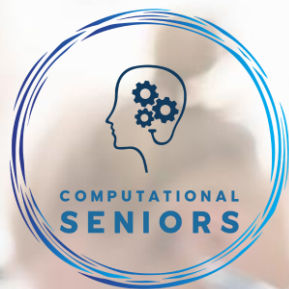




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MODULE 3

Integrating Computational Thinking in adult education



WELCOME TO MODULE 3

In this module, we will explore how to integrate Computational Thinking into adult education environments, focusing on its practical value, accessibility and adaptability to diverse learning needs.

The module highlights how trainers can adopt effective pedagogical approaches, design inclusive lesson plans and implement CT activities that align with adult learners' experiences and goals.

Emphasis is placed on the educator's role in making CT meaningful and applicable across different learning contexts, supporting engagement, digital literacy, and lifelong learning pathways.

Use this module to understand the benefits of CT in adult education, adopt effective pedagogical strategies and design engaging, real-world activities that foster CT skills in your learners



STRUCTURE OF THE MODULE

Unit 1. Integrating Computational Thinking: opportunities and benefits

- Why CT matters in adult education
- CT is adaptable across subjects and real-life scenarios
- Easy integration examples

Unit 2. Pedagogical approaches for CT implementation

- What makes adult students different
- Teaching methods that work best for adult education
- Scaffolding and unplugged activities to support inclusive and accessible CT instruction
- Desired outcomes of adult learning

Unit 3. Designing lesson plans and activities

- Importance and elements of a well-structured lesson plan
- Designing activities for adult students
- Step-by-step guide to create a lesson plan with CT integration
- Assessment techniques and evaluation and continuous improvement

Unit 4. 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 this course, you, as an educator, will be able to...

Learning outcomes

Describe strategies for integrating computational thinking into your lessons

Determine effective pedagogical approaches for teaching computational thinking to adult learners

Demonstrate how to create lesson plans that incorporate computational thinking through real-world tasks

Acknowledge the role of feedback and reflection in improving computational thinking skills

Identify tools and resources for teaching computational thinking in adult education

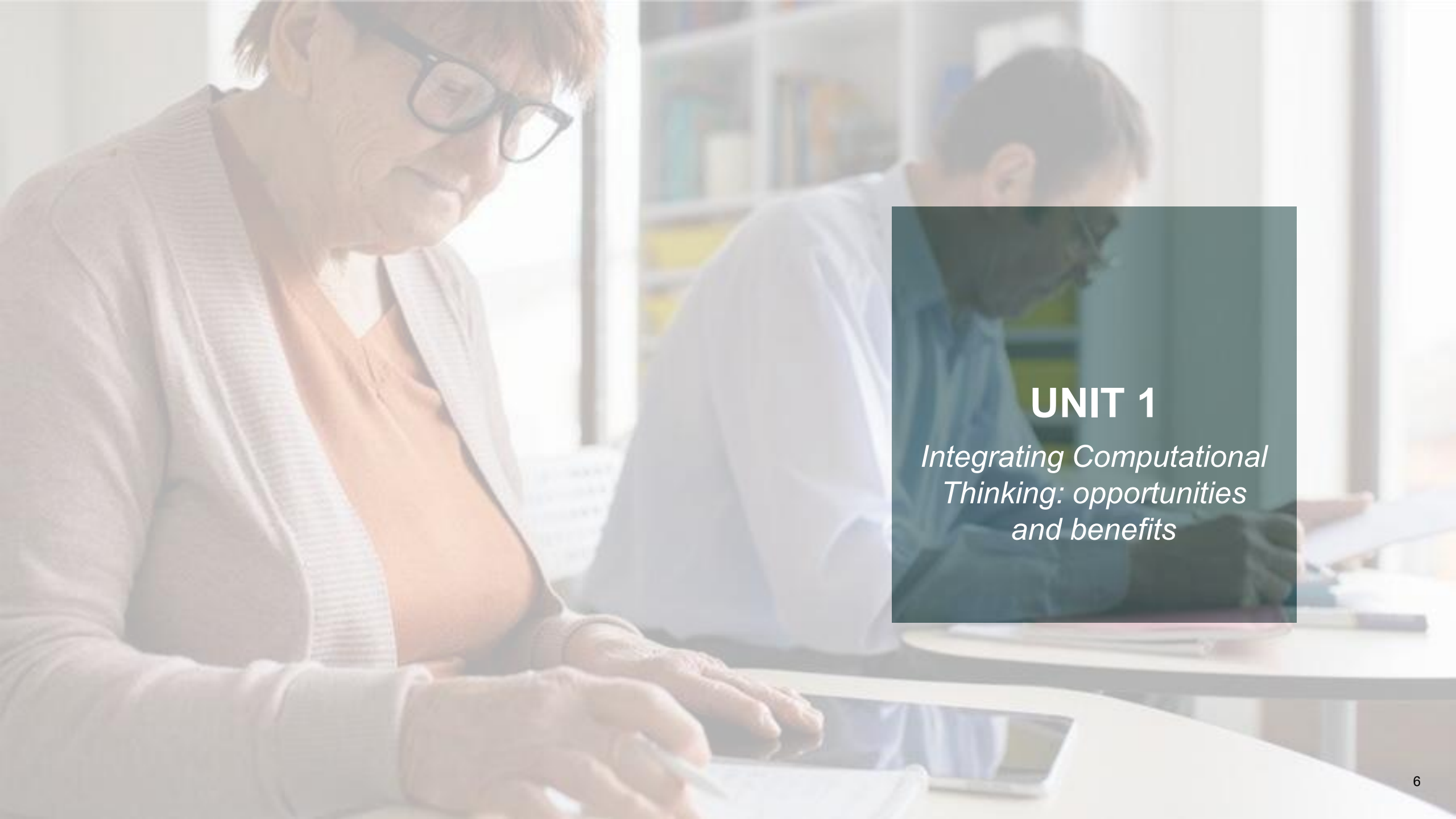
MODULE AIM and OBJECTIVES

AIM: To support trainers in implementing Computational Thinking in adult education through practical, inclusive and pedagogically sound strategies.

OBJECTIVES:

1. Understand the value of CT in adult education and its relevance to digital and lifelong learning.
2. Explore inclusive and engaging approaches to foster CT among diverse adult learners.
3. Reflect on their own practice to enhance CT facilitation and learner engagement.





UNIT 1

*Integrating Computational
Thinking: opportunities
and benefits*

Why CT in adult education?: Reasoning

CT integration in adult education involves integrating its principles and practices into various educational settings to enhance problem-solving and logical reasoning, among other relevant skills.

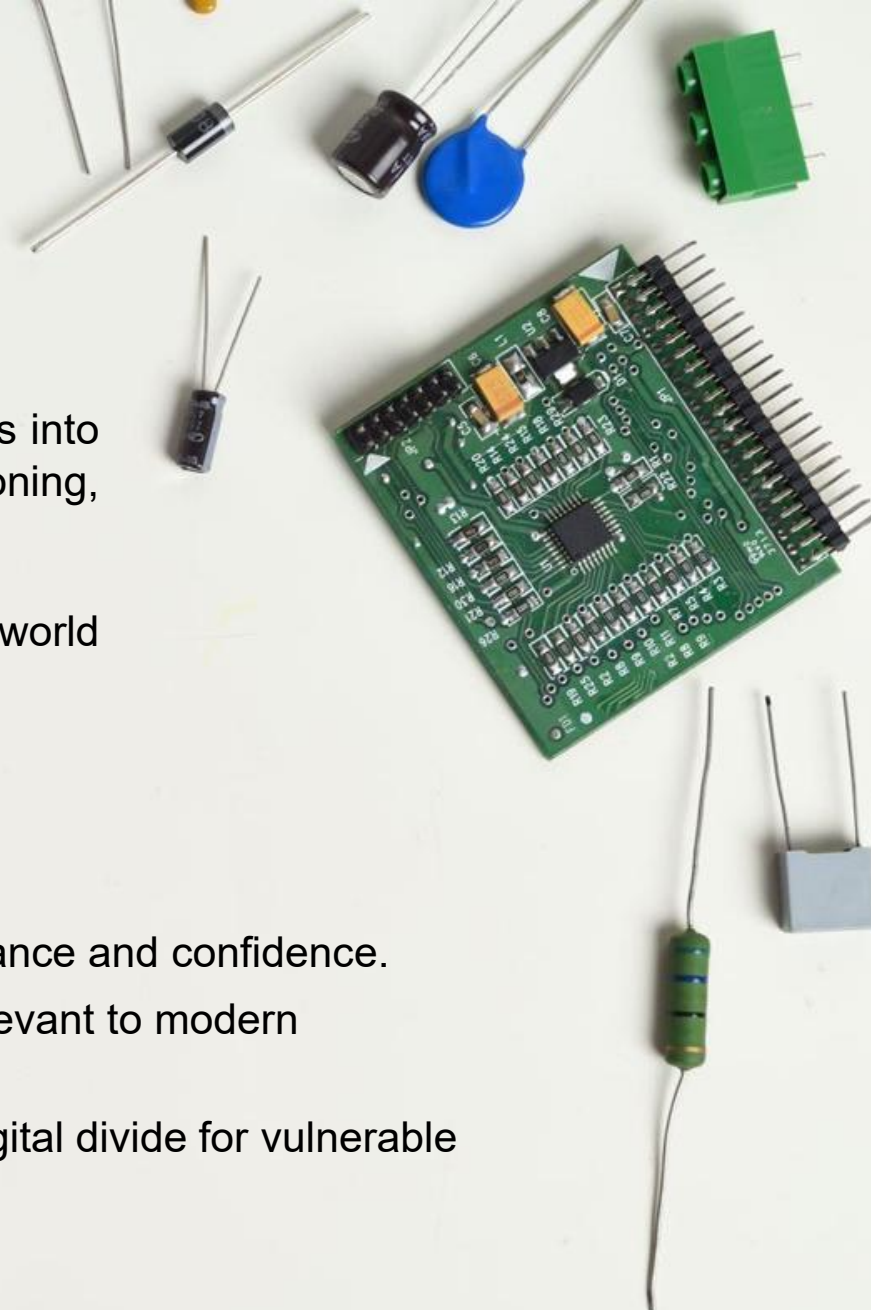
CT equips adult learners with tools that are relevant for adapting to the digital world and for addressing real-life issues in everyday activities and tasks.

CT integration supports key goals in adult education by:

Alignment with
adult education
goals



- **Empowering learners:** Promoting self-assurance and confidence.
- **Improving employability:** Providing skills relevant to modern workplaces.
- **Advancing digital inclusion:** Bridging the digital divide for vulnerable populations.



Why CT in adult education?: Reasoning

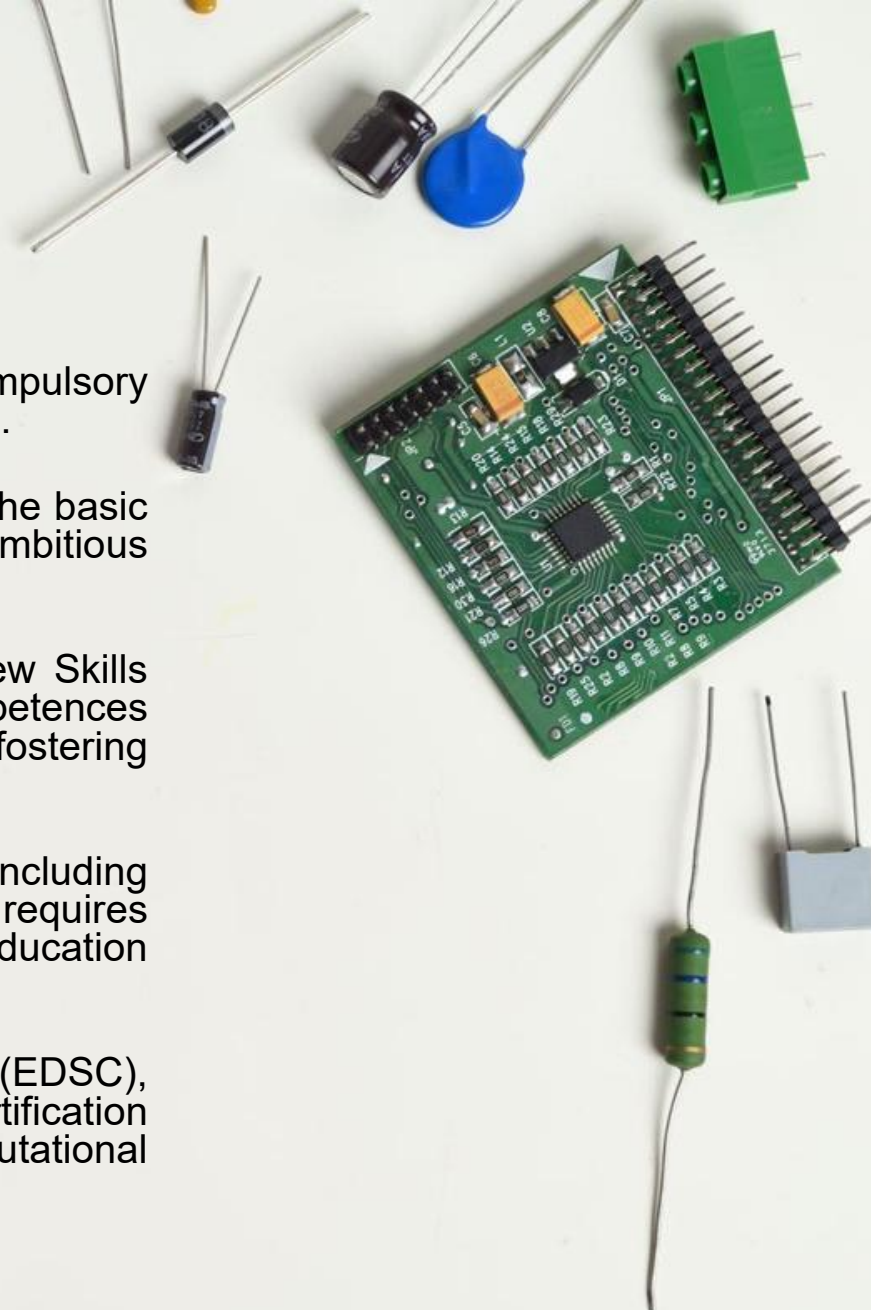
While substantial progress has been made in implementing computational thinking in compulsory education (primary and secondary schools), the focus on adult education remains limited.

Recent analysis indicates that only 55.6% of the EU's adult population currently meets the basic digital competence threshold[2]. This falls significantly short of the European Union's ambitious goal of ensuring 80% of adults possess at least basic digital skills by 2030

The recognition of computational thinking as a key competence has informed the New Skills Agenda for Europe, which acknowledges the importance of investing in skills and competences and establishing a shared understanding of key competences as a crucial step for fostering education, training, and non-formal learning across Europe

The European Digital Decade Programme establishes ambitious targets for 2030, including ensuring at least 80% of those aged 16-74 have basic digital skills[13][2]. This target requires significant coordination and effort across all member states, particularly in adult education contexts.

Another important cross-national initiative is the European Digital Skills Certificate (EDSC), designed to be recognized and accepted throughout EU member states[4]. This certification aims to provide a standardized way to recognize digital competences, including computational thinking skills, across Europe.

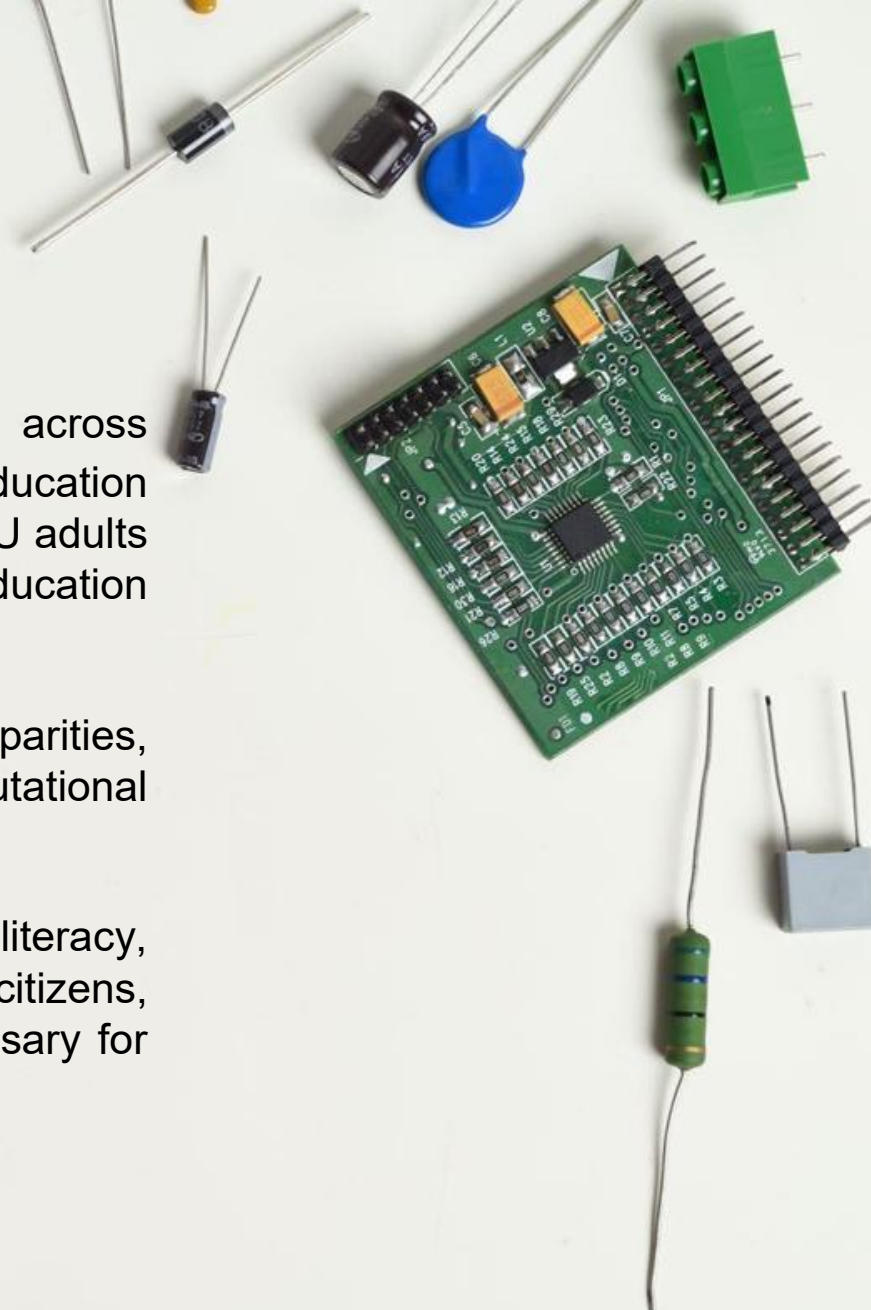


Why CT in adult education?: Reasoning

Despite progress in implementing **computational thinking** across European education systems, significant challenges remain, particularly in adult education contexts. The substantial gap between the current level of digital skills (55.6% of EU adults with basic skills) and the 2030 target (80%) requires accelerated efforts in adult education programs

Future initiatives should focus on addressing demographic and geographic disparities, developing standardized assessment methods, and creating inclusive computational thinking programs specifically designed for adult learners.

As computational thinking continues to evolve as a key component of digital literacy, European education systems must adapt their approaches to ensure all citizens, regardless of age or background, develop the computational thinking skills necessary for successful participation in the digital society of the future



Why CT in adult education?: Benefits

Enhances problem-solving and critical

CT teaches learners how to break down challenges into manageable steps and find logical, creative solutions for real-life situations

Builds confidence and motivation

CT activities give learners a sense of accomplishment, boosting their self-esteem and encouraging active participation

Promotes collaboration and communication

Group tasks in CT foster teamwork and help learners practice expressing their ideas effectively

Develops adaptability

CT nurtures flexible thinking, helping learners tackle unexpected challenges with resilience and creativity

Empowers vulnerable adults

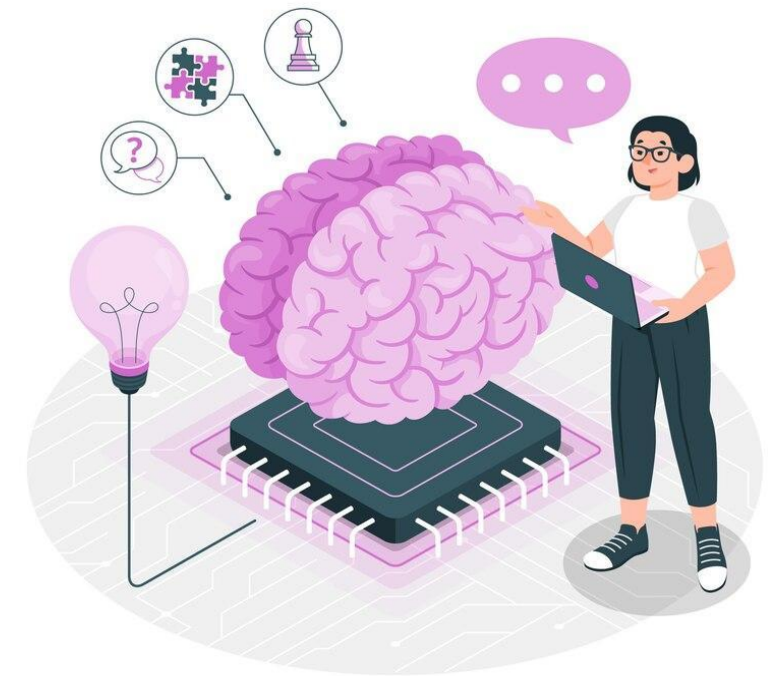
Interactive CT activities connect to learners' experiences, making them feel valued and engaged in their education

Why CT in adult education?: Flexibility

Applicable across diverse subjects: You can integrate CT into various topics, such as math, science or teaching life skills.

Relevance beyond technology: CT helps learners tackle real-life issues, such as creating budgets, organizing events, or making thoughtful decisions.

Adaptable for all contexts: Whether you're teaching academic content or life skills, CT offers flexible strategies to engage and support your students effectively.



Why CT in adult education?: Examples for easy integration

Everyday algorithms

Teach learners to create step-by-step guides for familiar tasks like preparing a recipe, cleaning a room, or getting ready for a job interview. This helps them break processes into clear, manageable steps.

Use decision-making flowcharts to help learners visualize choices. These tools simplify complex decisions and improve logical thinking.



Collaborative learning projects

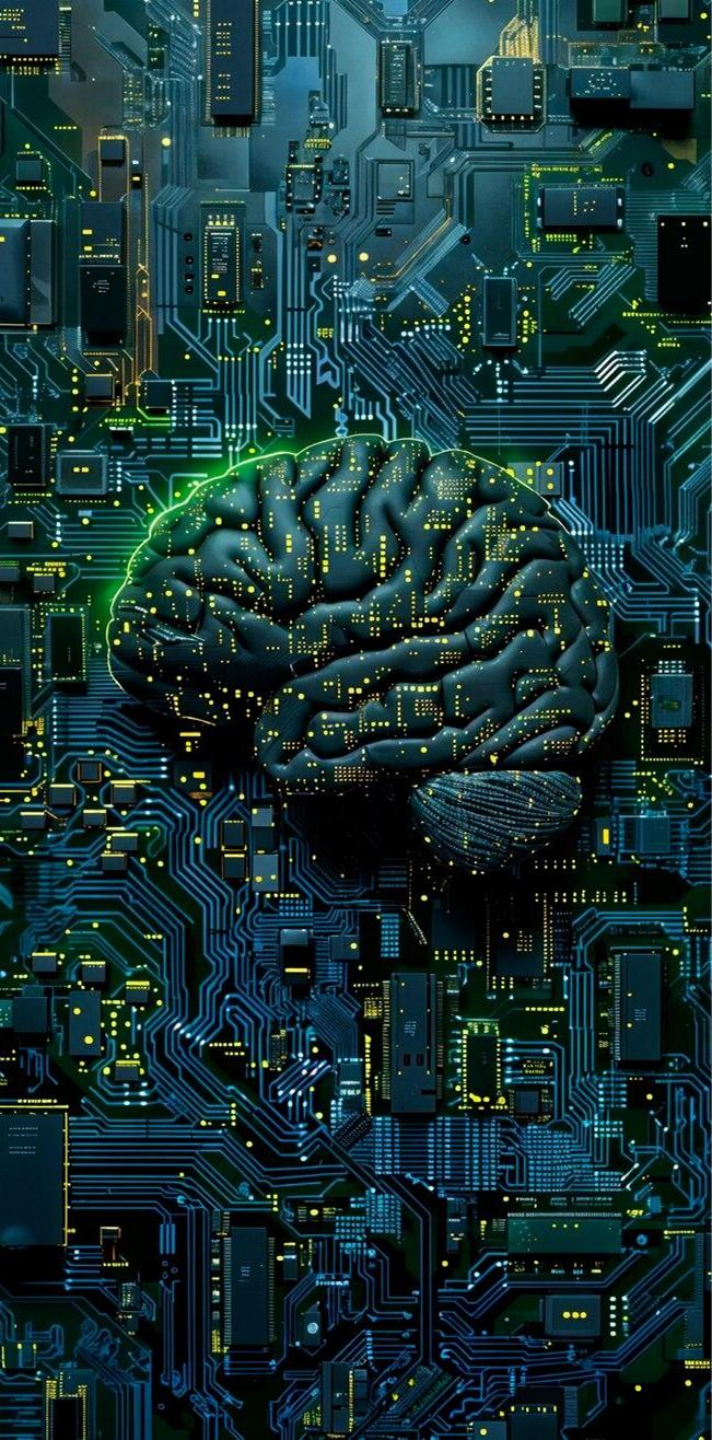
Organize group activities where learners plan simple projects, like a community meal, breaking tasks into manageable steps.

Facilitate brainstorming sessions to resolve issues, such as reducing household expenses, developing shared problem-solving and practical skills.

The background image shows two individuals in a bright, modern study or library environment. In the foreground, an older woman with short brown hair and black-rimmed glasses is seated at a white table, looking down at a tablet device. She is wearing a light-colored cardigan over an orange top. In the background, a man with dark hair and glasses is also seated at a table, looking down at a document. He is wearing a light blue shirt. The background features bookshelves filled with books and a large window letting in natural light.

UNIT 2

*Pedagogical
approaches for CT
implementation*



In this unit, we will explore a range of pedagogical approaches specifically designed for adult learners.

Teaching adults requires a flexible and considerate approach, as their learning needs differ from younger students. They also bring a lot of life experience that shapes how they learn.

By focusing on practical, real-world applications, adult learners can connect new concepts to their everyday lives, making learning more impactful.

Throughout this unit, we will study diverse strategies that emphasize active participation, problem-solving and critical thinking. We will also discuss how to create flexible, inclusive learning environments that cater to the different needs of adult students, ensuring that everyone can engage and succeed in their learning path.



Did you know that **Andragogy** is the theory focused on teaching adult learners? Developed by Malcolm Knowles, it emphasizes key principles that are widely used in adult education today.



What makes adult students different

When working with adult students, it's important to understand that they provide their own set of characteristics and experiences to the learning process. These differences shape how they engage with new information and how they prefer to learn.

Here's a look at what makes adult learners distinct from other age groups:

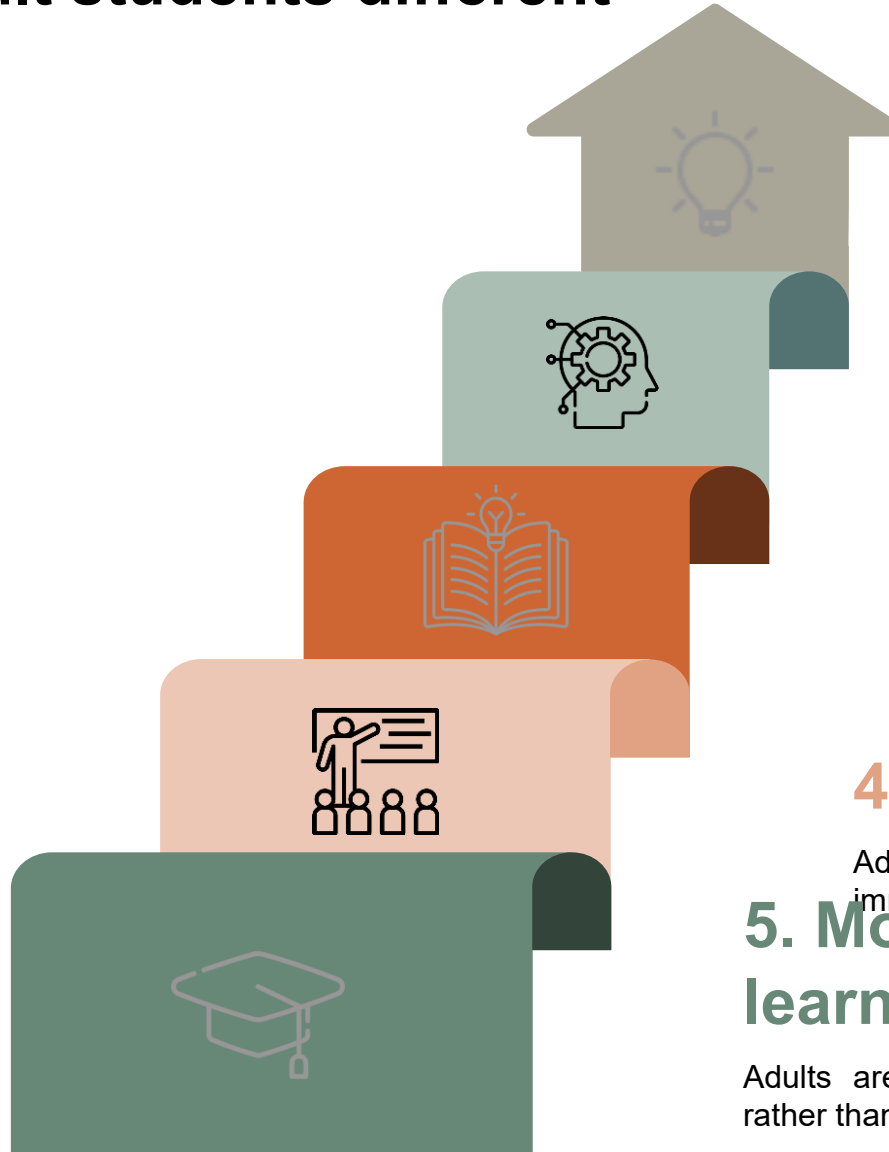
- ❑ Adults **decide for themselves** what is important to be learned
- ❑ They need to **validate new information** by connecting it to their own beliefs and experiences
- ❑ With their experience, adult learners may **have established viewpoints** that influence how they approach new concepts
- ❑ Adult learners expect what they are learning to be **immediately useful** in their personal or professional lives
- ❑ They can serve as a **knowledgeable resource** to trainers and fellow learners



What makes adult students different

Understanding how adults learn is key for effective education.

To design effective learning experiences for adults, it's important to understand the **assumptions that underpin their approach to education**. These assumptions help explain how adults engage with new information and skills, and how their prior experiences impact their learning process.



1. Self-concept

Adults thrive in independent learning and training scenarios.

2. Experience

Adults learn experientially, meaning they learn from first-hand observations and interactions.

3. Readiness to learn

Adults are more willing to learn when they know clear objectives.

4. Orientation to learn

Adults learn best when the topic is of immediate value.

5. Motivation to learn

Adults are motivated by internal factors rather than external pressures.

What makes adult students different

Adult learners often bring a distinct learning styles that influence how they absorb and process information, which can be categorized into three primary learning styles that are relevant when considering how to introduce CT into adult education:

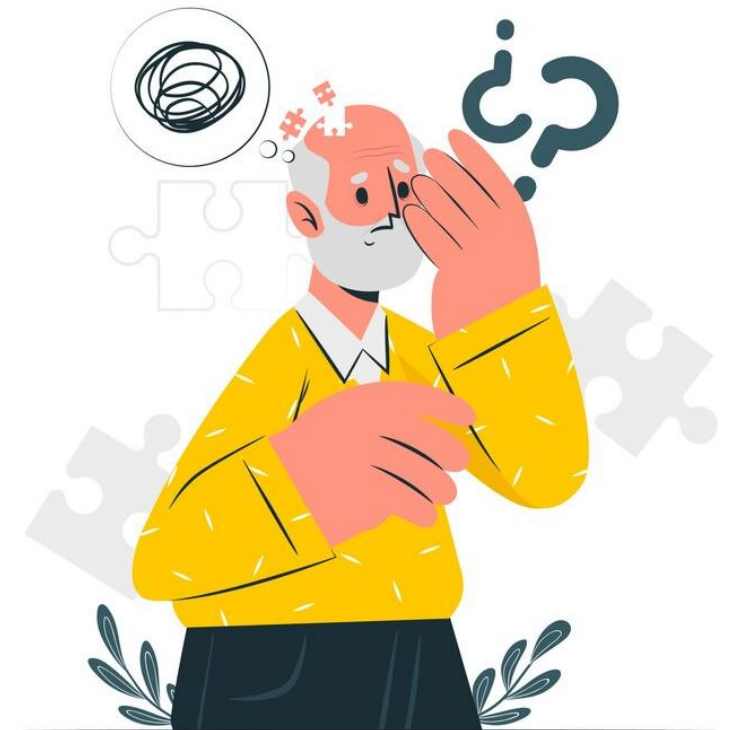
- ❑ **Visual learners** prefer information presented through diagrams, graphs, and illustrations. They thrive when they can see the concepts in action and benefit from tools like worksheets, whiteboards, and visually engaging presentations.
- ❑ **Auditory learners** excel when learning through listening. Discussions and verbal clear explanations resonate strongly with them, as they process information through sound and dialogue.
- ❑ **Tactile learners** learn best through hands-on activities. They prefer experiences that allow them to physically engage with the material, such as role-playing or practical exercises, to connect with the subject matter on a deeper level.



Teaching methods that work best for adult education

To effectively integrate computational thinking into adult education, it is essential to align teaching methods with the principles of CT, such as problem-solving, critical thinking, and logical reasoning. Strategies like project-based learning, collaborative learning, and experiential learning are especially effective in supporting CT by encouraging students to decompose complex tasks, identify patterns, and create structured solutions. These methods foster engagement, stronger understanding and the practical application of CT concepts.

1. Project-Based Learning
2. Problem-Based Learning
3. Collaborative Learning
4. Experiential Learning
5. Self-Directed Learning
6. Flipped Classroom



Teaching methods that work best for adult education

1. Project-based learning

Project-based learning is a teaching method where learners work on a project over an extended period, which helps them develop critical thinking, problem-solving, and collaboration skills. PBL is especially effective for adult learners as it encourages hands-on learning and mirrors real-world challenges.

CONNECTION TO CT

CT can be integrated into project-based learning by helping students break down complex projects into smaller, manageable tasks (decomposition), identify patterns, and create step-by-step procedures (algorithms) for problem-solving.

IMPACT OF CT

Students will approach projects more systematically, using logical thinking and structured problem-solving techniques. CT encourages creative solutions and innovation in project execution.

2. Problem-based learning

Problem-based learning focuses on solving real-world problems, encouraging learners to analyze situations critically and collaborate on solutions. It helps develop critical thinking, decision-making, and teamwork skills.

CONNECTION TO CT

CT enhances problem-based learning by guiding students to break down complex problems into smaller parts (decomposition), identify patterns, and use algorithms for structured problem-solving.

IMPACT OF CT

CT enables students to confront challenges methodically, promoting logical thinking and practical problem-solving skills that are essential for addressing real-world scenarios effectively.

Teaching methods that work best for adult education

3. Collaborative learning

Collaborative Learning involves students working together to reach common goals through group discussions, projects, and shared tasks. It builds teamwork, communication, and social skills while promoting a community and shared responsibility.

CONNECTION TO CT

CT strengthens collaborative learning by encouraging data sharing, collective analysis, and algorithmic problem-solving. Students can use CT principles to organize information and solve problems as a team.

IMPACT OF CT

Students develop critical thinking and structured approaches to group tasks, improving their ability to collaborate effectively and innovate in a team setting.

4. Experiential learning

Experiential Learning emphasizes learning through experience, allowing students to engage directly with real-world challenges through simulations, fieldwork, or hands-on activities. This method promotes deeper understanding by encouraging learners to reflect on their actions, analyze outcomes, and apply insights to similar situations.

CONNECTION TO CT

CT supports experiential learning by helping students apply decomposition, algorithms, and testing to analyze and solve problems they encounter during activities.

IMPACT OF CT

By integrating CT, students refine their ability to experiment, evaluate outcomes, and improve their solutions, making their learning process more systematic and impactful.

Teaching methods that work best for adult education

5. Self-directed learning

Self-Directed Learning empowers students to take control of their learning path by setting personal goals, managing their learning process, and reflecting on progress. This approach encourages independence and adaptability, while developing problem-solving and critical-thinking skills.

CONNECTION TO CT

CT helps students plan and organize their tasks, break them into manageable steps (decomposition), and track progress through logical methods.

IMPACT OF CT

Students become more independent and efficient, utilizing structured approaches to achieve their goals and solve challenges in a goal-oriented manner.

6. Flipped classroom

The Flipped Classroom shifts traditional learning by providing instructional materials before class, reserving class time for discussions and activities. It promotes active engagement and deeper understanding.

CONNECTION TO CT

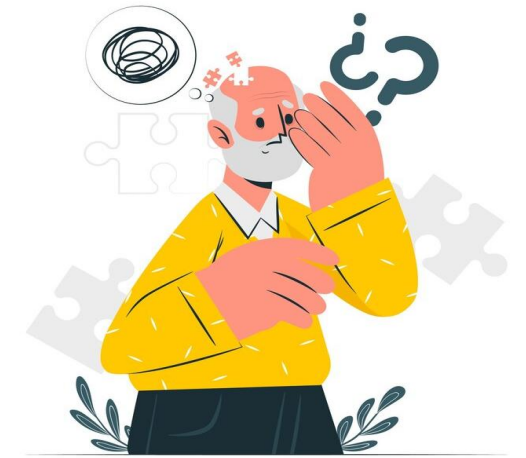
CT enhances flipped classrooms by encouraging pre-class problem-solving and the application of algorithms to analyze and interpret instructional content.

IMPACT OF CT

Students arrive at class with a structured understanding, ready to collaborate and engage in higher-order problem-solving, making the classroom experience more dynamic and interactive.

Are you currently using scaffolding or are you familiar with

Scaffolding is a teaching approach that breaks down complex concepts into smaller steps, gradually reducing support as learners gain independence. When combined with CT, scaffolding plays a key role in helping adult learners develop critical problem-solving and analytical skills. Scaffolding ensures that adult learners, regardless of their prior knowledge or digital literacy levels, can gradually develop CT skills at their own pace. This adaptability makes CT an inclusive methodology, as it allows educators to adjust complexity, reinforce concepts, and personalize learning pathways.



Key elements of scaffolding CT:

Step-by-step skill development

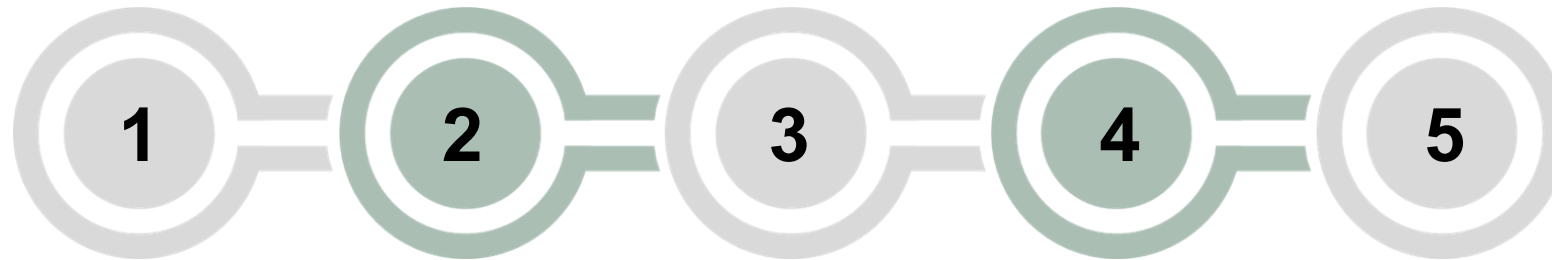
Introduce CT concepts, such as decomposition in small segments to build confidence.

Gradual release of responsibility

Start with guidance and move to independent tasks as learners gain confidence in applying CT strategies

Real-world applications

Relate each step to practical scenarios, helping learners see how CT concepts apply to real-life situations.



Guided practice

Offer structured activities with clear instructions and examples to ensure learners understand before working independently.

Feedback and adjustment

Provide regular feedback and adjust tasks to match learners' progress, preventing overwhelm.

By using scaffolding in your classes, you can create a supportive learning environment where your learners can progress at their own pace



Unplugged activities

CT can be developed without the use of computers or digital tools. Unplugged activities allow students to engage with CT concepts through hands-on, interactive exercises that build problem-solving and logical thinking skills. These activities are especially useful for educators who want to integrate CT into lessons without using technology.

Why use unplugged activities?

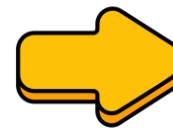
- ✓ **Accessible to all students:** No need for computers or prior technical knowledge.
- ✓ **Encourages hands-on learning:** Uses real-world, physical, and collaborative exercises to make CT more engaging.
- ✓ **Strengthens problem-solving skills:** Focuses on logical reasoning, critical thinking, and structured thinking.

Unplugged CT activities make computational thinking accessible, engaging and relevant for adult students, especially those who don't know how to use technology. By incorporating these exercises, you can strengthen learners' problem-solving skills without the need for digital tools.



Example

Students plan a family gathering by breaking it into smaller steps, like choosing a date, sending invitations, preparing food, and organizing activities.



This reinforces decomposition, helping students' structure complex tasks into manageable parts for better planning and execution.

Unplugged activities

Here are some practical examples of effective unplugged activities you can easily apply in adult education contexts to foster CT:

Job search organizer

Learners receive different fictional job postings. They must group and sort them by criteria: hours, skills needed, distance and/or salary. Then they rank which jobs they'd apply to and why.

Advantages:

- Simulates real-world responsibilities.
- Helps develop decision-making and prioritization skills.

Methodological value:

Strengthens classification, filtering and structured decision-making

Trainer guidelines:

- Use realistic job descriptions from local sources.
- Lead a discussion about the steps they used to sort and decide.
- Relate the process to search filters in online platforms.

Recipe card mix-up

Provide learners with recipe steps on separate cards, like making a salad or pasta. The steps are out of order. Their task is to arrange them correctly, then explain their logic. You can make it harder by introducing a “wrong” step for debugging.

Advantages:

- Accessible and low-pressure.
- Directly connects to sequencing and logic

Methodological value:

Develops algorithmic thinking and sequencing

Trainer guidelines:

- Use common recipes.
- Encourage learners to explain why they chose the order.
- Discuss what happens if one step is skipped or done wrong



Unplugged activities

Unplugged activities are powerful, low-barrier tools that help adult learners build computational thinking from the ground up. For example, having learners map out how they get ready in the morning using post-it notes can teach decomposition and sequencing. Group games like “if-this-then-that” storytelling or creating a human flowchart can foster logic and collaboration. These types of exercises encourage adult students to actively engage, test solutions and reflect on their problem-solving strategies in familiar contexts.

When applied intentionally, unplugged activities create structured learning moments that feel natural and meaningful.

Guidelines for trainers:

1. **Start simple:** Always introduce unplugged activities with relatable scenarios.
2. **Facilitate:** Act as a facilitator rather than just an instructor, guiding and supporting learners through activities.
3. **Reflect on what they’ve learn:** End each activity with guided reflection:
“What did we do?”
“Why did we do it this way?”
“How does it relate to computational thinking?”
4. **Assess:** Use group discussions and reflective feedback as assessment strategies, emphasizing the understanding of processes rather than right/wrong answers.



Programming activities



Programming activities offer a hands-on way to build the structure of computational thinking in adult learners. When learners design digital solutions, like animations or apps, they engage in the core principles of CT.

Programming doesn't have to be complex. There are beginner-friendly tools that can help adult learners experience CT concepts in engaging ways without needing advanced tech skills:

Scratch



Scratch is a free, block-based visual programming environment that allows learners to build stories, games and animations by snapping together code blocks like puzzle pieces.

Advantages:

Scratch teaches the logic and structure of programming in a visual way. Learners explore sequencing, loops, events and debugging while seeing immediate results from their actions. Scratch is creative and playful and encourages learners to use core elements of CT.

Trainer tips:

- Start with a simple goal.
- Use pre-built templates to lower the entry barrier.
- Guide learners to reflect on the logic behind their block choices.
- Encourage peer sharing to build confidence and communication.

App inventor



Visual programming platform that allows users to create simple Android apps using block-based logic. It's ideal for beginners and doesn't require prior coding knowledge.

Advantages:

App inventor develops event-driven understanding of how user actions (like tapping a button) trigger responses (like displaying a message). Learners explore inputs, conditions, outputs, sequencing and logic flows in a hands-on way, often designing tools for their own daily needs.

Trainer tips:

- Keep projects practical and relevant.
- Begin with tutorials that build apps step-by-step.
- Emphasize planning and flowcharting before building the app.
- Use phones or emulators to test apps and show the real-world connection.

Arduino



Arduino is a microcontroller platform used for building digital devices and interactive physical systems. Learners write simple code that interacts with physical components to perform tasks.

Advantages:

Arduino introduces learners to input/output logic and core CT principles in real-time. Learners can see and touch the outcomes, and this reinforces the idea that structured thinking leads to real-world results.

Trainer tips:

- Begin with guided, pre-wired projects to reduce hardware complexity.
- Focus first on understanding the cause/effect flow.
- Encourage troubleshooting as a learning moment, not a mistake.
- Use it as a bridge to talk about how automation and systems work in real life.

Keeping adult students motivated

Motivating adult learners involves connecting educational content to their personal goals and real-world needs. CT plays a key role in promoting engagement by showing its relevance and practicality. By using CT to address everyday challenges, promoting creativity, and tailoring instruction to individual goals, you can empower your students.



- ✓ Show how CT principles solve everyday problems, keeping learners motivated and engaged.
- ✓ Foster self-confidence by teaching learners to approach problems systematically and independently.
- ✓ Encourage creativity through tasks that let learners use CT for planning and design.
- ✓ Tailor CT instruction to each learner's unique goals, making the content directly applicable.
- ✓ Promote collaborative learning through group activities that enhance motivation and idea-sharing.
- ✓ Reinforce progress with positive feedback to highlight the practical benefits of CT.

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



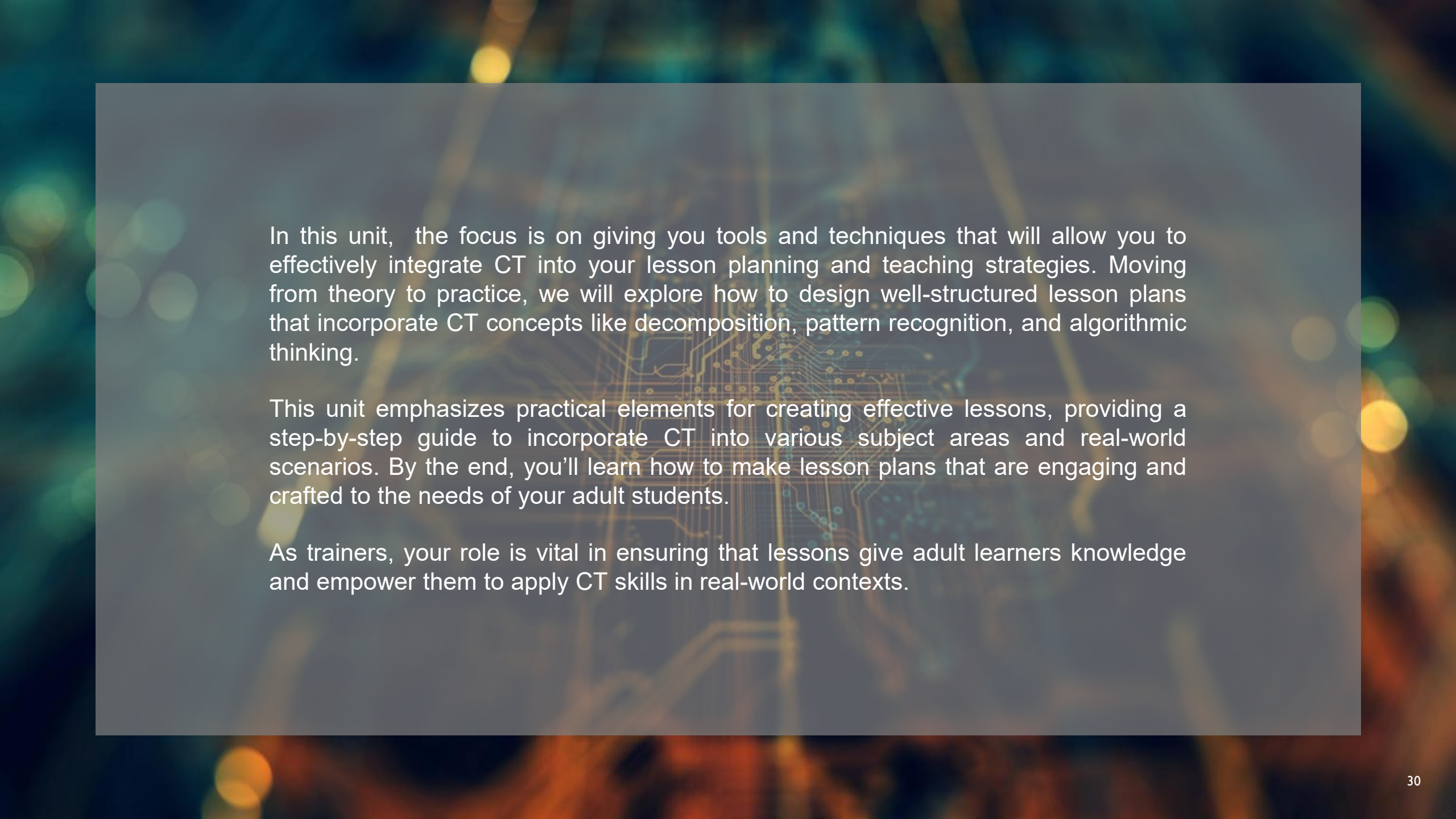
What is the main focus when teaching adult learners?

- A) Memorizing facts
- B) Practical, real-world applications
- C) Competitive learning environments
- D) Long theoretical lectures



UNIT 3

*Designing lesson
plans and activities*



In this unit, the focus is on giving you tools and techniques that will allow you to effectively integrate CT into your lesson planning and teaching strategies. Moving from theory to practice, we will explore how to design well-structured lesson plans that incorporate CT concepts like decomposition, pattern recognition, and algorithmic thinking.

This unit emphasizes practical elements for creating effective lessons, providing a step-by-step guide to incorporate CT into various subject areas and real-world scenarios. By the end, you'll learn how to make lesson plans that are engaging and crafted to the needs of your adult students.

As trainers, your role is vital in ensuring that lessons give adult learners knowledge and empower them to apply CT skills in real-world contexts.

Importance of a well-structured lesson plan

A well-structured lesson plan is essential for teaching adults effectively. It serves as a roadmap, ensuring that both educators and learners stay focused on clear objectives while addressing the unique needs of adult learners.

Adult learners often balance education with work, family, and other responsibilities, so lessons must be purposeful, efficient, and engaging. A structured plan helps make the most of limited learning time and ensures the content is relevant to their real-world goals.

Tailoring the lesson plan for adults involves incorporating their life experiences, providing practical applications, and addressing different learning styles. A thoughtful structure ensures that lessons build logically, connecting prior knowledge with new concepts, while offering flexibility to adapt to student needs.

A strong plan doesn't just guide the session, it creates a supportive framework for meaningful and effective learning experiences





Elements of a good lesson plan

A strong lesson plan is the base for effective teaching, especially for adult students who value clarity, relevance and structure. By incorporating these key elements, you can design lesson plans that resonate with adult students and make a lasting impact.

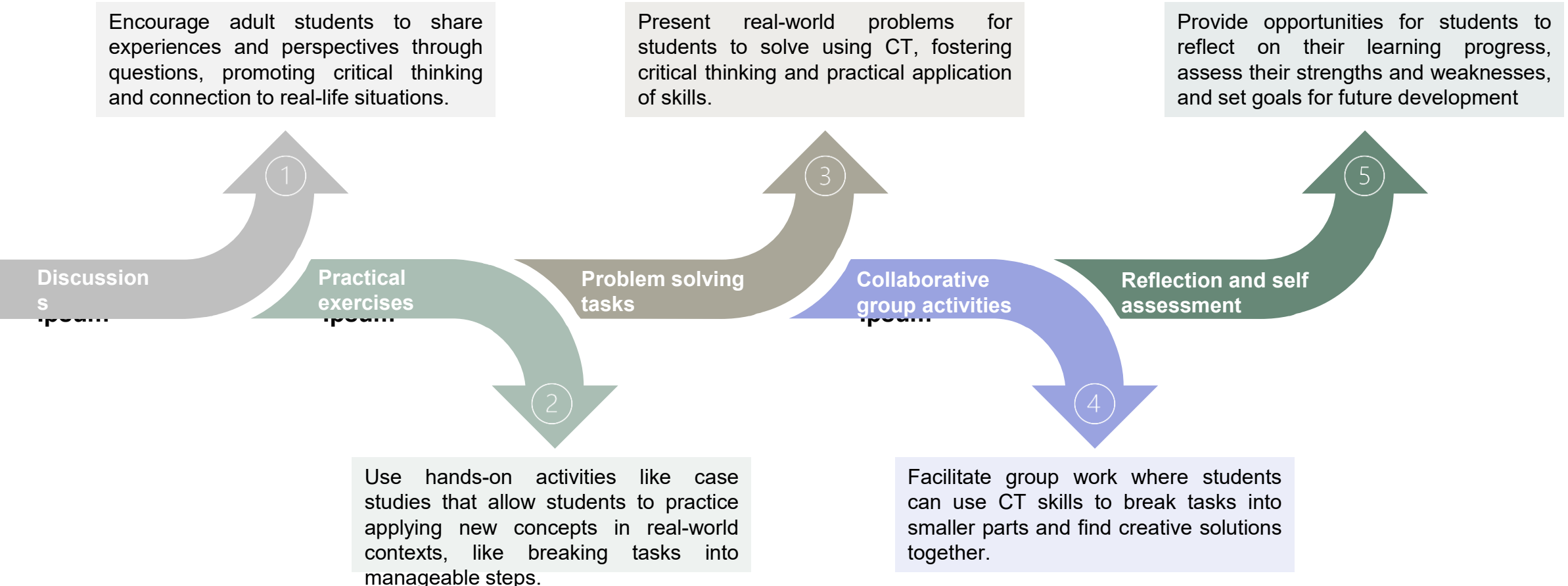
Element	Definition	Why it matters	Key features
Clear Objectives	Define what learners will achieve by the end of the lesson, using specific, measurable, and relevant goals tailored to their needs	Provides direction, keeping lessons focused and with purpose. For adults, knowing the end goal increases motivation and engagement	<ul style="list-style-type: none">• Connect to real-world tasks or skills• Practical and achievable goals• Measurable outcomes
Structured Content	Organize the lesson into logical sections: <ul style="list-style-type: none">• Introduction• Core content• Conclusion	Ensure learners can follow along, build on prior knowledge, and retain key information more effectively	<ul style="list-style-type: none">• Context-setting in the introduction• Step-by-step delivery with practical examples• Conclusion ties everything together and connects to future lessons
Engagement Strategies	Use storytelling, real-world scenarios, and interactive activities to capture learners' attention and keep them motivated	Connect lessons to learner experiences, making the content relatable and increasing understanding	<ul style="list-style-type: none">• Storytelling and real-life scenarios• Interactive and hands-on activities• Methods for varied learning styles
Assessment and Feedback	Involve checking learners' understanding and offering constructive input to support their growth	Reinforce learning, help identify gaps, and keep learners motivated to progress	<ul style="list-style-type: none">• Practical assessments and understanding checks• Constructive, actionable feedback• Encourages reflection and continuous improvement

Designing activities for adult students



Designing effective activities for adult students involves using techniques that engage, challenge and motivate them. These activities should connect to real-world experiences, foster critical thinking, and encourage collaboration.

Here are some activity types that work well for adult students:



Incorporating CT into lesson plans

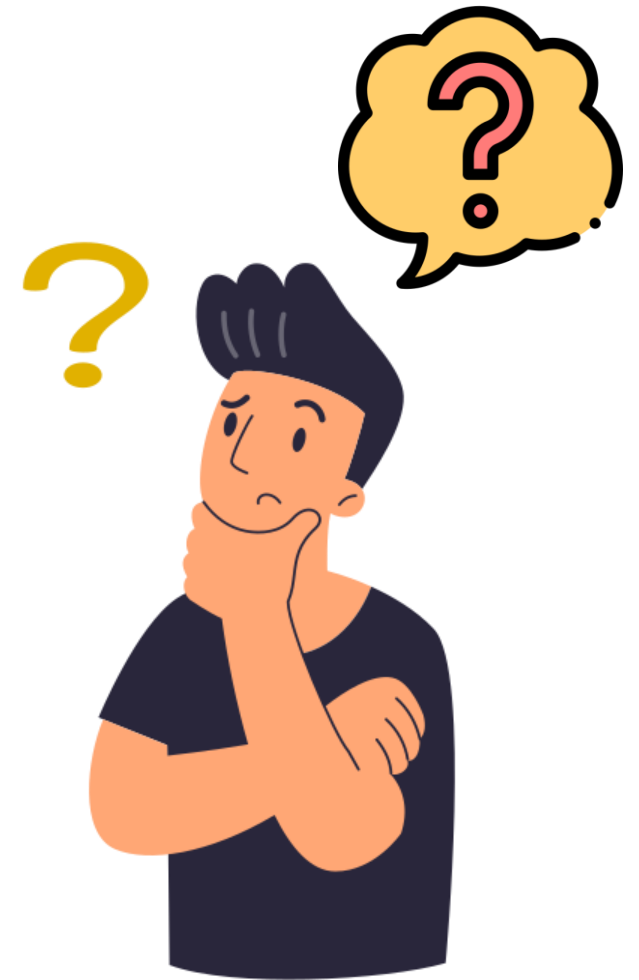
Incorporating CT into your lesson plans helps adult students develop essential skills. By aligning CT principles with real-world tasks, educators can make learning more relevant and impactful.

Here are three strategies you should follow to effectively incorporate CT in your lessons:

Start with simple CT exercises: Begin by introducing CT principles through easy-to-understand exercises. These should be straightforward tasks that allow learners to grasp the basic concepts without feeling overwhelmed. As learners become more comfortable, you can gradually increase the complexity of tasks.

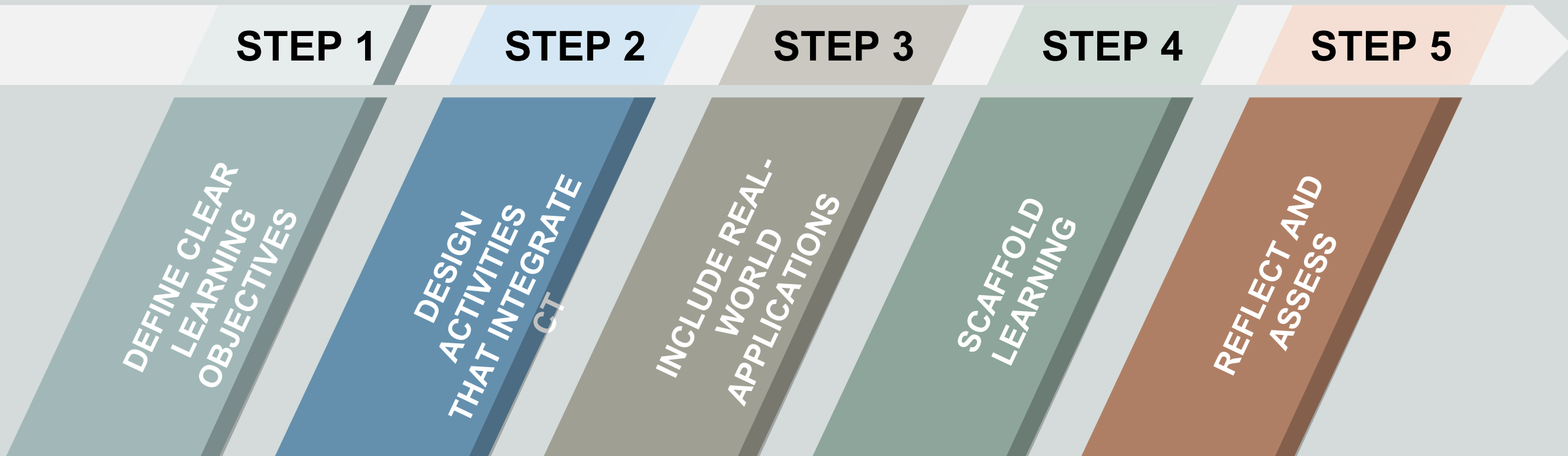
Connect CT to the real-world: Link CT concepts directly to real-life situations that are meaningful to the learners, like personal finances, career tasks, or daily problem-solving. By doing so, you demonstrate the practical benefits of CT and help learners see how these skills are relevant to their own lives.

Introduce CT into real-world tasks: Allow learners to apply CT principles directly to everyday tasks like budgeting or project planning. This allows learners to apply problem-solving skills directly to tasks they encounter, such as using decomposition for planning and pattern recognition for analyzing trends.



Step-by-step guide to create a lesson plan with CT integration

To integrate CT into your lesson plans, it's important to follow a clear, step-by-step approach. The following steps outline how to design and implement a lesson plan that fosters problem-solving skills in adult students. These steps are not mandatory but are recommended for creating an effective learning experience:



Let's walk through each of these steps in detail to ensure CT integration



Step 1: Define clear learning objectives

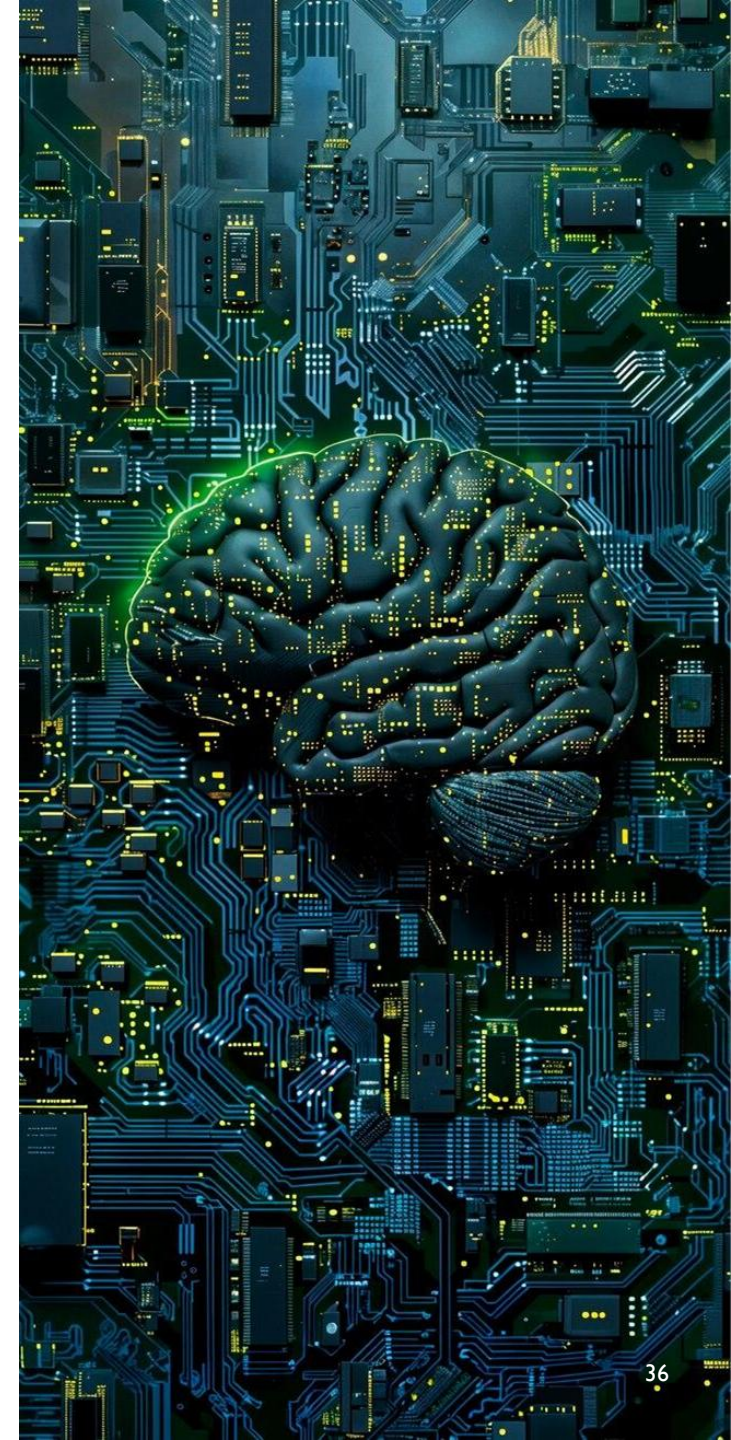
In adult education, defining clear, measurable objectives helps adult learners understand the purpose of the lesson and how it directly relates to their lives, making the learning process more meaningful.

Key points:

- ✓ **Identify CT principles to focus on:** Start by selecting CT principles that are most relevant to the learners' real-life challenges. For adults, this might include focusing on decomposition (breaking down work tasks), pattern recognition (identifying trends in personal or professional life), and algorithms (creating efficient step-by-step processes for daily tasks).
- ✓ **Make objectives specific and measurable:** Objectives should be clear and measurable to provide a sense of direction.
- ✓ **Ensure relevance:** Make sure that the learning objectives connect directly to adult learners' goals, whether it's managing time effectively, making data-driven decisions, or solving work-related problems. Real-life relevance is key to keeping adult learners motivated and engaged.

Example of what you could say in your lesson:

“By the end of this lesson, you will be able to break down a work project into smaller tasks, recognize patterns in previous projects, and use algorithmic thinking to create a step-by-step action plan.”



Step 2: Design activities that integrate CT

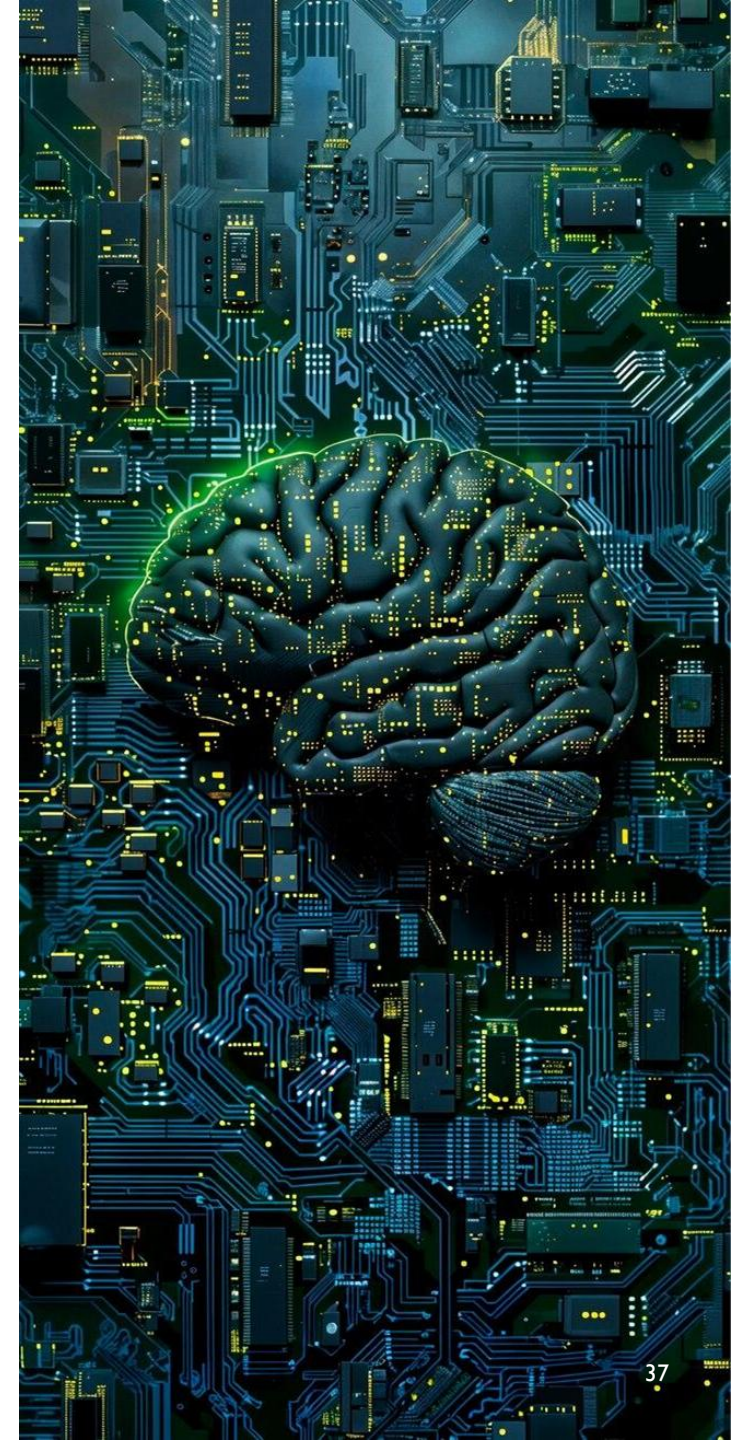
Creating engaging activities that involve learners is essential for stronger insight. Adults tend to learn best when they can apply concepts to real situations. Designing activities that integrate CT principles encourages adult learners to engage in hands-on problem-solving, making abstract concepts more tangible.

Key Points:

- ✓ **Active engagement with CT principles:** Design activities where learners can directly apply CT concepts.
- ✓ **Problem solving tasks:** Use tasks that require learners to use CT skills to solve real problems. For example, planning a community event, where learners apply decomposition, pattern recognition, and algorithms.
- ✓ **Incorporate collaborative learning:** Plan activities that involve group work or discussions allow learners to use CT principles in a collaborative setting, promoting peer learning and collective problem-solving.

Example of an activity for your lesson:

Break down a work project into smaller tasks. Discuss with a group how each task could be completed more efficiently by applying algorithms or recognizing patterns in previous projects



Step 2: Design activities that integrate CT

GAMIFICATION

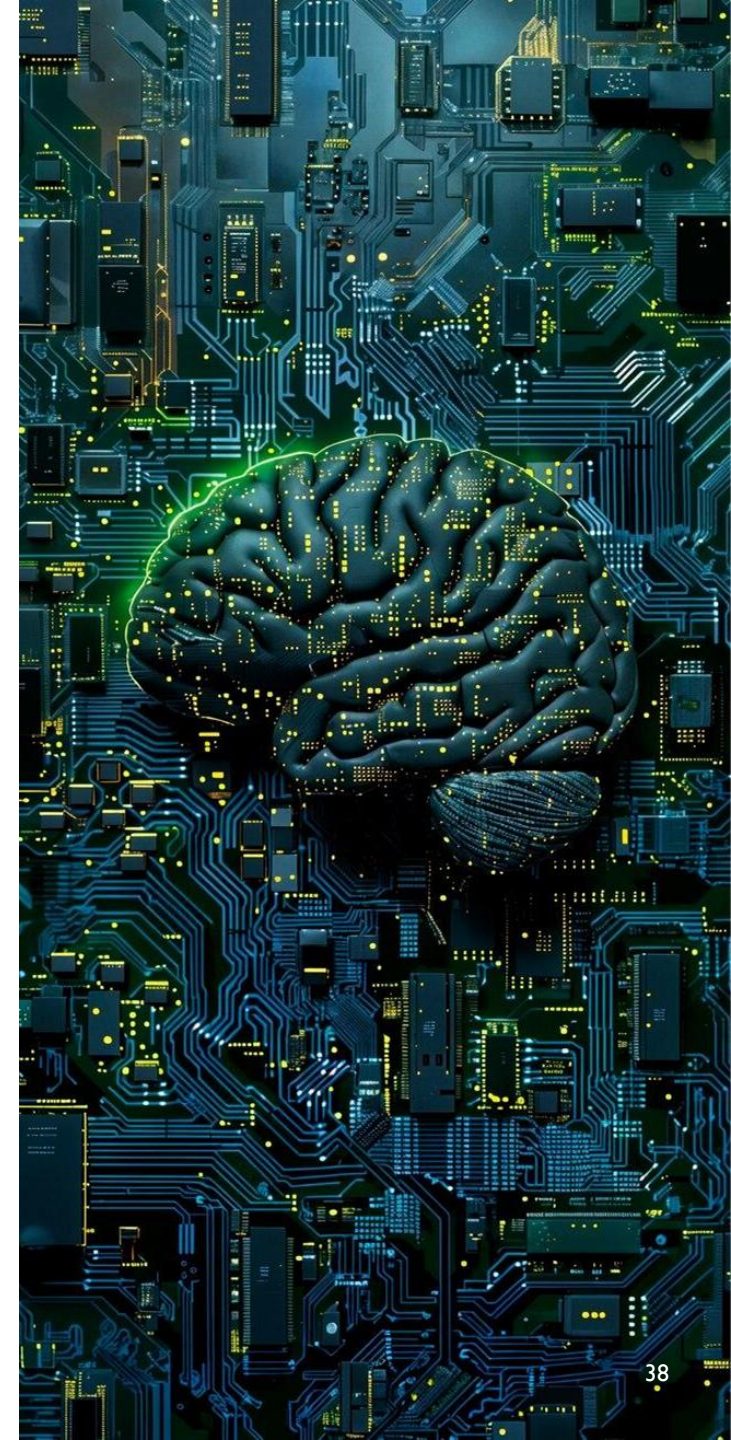
Gamification applies game-like elements to learning, increasing motivation, engagement, and participation. It is useful in adult education because it makes abstract concepts more interactive and enjoyable.

Gamification is particularly effective for teaching CT concepts such as decomposition, pattern recognition, and algorithmic thinking. Interactive activities help learners visualize abstract concepts in a concrete way, making problem-solving more accessible. For example, escape-room style challenges can encourage decomposition by requiring learners to break down a problem into smaller steps, while simulation-based tasks can strengthen their ability to recognize patterns and predict outcomes.

Gamification transforms learning into a motivating and interactive process that helps adult learners develop CT skills in a fun and engaging way. By using elements of play, educators can ensure that learners remain active, motivated, and confident in applying computational thinking to real-world challenges.



By integrating structured challenges, rewards and interactive problem-solving activities, you can create a more stimulating and effective learning environment.



Step 3: Include real-world applications

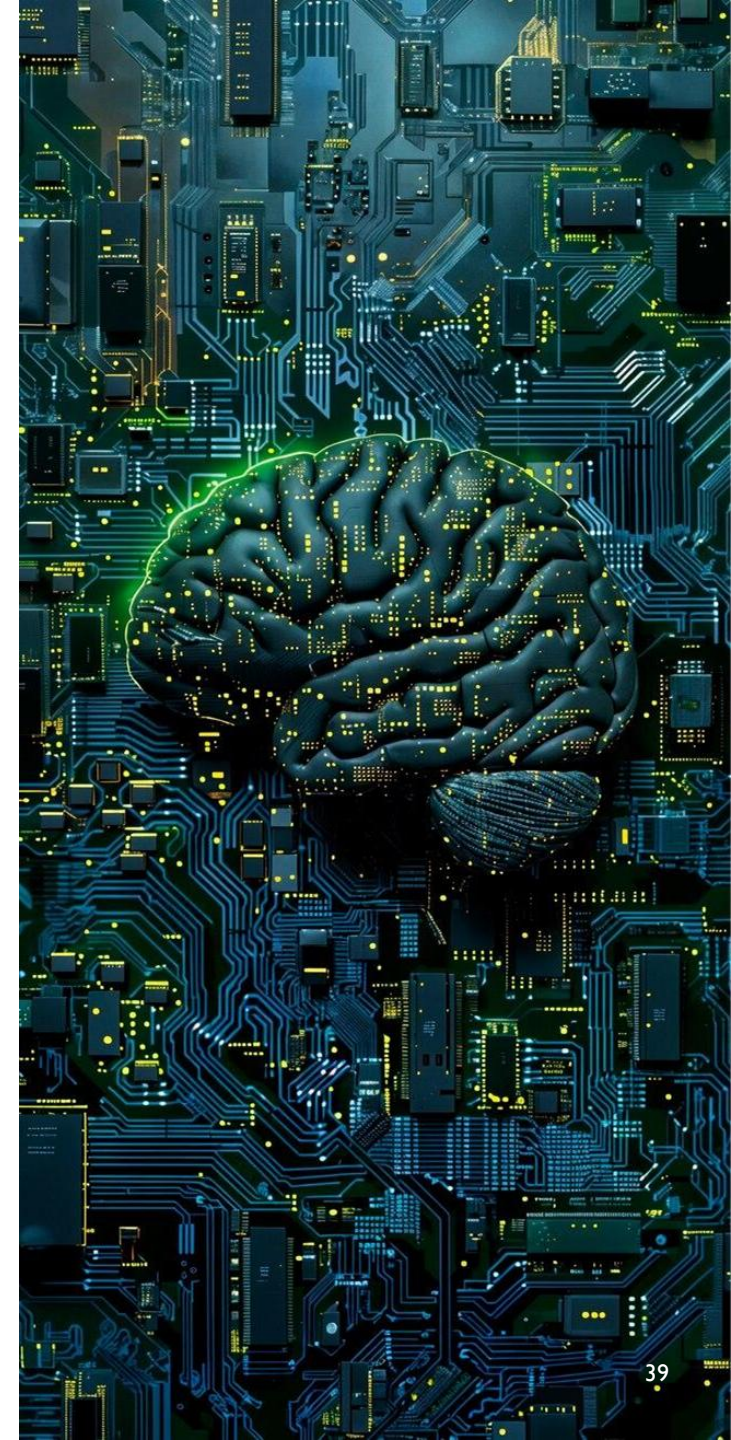
Adults learn best when they see how new skills relate directly to their personal and professional lives. By incorporating real-world applications, you can help learners understand the practical value of CT principles. This approach boosts engagement and improves motivation by showing immediate benefits.

Key Points:

- ✓ **Tie CT with practical scenarios:** Design activities that directly connect CT concepts to adult learners' personal or work-related tasks.
- ✓ **Exemplify the relevance of CT in their lives:** Help learners connect the dots between CT and their daily routines. For example, algorithmic thinking can be applied to making decisions and managing time.
- ✓ **Apply CT to solve real problem:** Engage learners in solving real-world problems, using CT principles to tackle challenges they face at work or home.

Example of an activity for your lesson:

"Create a personal budget using pattern recognition to analyze spending trends and use decomposition to break down the budgeting process into actionable steps."



Step 4: Scaffold learning

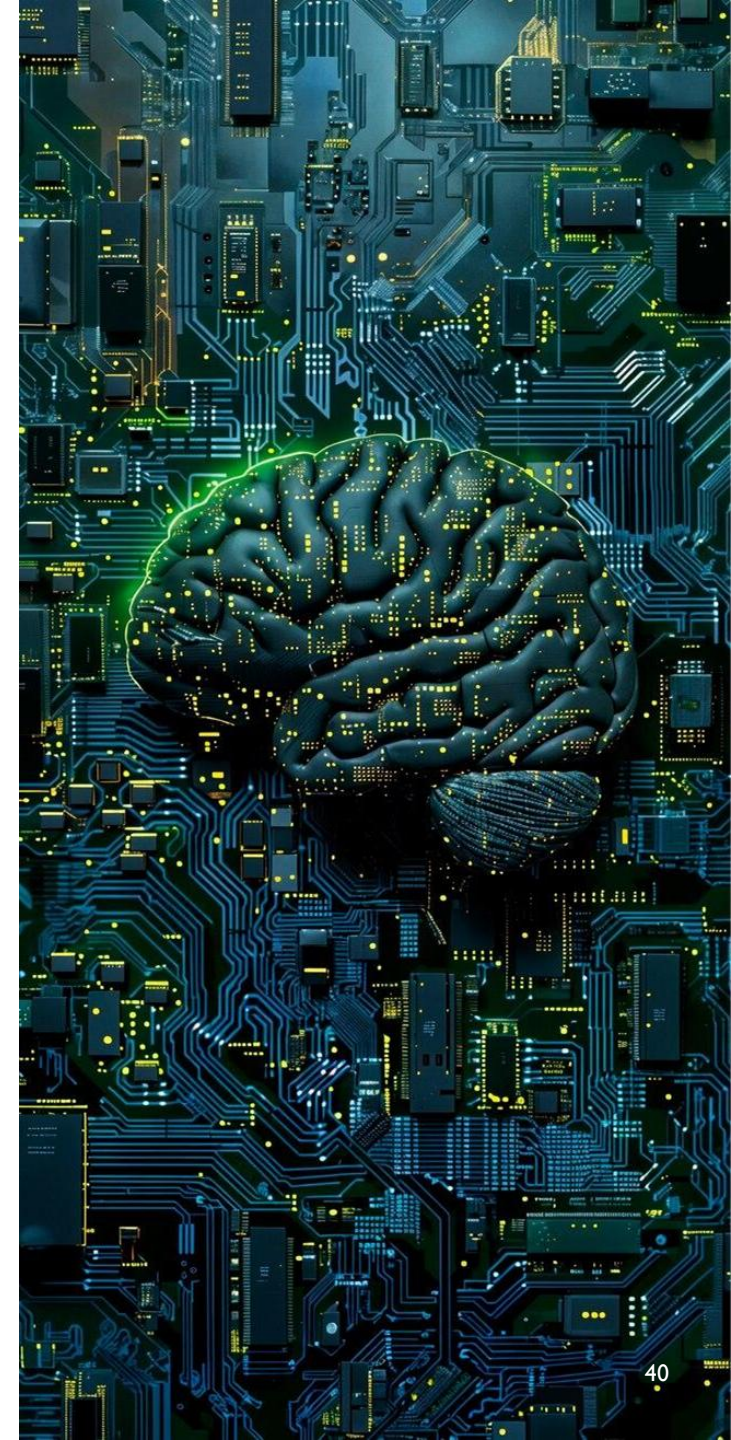
Scaffolding is an essential teaching strategy in adult education. It allows learners to build confidence and learn by starting with simple tasks and gradually progressing to more difficult challenges. This step-by-step approach ensures learners can apply CT principles and integrate them into tasks.

Key Points:

- ✓ **Start with simple exercises:** Begin by introducing simple CT activities, like recognizing basic patterns in data or breaking down small tasks. These exercises lay the foundation for more advanced CT principles.
- ✓ **Increase complexity gradually:** Once learners are comfortable with basic tasks, gradually introduce more complex activities that require deeper thinking and integration of multiple CT principles.
- ✓ **Practice each CT principles:** Allow learners time to practice each CT principle individually. This ensures they understand how each principle works before integrating them into larger tasks that involves more than one principle.

Example of an activity for your lesson:

"Start by breaking a simple task (like creating a weekly schedule) into smaller tasks (decomposition). Then, progress to more complex planning activities"



Step 5: Reflect and assess

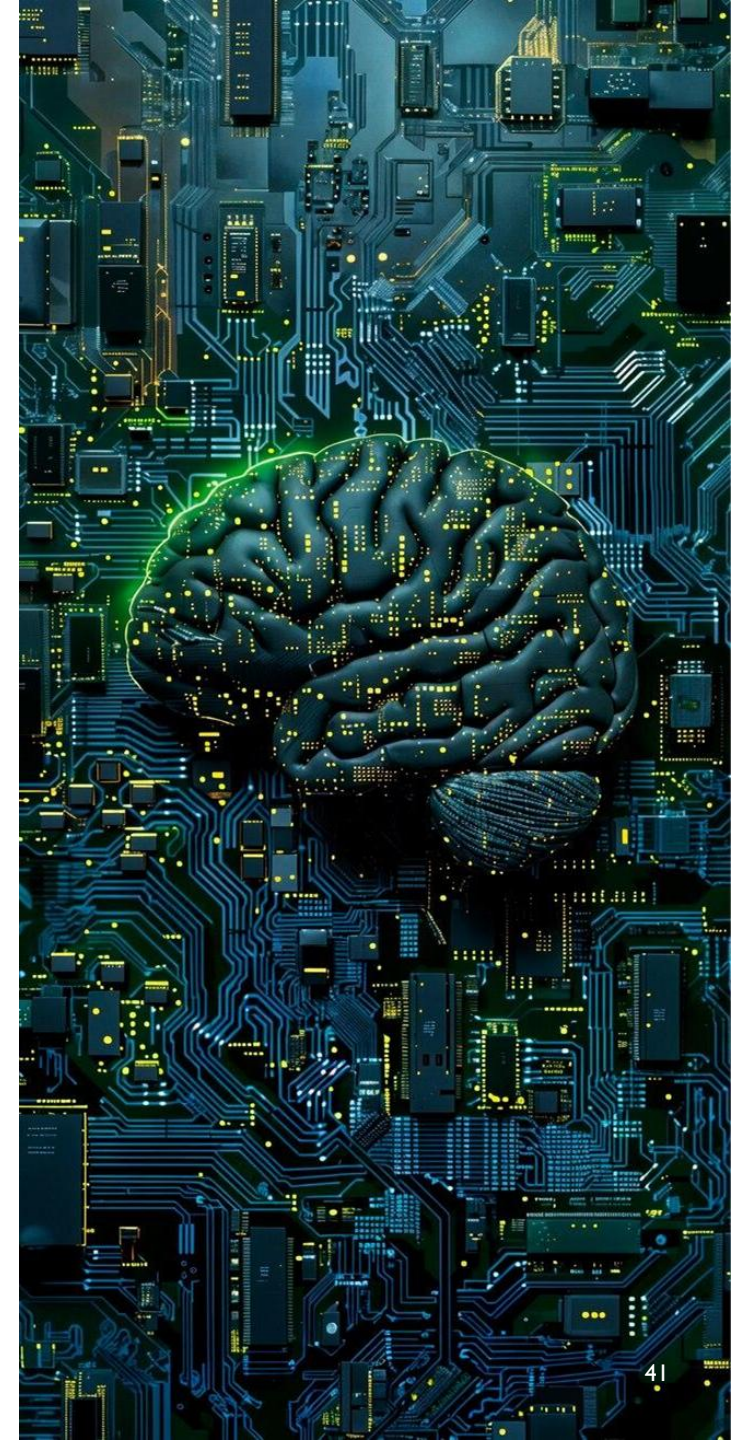
Reflecting on how CT principles were applied helps reinforce learning, while assessment provides feedback for continuous improvement. By allowing time for both, you ensure that learners understand CT concepts and can apply them effectively in real-life situations.

Key Points:

- ✓ **Reflect on the CT process:** Encourage students to reflect on how they approached tasks using CT principles. This helps them internalize what worked, what didn't, and how they can improve in the future.
- ✓ **Provide constructive feedback:** Offer feedback that highlights strengths and suggests areas for improvement to reinforce learners' understanding and motivation.
- ✓ **Adapt based on learner needs:** Use feedback from reflection and assessment to adjust future lesson plans, ensuring that learners continue to build their skills and are challenged with what they are learning.

Example of an activity for your lesson:

After planning a project or creating a budget, ask learners to reflect on how they used decomposition or pattern recognition. Provide feedback on how they could apply these skills in future tasks



Assessment techniques

Effective assessment of CT-based learning requires a clear focus on how adult students can apply computational thinking principles to real-world tasks.

Here's how you can assess their progress:

Formative assessments

Monitor students' progress during activities by observing their use of CT skills like decomposition, pattern recognition, and problem-solving. This allows for real-time feedback and adjustments.

Practical application

Assess how students apply CT skills in real-world tasks like organizing or decision-making. This shows how well they connect theory to practice.

Peer and self assessment

Encourage peer feedback and self-reflection. Peer assessments offer diverse perspectives on problem-solving, while self-assessments help learners reflect and improve.

Rubrics and checklists

Use rubrics and checklists to evaluate specific CT skills. These provide clear criteria for learners to understand and track their progress.

Did you know you can use gamification to make assessments more engaging for adult students?

Tools like **Kahoot!** can turn assessments into interactive challenges, making learning more motivating and less stressful. Gamification encourages active participation and can help adult learners stay engaged while assessing their understanding in a fun way.



Evaluation and continuous improvement

Evaluating the success of lessons and making improvements over time is key for effective adult education.

Here are some ways you can assess your lessons to be able to adjust them:

- ❑ **Students feedback:** Collect feedback from students about the lesson content, teaching methods, and activities. Consider creating spaces where learners feel comfortable sharing their thoughts and feedback. One-on-one discussions can provide an opportunity for open dialogue, while anonymous surveys offer a safe way for learners to express their thoughts honestly.
- ❑ **Learning outcomes:** Evaluate whether the objectives of the lesson were met by assessing the students' ability to apply what they learned. Are they able to break down tasks, identify patterns, or solve real-world problems using CT? Analyze if the learning outcomes align with the lesson goals
- ❑ **Observation of student engagement:** Assess the level of engagement throughout the lesson. Were students actively participating, asking questions, and applying the CT concepts to practical tasks? A high level of engagement often indicates that the content is relevant, and the delivery method is effective.
- ❑ **Reflective practice:** Continuously reflect on your teaching methods and their effectiveness. After each lesson, take time to assess what strategies helped learners succeed and where modifications might be needed.
- ❑ **Peer review:** Seek feedback from other educators or colleagues to evaluate your lesson plans and teaching methods, especially those working in CT integration as they can also share what has worked for them.

Example CT integration into your classes

In summary, this is an example of how your one-hour lesson could look like if you are trying to integrate CT into your lessons:

Introduction (10 minutes)

Introduce the CT principle that will be the focus of the lesson.

Activity (30 minutes)

Engage learners in a hands-on task that demonstrates the CT principle in action.

Discussion (15 minutes)

Facilitate a conversation where learners share their thought process and approach during the activity.

Wrap up (5 minutes)

Conclude the session by summarizing the CT principle and its application.

Remember, you can always change your lessons, so they adapt to your students' learning needs. All classes will have different needs, and with the assessment and evaluation of your lessons you will be able to easily adapt them to make the most of your classes.



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 4

*Case study and
activities*

Case Study: Enhancing CT in adult learners through adaptive educational games



Background

Adult learners bring diverse experiences and skills to the classroom, but many face challenges when it comes to structured problem-solving and logical thinking. CT offers a practical way to develop these skills through methods that improve them.

At the Université de Lille in France, researchers explored how adaptive learning strategies could help adults strengthen CT skills like decomposition, pattern recognition, and algorithmic thinking. The study aimed to assess whether game-based problem-solving methods could enhance learners' ability to think critically and structure their approach to complex tasks.

To support adult learners in developing CT, researchers designed AutoThinking, an educational tool that presents structured problem-solving challenges without relying on traditional coding or technology-based programming. Instead of requiring learners to interact with complex software, the game encouraged logical reasoning, sequencing, and decision-making through interactive exercises that mimic real-world problem-solving scenarios.

Implementation

The study involved adult participants enrolled in a Master's program at the Université de Lille. Participants engaged with AutoThinking during their course, undertaking a series of game-based tasks aimed at enhancing their CT skills. To assess the game's effectiveness, researchers administered pre and post-tests focusing on key CT concepts such as sequencing, pattern recognition, and debugging.

Case Study: Enhancing CT in adult learners through adaptive educational games



Outcomes

The results demonstrated a significant improvement in the participants' CT abilities:



These findings suggest that adaptive educational games like AutoThinking can effectively enhance CT skills in adult learners.

Challenges

Learners with different educational backgrounds adapted at varying speeds, making clear, structured guidance essential for success. Some needed more time to grasp problem-solving steps, highlighting the importance of scaffolding activities. Additionally, using real-world examples proved crucial, when CT exercises were linked to familiar tasks like scheduling or organizing a project, learners were more engaged and better able to apply the concepts effectively.

Conclusion

This case study highlights the effectiveness of unplugged CT strategies in adult education. By integrating structured problem-solving, logical reasoning, and step-by-step planning into learning environments, educators can equip adult learners with essential cognitive tools that enhance their ability to analyze, structure, and solve problems independently, all without requiring the use of technology or programming skills.

Activity 1: Quiz



1. What is the primary purpose of integrating CT into adult education?

- a) To improve learners' ability to break down and solve complex problems
- b) To teach adult learners how to code
- c) To replace traditional teaching methods with technology

2. Which of the following best describes an unplugged CT activity?

- a) Using a mobile app to solve puzzles
- b) Writing step-by-step instructions to make a sandwich
- c) Completing an online CT simulation

3. Which CT principle involves breaking down a large task into smaller, manageable steps?

- a) Pattern recognition
- b) Abstraction
- c) Decomposition

4. How does gamification benefit adult learners in CT-based lessons?

- a) It increases motivation and engagement through structured challenges
- b) It replaces all assessments with competitive games
- c) It ensures that CT is only taught using digital tools

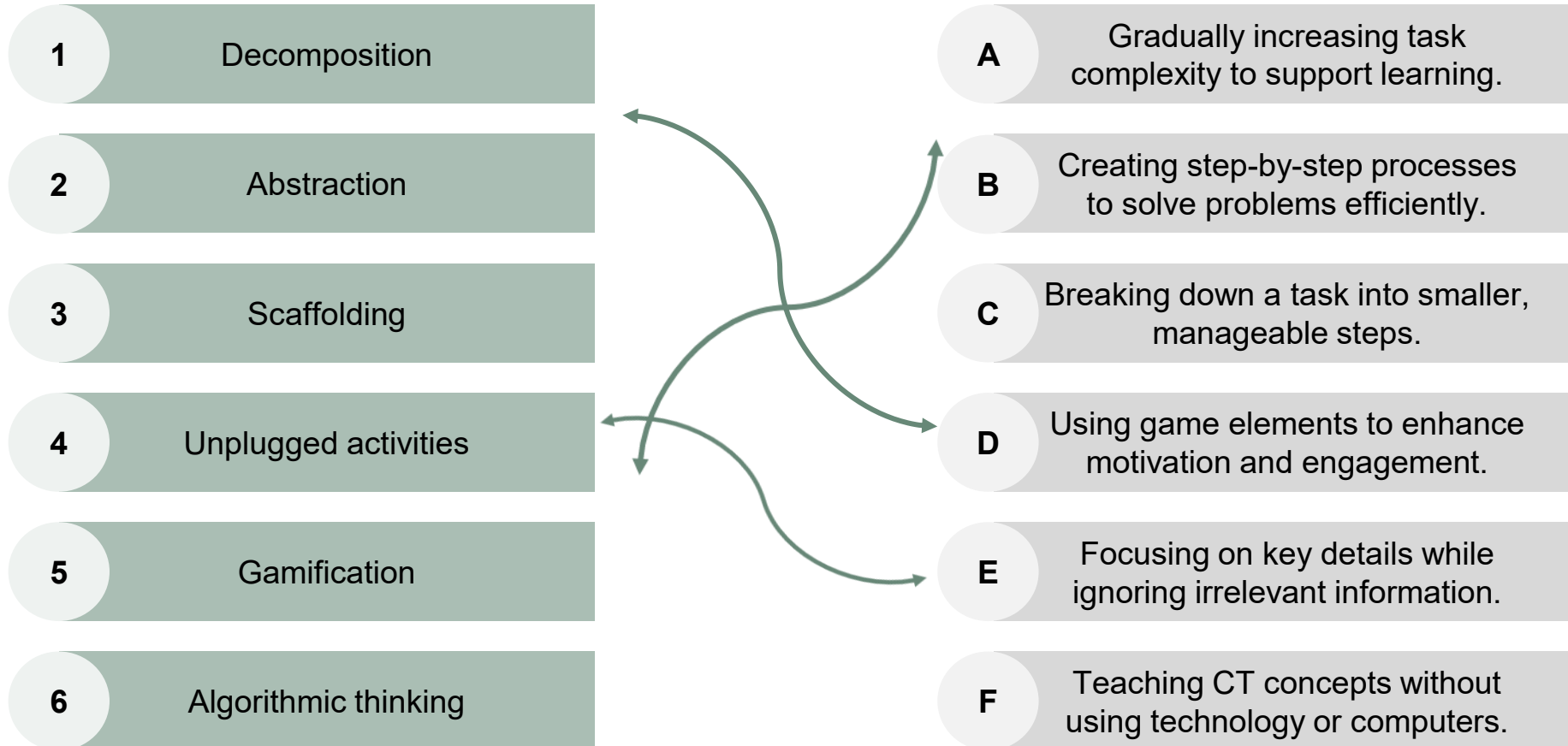
5. Why is scaffolding important when teaching CT?

- a) It allows learners to work independently without instructor support
- b) It helps learners gradually build their skills by increasing complexity step by step
- c) It eliminates the need for structured lesson plans

Activity 2: Matching pairs



Instructions: Match each **CT-related term** with its correct **definition**.



SUMMARY

This module explored how to bring Computational Thinking into adult education settings in a way that is inclusive, practical and relevant to learners' everyday lives.

We examined pedagogical approaches tailored to adult learners, such as project-based and experiential learning and strategies like scaffolding and unplugged activities to make CT accessible for everyone.

You also learned how to design CT-integrated lesson plans with real-world applications and step-by-step guidance and saw examples of how games and collaborative tasks can help adult learners build problem-solving skills through CT.

The module highlighted the importance of aligning CT with learners' experiences and goals and showed how educators can adapt content to different contexts without requiring advanced technical tools.



CALL TO ACTION:

Reflect on what you've learned:

- *How can you design lesson plans that integrate CT concepts meaningfully?*
- *What kinds of real-life tasks or scenarios could help adult learners practice decomposition, pattern recognition, abstraction or algorithmic thinking?*
- *How will you adapt CT activities to different learning styles, levels and needs?*
- *How can assessment and feedback help learners strengthen their CT skills?*

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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