunities for low-qualified adults, enhancing their cognitive, professional, and socio-economic perspectives.
- The CT contributes to social inclusion by reducing the digital divide. Adults with limited formal education often experience barriers to lifelong learning and workforce participation, yet CT training equips them with essential 21st-century skills.
- CT principles fosters self-efficacy, lifelong learning habits, and active engagement in an increasingly technology-dependent society.



Making CT work in every context



Challenge

Explanation of challenges

Opportunities

Pedagogical

- Learning models that do not correspond to the learner's needs
- Difficulties with learning personalization
- Difficulties with the selection of relevant teaching context
- Lack of tailored resources or trainers experienced in teaching CT to low-qualified adults
- Lack of knowledge of how to apply teaching strategies for low-qualified adults

Learner-centered/teachers-centered pedagogical approaches; individualized learning paths; scaffolding; investment in educator training programs; use of interactive teaching strategies (gamification, storytelling, collaborative learning, and hands-on activities)

Learning content & context

- In dynamic contexts to provide the newest learning content
- To adopt content to every learner's context and needs
- Content visualization and adaptation according to the context

Relevant learning content; enhanced personalization; interactive simulations, graphical representations real-world case studies

Making CT work in every context



Challenge

Explanation of challenges

Opportunities

Personal

- The insufficient recognition of the subject's significance and practical relevance.
- Lack of the learner's motivation and engagement
- Lack of experience in technology devices and knowledge, how to collect, analyze and interpret data
- Resistance to new learning approaches

Integration real-world problems-solving scenarios and workplace-related tasks, adaptive learning technologies and gamified instructional; personalization, learner-centered methodologies

Cognitive

- The use of high-level abstractions that hinder the understanding ability for learners with a lack of CT
- The need to keep balance between the theoretical knowledge and practice may reduce the interest in particular subject
- Difficulty understanding abstract concepts like algorithms or patterns.

Use of low-level abstractions; CT concepts integration in real-world scenarios; experiential learning and metacognitive strategies implementation; graphical and flowcharts representation

Making CT work in every context



Challenge

Explanation of challenges

Opportunities

Technological

- The lack of adequate tools, that provide adaptation and generalization
- Lack of technical support (interactive learning should overcome obstacles related to pedagogical and cognitive problems)
- Limited or no access to computers, the Internet, or digital tools

Development of adaptive educational technologies; integration of mobile learning (m-learning), offline resources, and community technology hubs

Socio-Economic / Cultural

- Competing responsibilities (jobs or family affairs) may limit time for learning.
- Limited recourses (time, financial, logistics, especially if learners live the periphery).

Online and blended learning models, asynchronous course, micro-learning modules. Community-based learning centers can serve as accessible educational spaces

Strategies for CT promotion: learners engagement

To engage learners

- The engagement of learners could be higher when they may play the role of mediator, leader, or team member, but everyone should participate when practicing (students, researchers, and teachers).
- Learners (adults) have many life experiences to share too, therefore they can share these experiences.
- The different teaching methods should be engaging: arranged in a circle, divided into teams, or other ways that favor direct communication, contact, and collaboration with each other. Activities should be presented in an inviting and attractive way to raise learners' interest.



Strategies for CT promotion: learners engagement

To create a sense of need

- When the activities are as close as possible to the learners' socio-cultural context, it will make students sense that the knowledge they are creating can be applied and related to their needs, interests, desires, curiosities, difficulties, etc.

To create a sense of usefulness

- When training content and practical tasks involve useful things for learners, they can apply them immediately and see the benefits.
- Clear, well-structured, visualized, coherent training content will give them the feeling that they are progressing and learning more.



Strategies for CT promotion: learners engagement

To personalize

- The training content must be applied for all the groups of learners, especially concerning limitations or difficulties in terms of movement and vision.
- For disabled people (such as deafness or blindness) some specialized resource may be necessary.
- The learners may study at different speeds. Instead of speeding up learners who have not finished their activities, it's better to offer additional activities for those who have already finished, ask them to help other students, or show what they have done and learned.



Strategies for CT promotion: learners engagement

To apply trans-disciplinary approach

- Activities must involve a combination of different contents, prioritizing the work in thematic problem situations instead of specific contents.

To create a positive experience

- When the experience is joyful, positive, and engaging for adults who apply CT in practices, this will have a positive impact on digital culture creation.
- The process creates mental models that help learners develop familiarity with technological devices, reducing rejection and fear of exploring new technologies.



Strategies for CT promotion: learners engagement

OER availability and interactivity

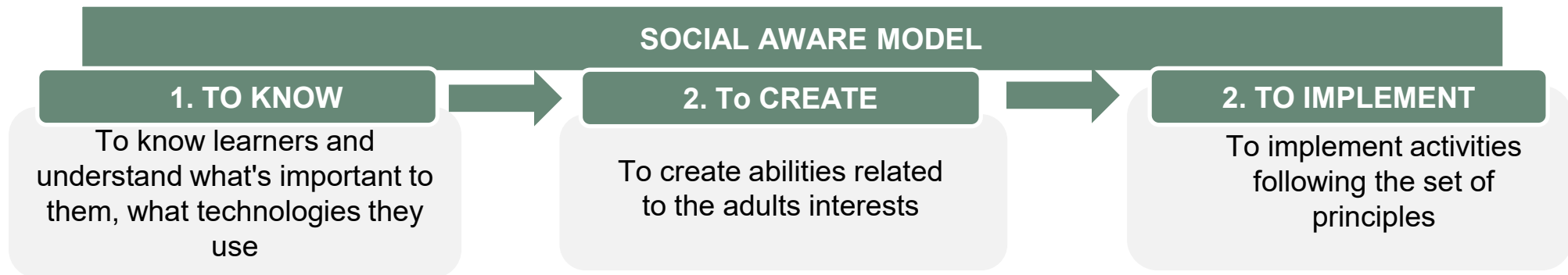
- The part of the digital culture to ensure the availability of the OER, when the adults can study an inappropriate times using blended learning models, asynchronous courses, and micro-learning modules
- It shouldn't be an impediment to participate if the learner misses any activity/training. Even when activities are linked to the previous ones, a new learner should have the opportunity to continue their studies.
- The interactive tools integration may help to see the progress.
- But at the same time, there should be opportunities to study offline.



The Socially Aware Design model

The Socially Aware Design model main idea: before developing any solution, it is essential at first to understand the problem, engaging both users and stakeholders; the problem examination from multiple perspectives ensures a more comprehensive understanding of its context.

- 1) Model focuses on understanding the problem before anything else;
- 2) The understanding goes beyond just technical aspects of the problem and covers informal aspects such as culture and values and formal such as procedures and rules of the problem and context of use;
- 3) This study is carried out with the involvement of users and stakeholders who are or will be affected by the problem or its solution.



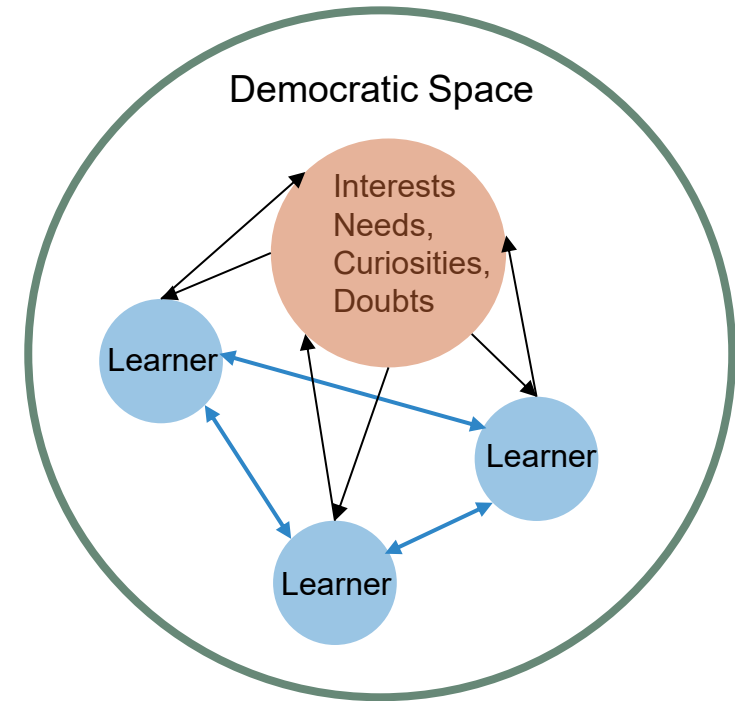
The Socially Aware Design model

Socially Aware Design model application in adults education.

Democratic space. Everyone can express opinions, curiosity, and needs, emphasizing the subjects that are important to the participants.

Participation practices. All group members (learners) participate, therefore study object should represents all the participants' preferences and context. The motivation, engagement, empowerment and enrichment the learning experience are important.

Priorities. First focus on learners the interests, needs, curiosities, doubts, or everyday problems that could be approached with the available technology. Then, activities to can be carried out to solve the problems, evaluating the abilities and experiences students already have.



Are you following along? Try this quick question to reinforce what you've learned



What are the main challenges in implementing CT in adult education?

- A) Pedagogical, Personal, Cognitive, Technological
- B) Socio-economic/cultural
- C) Learning content and context
- D) All of them



UNIT 4

*The impact and potential of
CT on low-qualified adults*

In this unit, "The impact and potential of CT on low-qualified adults", we examine the necessity of CT knowledge.

The integration of CT competencies among low-qualified adults has the potential to enhance employability prospects and facilitate lifelong learning opportunities. Among the TOP 10 critical skills identified for the contemporary workforce are problem-solving, creativity, and critical thinking, where CT is frequently associated with computational critical literacy, as well as technological proficiency and adaptability.

The close relationship among computational thinking and AI thing is presented as well.

How can CT support low-qualified adults in the job market?

In 2021, the World Economic Forum identified the TOP 10 skills projected to be essential by 2025:

- **Problem-solving**
- **Creativity**
- **Critical thinking**

These skills are linked to **computational critical literacy and technological proficiency**. CT has the potential to enhance several of these key competencies.

Within the CT education process, it is crucial to foster an inclusive and democratic learning environment where all learners can participate equally. Such an environment can enhance learners' abilities to work **with other people**.

Furthermore, **self-management** is a critical skill for adults, enabling them to balance work and continuous professional development effectively.

Additionally, developing soft skills can be particularly beneficial for low-qualified adults, **enhancing their employability in the labor market**.

Top 10 skills of 2025

Type of skill

- Problem-solving
- Self-management
- Working with people
- Technology use and development



Source: Future of Jobs Report 2020. World Economic Forum

Unlocking Potential with CT

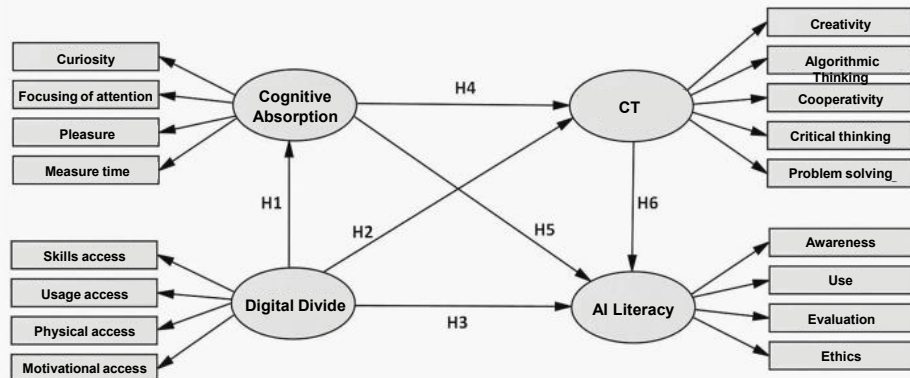
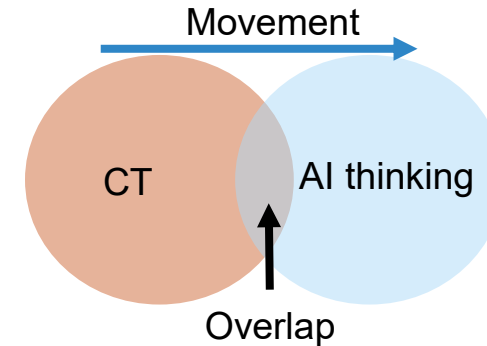
- CT can have a significant impact by strengthening problem-solving abilities, logical reasoning, and decision-making skills among low-qualified adult learners across professional, educational, and everyday contexts.
- The acquisition of these competencies can contribute to improved employability and expanded lifelong learning opportunities.
- CT plays a crucial role in promoting digital inclusion among low-qualified adults by equipping them with essential skills for navigating the digital landscape.
- Individuals with a strong understanding of CT principles demonstrate greater proficiency in technology use and exhibit higher levels of digital and artificial intelligence (AI) literacy.



CT in the age of AI

CT elements such as decomposition, abstraction, pattern recognition, and algorithms are directly related to Artificial Intelligence (AI) thinking.

Adults who understand the CT main principles can more easily adopt technologies and better apply AI thinking principles.



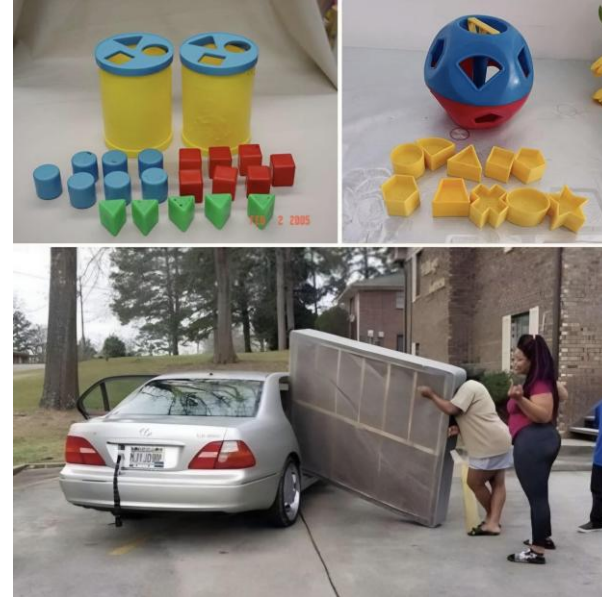
Source: Celik, 2023

AI thinking goes beyond CT foundations and incorporates more advanced cognitive and computational processes such as: Leveraging knowledge bases and case-based reasoning for problem-solving; Capturing and reasoning about commonsense knowledge; Enabling the processing of semantics and contextual information; Effectively handling unstructured data, among other complex tasks.

These capabilities position AI Thinking as a more holistic and adaptive framework for addressing intricate, real-world challenges.

CT application in everyday scenarios

- **Budget Management (decomposition):** Breaking down expenses into categories, identifying spending patterns, and creating a savings algorithm.
- **Household projects (decomposition):** Breaking large household projects, such as moving or renovations, into manageable tasks.
- **YouTube usage (algorithms):** Develop a step-by-step process for conducting a voice-command search on YouTube.



Identify where do you apply CT in your daily life:

- decomposition
- abstraction
- pattern recognition
- algorithms

Present these examples to your colleagues.

CT application in workplace

- **Customer Service:** Learners can apply logical thinking to develop decision trees for improving customer service by using patterns.
- **Management:** Using **algorithms** to forecast supply needs and minimize waste.

CT application in education

- **Mathematics:** To solve percentage calculations (e.g., calculating discounts) can use **decomposition** to separate the problem into steps: identifying the original price, determining the percentage, and subtracting the discount.
- **Writing:** Writing an essay can help to understand common structures (e.g., introduction, thesis statement, supporting arguments, and conclusion). **Abstraction** can help with argumentation.
- **Photography (algorithm):** Create and present a coherent sequence for taking photos with your smartphone.

Which CT principle can help with the essay argumentation?

- Decomposition
- abstraction
- algorithm design



The background image shows an elderly woman with short brown hair and black-rimmed glasses, wearing a light-colored cardigan over an orange top. She is seated at a white table, looking down at a tablet device. In the background, a man in a white shirt is also seated at a table, looking down at some papers. The setting appears to be a library or a study area with bookshelves visible in the background.

UNIT 5

*Case study and
activities*

Case study

Researchers from the Department of Informatics at the Federal University of Paraná (Brazil) conducted a case study applying fundamental computational thinking (CT) skills to help participants develop essential mental models for understanding technology and fostering digital culture (Ortiz et al., 2023)

The study involved adults in the early stages of literacy, progressing through activities that ranged from simple, low-fidelity ATM prototype exercises to more complex tasks using a functional ATM prototype.

A total of eight workshops focused on financial literacy and ATM usage were implemented. Initially, the workshop objectives, activities, and attendance requirements were introduced. Then, the CT skills to be acquired during each session were identified, followed by an analysis of the results from each workshop.

The evaluation methods included voting, participant feedback, structured observations, and unstructured interviews.

The results indicated that these methods were effective, as participants became increasingly self-assured and independent. As the activities progressed, they successfully applied the skills and knowledge gained from earlier exercises to complete subsequent tasks.



Generated with Firefly

Case study

Goal and activity	CT skills	Main result
1. Identify learners interests; story telling	Algorithm	The main interests where identified
2. Present ATM concepts; Hangman game	Decomposition, data analysis, pattern recognition	Learners were engaged in reading
3. Make withdrawals in a low-fidelity ATM prototype; Bingo-type game	Decomposition, data analysis, pattern recognition, simulation and abstraction	The withdrawals experiences helped better to understand processes
4. Describe the steps involved in withdrawing money from an ATM; a low-fidelity ATM prototype	Decomposition, data analysis, pattern recognition, simulation and abstraction, algorithm	The understanding how to describe the process step-by-step of withdrawing from an ATM in the following steps
5. Interpreting, ordering, executing a cash withdrawal algorithm; a pictorial algorithm, a high-fidelity ATM prototype	Decomposition, data analysis, pattern recognition, simulation and abstraction, algorithm	Execution the withdrawal process at the functional terminal
6. Practicing to pay the bills, checking cash; Algorithm to check cash change	Decomposition, data analysis, pattern recognition, simulation and abstraction, algorithm	Practiced the task, they usually have difficulties with
7. Practicing to use calculator	Decomposition, data analysis, pattern recognition, simulation and abstraction, algorithm	The identification of smartphones functions
8. Remember previous discussions	Abstraction	Qualitative feedback

Activity 1: Quiz



1. Why is computational thinking considered a transversal skill?

- a) Because it is only useful in science and technology
- b) Because it can be applied across different life contexts, professions, and learning areas
- c) Because it is mainly used in programming classes

2. What is one main challenge adult trainers face when promoting CT?

- a) Too many CT tools to choose from
- b) Learners being too tech-savvy
- c) Lack of pedagogical guidelines and limited access to CT materials

3. Which of the following increases learner engagement in CT-based training?

- a) Encouraging learners to take active roles like mediator or team member
- b) Only using lecture-based methods
- c) Avoiding collaboration to save time

4. What is the first step in the Socially Aware Design model for CT integration?

- a) To test learners with complex CT challenges
- b) To understand the learners' context, needs, and technologies they use
- c) To start teaching technical procedures immediately

5. Which key skills linked to CT were highlighted by the World Economic Forum?

- a) Cooking, memorization, and time management
- b) Problem-solving, creativity, and critical thinking
- c) Typing speed, spelling accuracy, and note-taking

Activity 2: Practical exercise

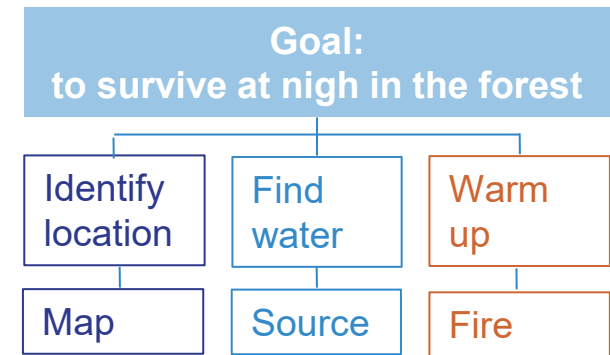
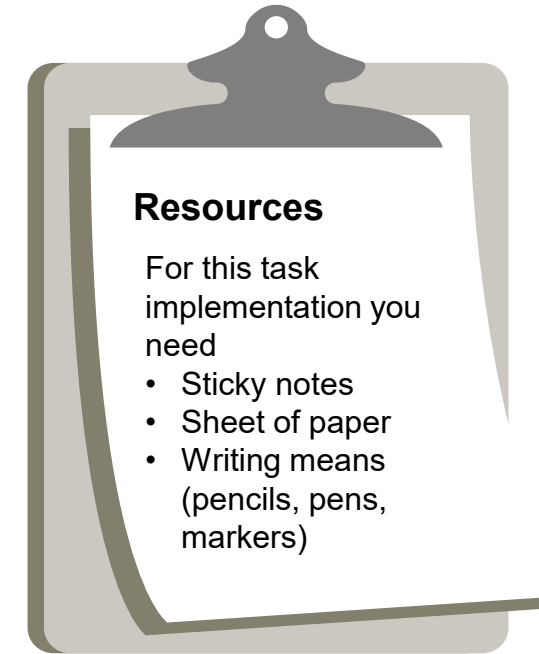
Daily Life

Task. Imagine it's now nightfall and our friends stuck in the forest. Help them survive the night.

Result. The flow chart will help visually (1) break down the problem (decomposition) and (2) algorithm design will help to plan the steps for the problem solving

1) The group of 4 members should solve, the problem, how to survive the night.

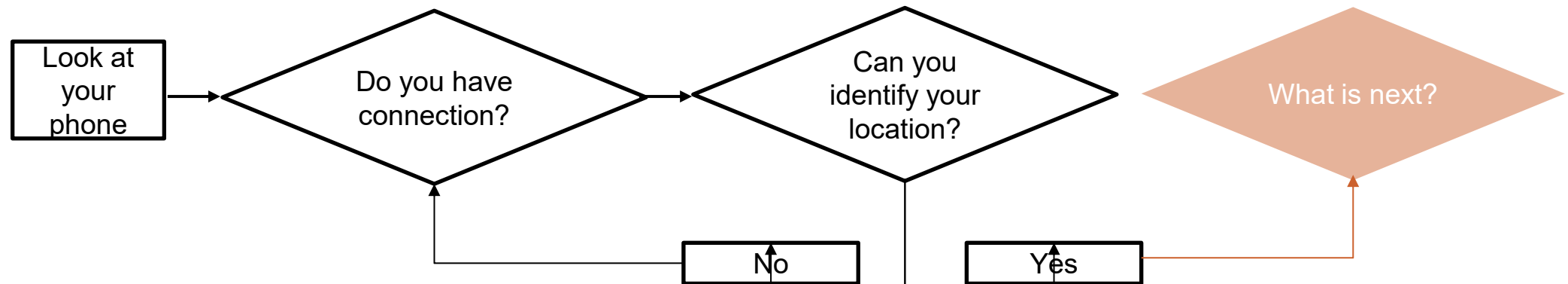
The goal should be at the top, and high-level considerations should be the first step in the phases that follow. After that, these high-level factors can be braked down into smaller steps.



Activity 2: Practical exercise

2. Apply the problem solving algorithm design principles.

The group of 4 members should visualize a step-by-step process, how to solve the problem.



SUMMARY

Computational Thinking offers a powerful set of skills and mindsets for navigating today's digital and AI-driven society. In this module, we explored how CT goes beyond technical disciplines and plays a key role in adult education, especially for low-qualified learners.

We looked at the challenges many adults face in accessing upskilling opportunities across Europe and how CT can help bridge those gaps by promoting adaptability, critical thinking and lifelong learning.

Through real-world applications and examples, we examined how CT is used across industries and everyday life, and how its integration can boost employability, digital inclusion and participation in the evolving job market.

This module also emphasized the importance of designing inclusive training strategies that equip adult learners with the tools to engage meaningfully with digital tools and concepts, including artificial intelligence, in both personal and professional contexts.



CALL TO ACTION

Reflect on what you've learned

- *What is the meaning of computational thinking in 21st century?*
- *What are challenges, opportunities and strategies for CT promotion?*
- *What is the impact and potential of CT on low-qualified adults?*

GLOSSARY

Computational Thinking or CT: Solving problems like a computer would, step-by-step.

Decomposition: Breaking a big problem into smaller parts.

Abstraction: Focusing only on the important details.

Pattern Recognition: Spotting trends or things that repeat.

Algorithm: A set of instructions to complete a task.

Iteration: Repeating a process to improve it.

Unplugged Activities: Learning CT without screens using games, puzzles, etc.

Debugging: Finding and fixing errors in a process.

Soft Skills: Non-technical abilities that help people work well with others and adapt to challenges.

Gamification: Using game elements (like points or challenges) in learning.

Digital Literacy: Knowing how to use digital tools safely and effectively.

Inclusion: Making learning accessible to everyone, no matter their background.

Scaffolding: Supporting learners step-by-step so they can gradually do more on their own.

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