Come ThinkAgain

Certification based Education Training System

# Concept for Assessment and Certification



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# EXECUTIVE SUMMARY

The **ComeThinkAgain (CTA)** project is a European initiative that seeks to strengthen transversal competences crucial for future learning, work, and citizenship. At its core, CTA focuses on three areas of competence: Computational Thinking (C1), Entrepreneurship and Innovation (C2), and Green Skills (C3). The project develops innovative pedagogical, assessment, and certification approaches that are learner-centred, sustainable, and aligned with European competence frameworks, notably DigComp (digital skills), EntreComp (entrepreneurship), and GreenComp (sustainability). By integrating authentic, process-oriented, and reflective learning practices, CTA equips learners not only with technical knowledge but also with the ability to apply it meaningfully in real-world contexts.

This deliverable (**D4.3**) defines the conceptual framework for assessing and certifying competences C1 (Computational Thinking), C2 (Entrepreneurship and Innovation), and C3 (Green Skills) within the ComeThinkAgain (CTA) project.

The **CTA assessment model** is grounded in seven key principles: authenticity, process orientation, reflection, peer learning, personalisation, learner-centricity, and alignment with learning objectives. Assessment is designed not as a single measurement event, but as a continuous learning process (assessment *as* learning), reinforced by formative feedback (assessment *for* learning) and validated by summative checkpoints (assessment *of* learning).

Evidence of competence development can be generated through a **toolbox of assessment instruments**, such as reflective journals, peer- and self-assessment, scenario-based simulations, project-based tasks, and self-assessment checklists. Together, these instruments capture both process and product, documenting problem-solving strategies, collaboration, and decision-making in authentic contexts. Evidence may be curated in a meta-portfolio, which functions as a flexible structure for integrating product- and process-oriented learning across contexts. Transparent, rubric-based evaluation ensures **validity, reliability, and comparability** across learners and contexts, while supporting scalability and sustainability.

Building on this foundation, the **CTA certification model** is inspired by the long-standing ICDL scheme. Within the CETS (micro-Certification based Education Training System) framework, certification follows a **tiered structure**:

- **CETS Micro-Credential**: recognition of focused competence achievement within a single module.
- **CETS Profile Certificate**: awarded for curated pathways of micro-credentials aligned with thematic or sectoral needs.
- **CETS Full Certificate**: the highest recognition, combining advanced modules with a capstone project demonstrating integration of C1–C3 competences.

All certifications are issued as secure **digital badges and certificates**, ensuring portability and transparency. This model allows learners to gain recognition for short, targeted achievements while providing employers and educators with trustworthy evidence of competences, backed by links to portfolio evidence.

In conclusion, the CTA framework demonstrates how competence assessment can be made both rigorous and supportive of learning. By combining innovative assessment methods with a robust, ICDL-inspired certification structure, it offers a sustainable model that is learner-centred, evidence-based, and aligned with European frameworks.

# 1. INTRODUCTION

## 1.1. The context: ComeThinkAgain overview

The ComeThinkAgain project addresses the growing need for 21st-century skills by developing an innovative, cross-sectoral training and certification system. Grounded in three core competence areas: computational thinking (C1), entrepreneurship and innovation (C2), and green skills with a focus on sustainability and social responsibility (C3). The project brings together higher education institutions, vocational training providers, and industry partners across Europe. Its overarching objective is to strengthen the transfer of knowledge between education and the labour market, while equipping teachers and trainers with the tools to prepare learners for rapidly evolving professional and societal challenges. By fostering interdisciplinary learning and providing a European-level micro-certification system (CETS), ComeThinkAgain aims to enhance lifelong learning opportunities, support reskilling and upskilling, and contribute to Europe's green and digital transitions.

## 1.2. The scope and objective of the document

This deliverable (D4.3) sets out the conceptual framework for the assessment and certification of the three competence areas at the core of *ComeThinkAgain*: computational thinking (C1), entrepreneurship and innovation (C2), and green skills with a focus on sustainability and social responsibility (C3).

The scope of the document is to establish a coherent basis for developing assessment methodologies and certification mechanisms that are both pedagogically sound and practically implementable across diverse educational and training contexts.

Central to this report are key guiding questions:

- How can C1–C3 skills be assessed effectively, ensuring validity, reliability, comparability, and scalability beyond the project context?
- How can assessment not only measure but also support learners in acquiring competences, affirming knowledge and skill development in line with a formative, constructionist approach?
- What principles should underpin a transparent and credible certification system that supports learners, educators, and employers alike?

In addressing these questions, the report aims to provide a foundation for a European-level framework that bridges the gap between learning outcomes and labour market needs, while fostering innovation, inclusivity, and lifelong learning.

# 2. PRELIMINARIES

Before presenting the CTA assessment and certification model, it is important to establish a clear understanding of the key concepts that underpin it. This chapter provides a common ground by defining what is meant by **assessment** and **certification**, clarifying their purposes, overlaps, and distinctions. While assessment concerns the processes used to evaluate and support learning, certification refers to the formal recognition of competences once learning outcomes have been achieved. Because assessment evidence often feeds into certification, the two are closely linked but not identical. Outlining these concepts, along with related innovations such as micro-credentials and digital badges, creates the conceptual foundation for the more detailed framework presented in the following chapters.

In an educational context, **assessment** refers to the process of measuring, evaluating, and recording learning progress with regard to understanding academic content or developing new skills. It helps educators determine whether the content delivered has been effectively learned and thus serves as a link between teaching and learning (Levy-Feldman, 2025). There are different types of assessment:

**Summative assessment**, often associated with traditional tests or exams, is designed to measure students' achievements at the end of a specific period or unit of study, and its results frequently determine progression to the next stage of education. This reflects an **achievement-oriented approach**, as it emphasizes evaluating end results and mastery of content against established standards. Within summative assessment, performance-based tasks provide opportunities for students to actively demonstrate their knowledge and skills (Dixson & Worrell, 2016).

**Formative assessment** identifies individual learning needs and adapts instruction accordingly (Dixson & Worrell, 2016), unlike summative assessment, which provides an overall summary of performance. This reflects a **process-oriented approach**, as it focuses on monitoring learning as it occurs and using feedback to guide improvement. At the same time, formative assessment is also **compatible with a constructionist approach**, since it emphasizes active learner participation, reflection, and the co-construction of knowledge during the learning process. Formative assessment is strongly associated with innovative teaching practices and self-assessment skills, thereby fostering learner autonomy and promoting lifelong learning (Tilbury, 2023).

**Alternative and innovative assessment** follows a **constructionist approach** to assessment, emphasizing the need to replace traditional methods with practices that better reflect individual learning processes. Traditional assessments offer little feedback on the specific challenges learners encounter, in contrast, alternative methods provide a more comprehensive picture of student understanding and enable learners to demonstrate their ability to connect concepts, for example, through tools such as concept maps or mind maps (Ahmad et al., 2020).

Figure 2.1 provides an overview of these assessment approaches: summative assessment can be understood as *assessment **of** learning*, while formative assessment is characterised as *assessment **for** learning* (Ahmad et al., 2020). In addition, alternative and innovative assessment is often described as *assessment **as** learning*, as it positions learners as active participants who construct knowledge through reflection and the integration of new concepts (Dann, 2014).

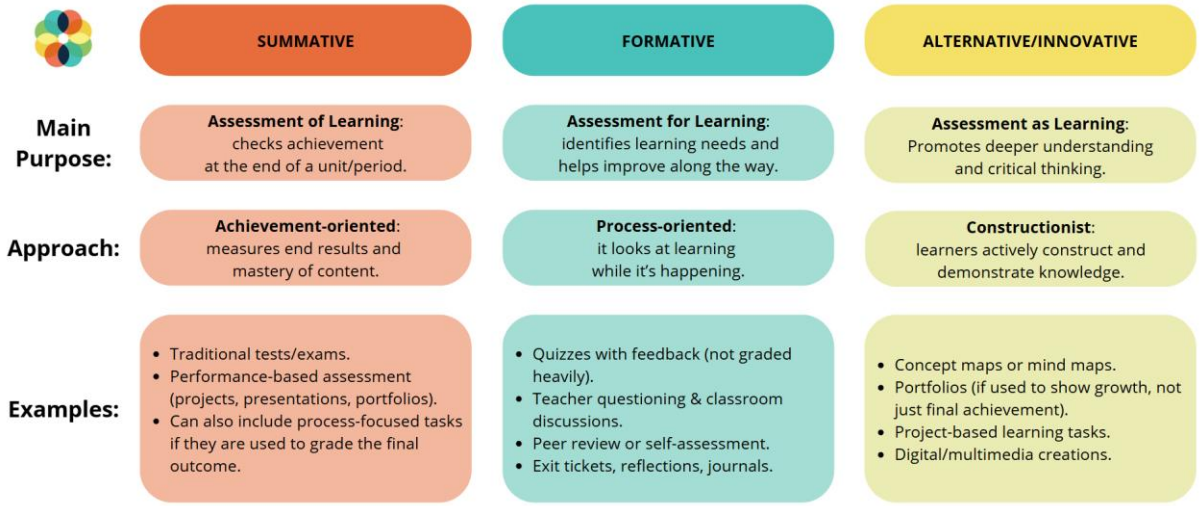


*Figure 2.1. Overview of the three main assessment approaches.*

**Certification** refers to the formal confirmation that a learner has completed a regulated training or educational programme, fulfilled the assessment criteria, and earned a qualification reflecting the skills and competences gained (Cedefop, 2015). In practice, certification is **inseparable from summative assessment**, as it relies on evidence gathered at the conclusion of a programme to verify that the learner has achieved the required standards. In this sense, certification can be seen as the institutional outcome of assessment processes, where validated evidence of performance is translated into an officially recognised qualification.

**Micro-credentials** are short, targeted learning units that recognise specific achievements within a subject area, in contrast to formal 'macro' credentials such as diplomas or university degrees. They have emerged as a flexible and modular means of recognising learning achievements and serve as an umbrella term for diverse formats including digital badges, nano-degrees, online certificates, short courses, and massive open online courses (MOOCs). Micro-credentials vary in size, duration, and complexity, and may be offered by universities, private providers, or commercial institutions through both online and face-to-face delivery. By offering a more affordable and accessible pathway to lifelong learning, retraining, and upskilling, they provide a flexible response to evolving industry needs and labour market skill gaps (Zdunek et al., 2024).

**Digital badges,** originally emerged in the context of gamification, are an innovative way to validate and demonstrate the competences and skills acquired through a prior micro-learning sequence. They can be issued either during the learning process to encourage progress, or upon completion to certify that the learner has successfully met the course requirements (Christian et al., 2024; Lifelong Education Commision, 2022).

The relationship between these three concepts can be understood as a hierarchy of recognition (Figure 2.2). At the top, **certification** represents the most formal and regulated validation of competences, usually tied to institutional qualifications and strict assessment procedures. **Micro-credentials** occupy the middle layer, offering more flexible, modular recognition of targeted learning achievements that can be stacked and

combined towards broader qualifications. At the most granular level, **digital badges** provide concrete validation of specific competences or skills, often linked to particular tasks or learning outcomes, and can be issued during or after learning to signal progress or achievement. Together, they illustrate a continuum from broad, formal certification to modular recognition of competences and finally to micro-level evidence of achievement.

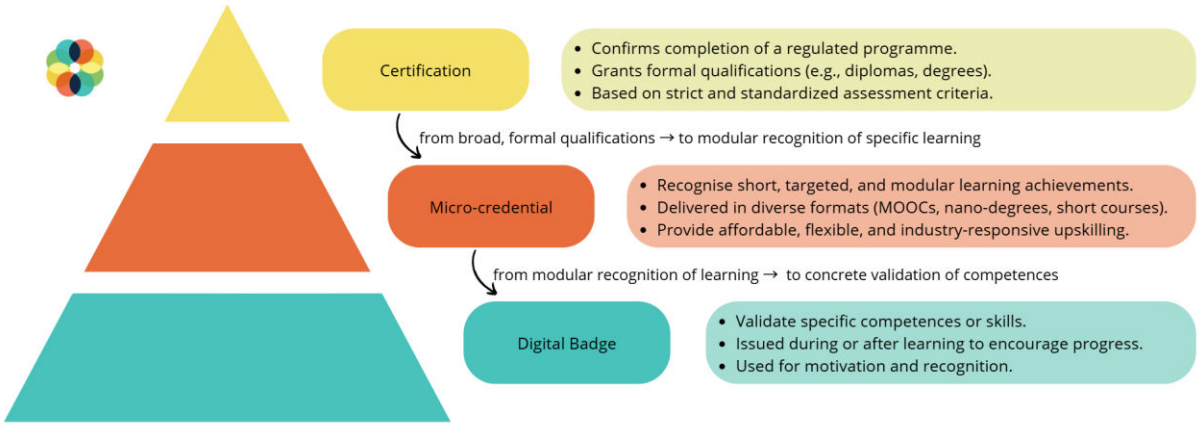


*Figure 2.2. Hierarchy of certification, micro-credentials, and digital badges.*

# 3. PRACTICAL EXAMPLES OF RELATED WORK

Across Europe and beyond, a wide range of frameworks, certification systems, EU-level tools, and innovative micro-credentials illustrate how competences such as computational thinking, entrepreneurship, and sustainability are being assessed, validated, and recognized (Figure 3.1). The following section highlights key examples from each of these areas to showcase practical approaches to competence-based assessment and recognition.

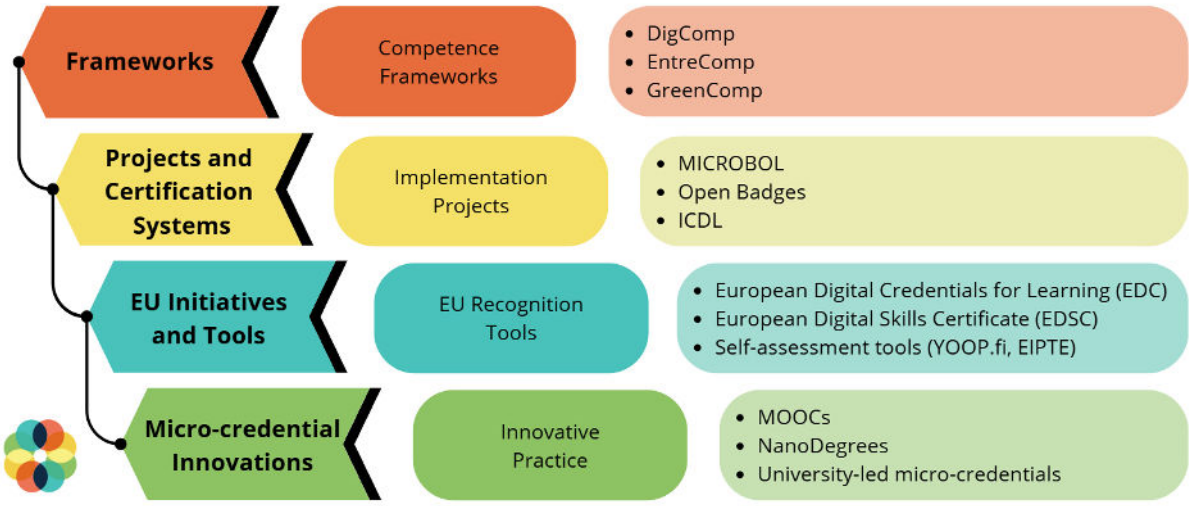


*Figure 3.1. Key examples of competence-based assessment and certification practices. Together, these layers show how policy foundations translate into implementation, recognition, and innovative practices.*

Europe has developed several well-established **competence frameworks** that serve as benchmarks for assessing skills and guiding certification practices.

- The European Digital Competence Framework (***DigComp***) defines the knowledge, skills, and attitudes required to live, work, and learn in a digital society (Vuorikari et al., 2022). It is structured around five areas (information and data literacy, communication and collaboration, digital content creation, safety, and problem solving) each described through proficiency levels and practical examples. DigComp has become a key reference for designing digital skills assessments and certification initiatives across Europe.
- The Entrepreneurship Competence Framework (***EntreComp***) provides a comprehensive model for entrepreneurial skills, covering ideas and opportunities, resources, and action (Bacigalupo et al., 2016). It is widely applied in educational and training contexts to guide curricula and assessment tools, and it underpins initiatives that link entrepreneurial learning to employability and innovation.
- The European Sustainability Competence Framework (***GreenComp***) defines competences for sustainability through four areas: embodying sustainability values, embracing complexity, envisioning sustainable futures, and acting for sustainability (Bianchi et al., 2022). It extends assessment beyond knowledge and skills to include attitudes and values, offering a reference point for integrating sustainability competences into both formal and non-formal education.

Building on these competence frameworks, several **projects and certification systems** demonstrate how they can be translated into practice for assessing, validating, and recognising skills. Three prominent examples include:

- The **MICROBOL project** (Micro-credentials linked to the Bologna Process) was launched under the Erasmus+ programme to explore how micro-credentials can be incorporated into European higher education systems. Its focus lies in supporting recognition, quality assurance, and transparency across national contexts, aligning with the principles of the Bologna Process. MICROBOL has worked on developing common definitions and standards for micro-credentials, addressing issues such as portability, credit transfer, and the relationship between micro-credentials and formal qualifications. This initiative demonstrates how European cooperation can turn conceptual frameworks into actionable policies that support lifelong learning and labour market responsiveness (Desk research report, 2020).
- **Open Badges**, first developed by Mozilla in 2011 and now stewarded by IMS Global, represent one of the most widespread approaches to digital credentialing. An Open Badge is a portable, verifiable digital representation of a skill or achievement, embedded with metadata that describes what the learner has accomplished and who has issued the badge. This innovation allows for recognition of both formal and informal learning, supporting flexible pathways and lifelong learning strategies. Within Europe, Open Badges have been adopted in diverse contexts as tools to motivate learners and provide transparent evidence of competences. Their interoperability and alignment with frameworks such as DigComp make them especially relevant for competence-based education and certification (Liyanagunawardena et al., 2017).
- The **International Computer Driving Licence (ICDL)**, previously known as the **European Computer Driving Licence (ECDL)**, is one of the most widely recognised digital skills certification systems globally. It assesses practical competences in areas such as word processing, spreadsheets, databases, presentations, and online collaboration, providing learners with verifiable proof of digital literacy. ICDL has been implemented in over 100 countries and is recognised by employers, governments, and educational institutions as a reliable standard of digital competence. Importantly, the ICDL syllabus is regularly updated to reflect changes in the digital landscape and is aligned with the European *DigComp* framework, ensuring consistency with broader EU digital policy (*ICDL and DigComp*, n.d.). As a large-scale, operational certification initiative, ICDL demonstrates how policy-level frameworks can be translated into accessible, standardized assessments that support both employability and lifelong learning.

Beyond individual projects, **EU initiatives and tools** have been developed to translate competence frameworks into practical instruments. They are designed to enhance transparency, comparability, and portability of learning achievements across member states, while facilitating the broader adoption of micro-credentials. Three relevant examples include:

- The **European Digital Credentials for Learning (EDC)**, integrated into the Europass platform, provide a secure and standardised way to issue, share, and verify digital records of learning outcomes. EDCs can represent a wide range of achievements, including qualifications, micro-credentials, diplomas, and certificates, ensuring interoperability across institutions and systems. By embedding metadata and aligning with European qualification frameworks, EDCs strengthen trust and portability, making them a cornerstone of the EU's digital education infrastructure (*European Digital Credentials for Learning*, n.d.).

- Complementing this, the **European Digital Skills Certificate (EDSC)**, currently under development as part of the EU's Digital Education Action Plan, seeks to establish a common European standard for assessing and certifying digital skills. The EDSC is designed to be aligned with DigComp, thereby ensuring that digital competences are assessed against transparent, comparable criteria across Europe. This initiative addresses the need for a reliable, Europe-wide certification system to support employability and mobility in the labour market (*European Digital Competence Certificate (EDSC) - European Commission*, n.d.).
- For entrepreneurship competences, a number of **self-assessment tools** based on EntreComp have emerged to help learners evaluate their own skills and identify areas for development. Examples include **YOOP.fi**, an online tool supporting young people in mapping their entrepreneurial competences (*Map Your Entrepreneurship Competence*, n.d.), and the **EIPTE project** (Entrepreneurship in Initial Primary Teacher Education), which provides self-assessment resources to integrate entrepreneurial competences into teacher education programmes (*EIPTE – Entrepreneurship in Initial Primary Teacher Education*, n.d.). These tools illustrate how EU frameworks can be operationalised in practice, fostering self-reflection, guiding learning pathways, and supporting educators in embedding competences into curricula.

While EU initiatives and tools provide a common infrastructure for recognition and transparency, **micro-credential innovations** show how these principles are being applied in practice. They offer short, focused learning opportunities that formally recognise specific skills or competences, providing a flexible and modular alternative to traditional qualifications. Initiatives such as MOOCs and NanoDegrees demonstrate how these formats bridge education and labour market needs.

- **Massive Open Online Courses (MOOCs)** have become a key vehicle for delivering micro-credentials, offering flexible, low-cost access to short learning units with optional certification. Recent studies highlight both opportunities—such as scalability, accessibility, and stackable credentials—and challenges, including quality assurance, learner motivation, and credibility of recognition (Micro-Credential Innovations in Higher Education, 2021). The rapid expansion of MOOCs during the COVID-19 period further demonstrated their potential to respond quickly to evolving learning needs and labour market demands.
- **NanoDegrees and university-led digital micro-credentials** are short, industry-oriented programmes that provide targeted, stackable learning opportunities. Typically developed in partnership with employers, they emphasise practical outcomes such as project-based work, applied assessments, and digital certification. Case studies, including initiatives in Malaysian universities, show their potential to expand flexible upskilling pathways, while also raising challenges related to credibility, assessment design, and institutional integration (Kumar et al., 2022).

The examples reviewed in this chapter illustrate the breadth of approaches currently used to assess, validate, and recognise competences across Europe and internationally. Policy frameworks such as DigComp, EntreComp, and GreenComp provide structured reference points for defining and assessing digital, entrepreneurial, and sustainability competences, while initiatives like MICROBOL, Open Badges, and ICDL demonstrate how such frameworks can be operationalised through concrete certification systems. Complementing these, EU-level tools such as the European Digital Credentials for Learning (EDC), the European Digital Skills Certificate (EDSC), and EntreComp-based self-assessment

resources (e.g. YOOP.fi, EIPTE) highlight ongoing efforts to standardise, secure, and increase the portability of learning recognition.

Micro-credential innovations, including MOOCs, NanoDegrees, and university-led digital certifications, further extend opportunities for modular, flexible, and industry-responsive learning pathways. Together, these practices underscore both the opportunities and challenges of competence-based assessment: while they offer scalable and transparent ways to support lifelong learning and employability, issues of comparability, credibility, and labour market recognition remain persistent barriers.

# 4. CTA ASSESSMENT AND CERTIFICATION

The CTA assessment and certification model is conceived as a **coherent meta-framework** for evaluating and validating competences in Computational Thinking (C1), Entrepreneurship (C2), and Green Skills (C3) (Figure 4.1).

Building on the conceptual foundations and good practices outlined in the previous chapters, the CTA approach places learners at the centre of the process, ensuring that assessment not only measures achievement but also supports the development of skills through personalised, formative, and practical methods. Certification, in turn, provides a reliable and standardised way of validating learning outcomes, drawing inspiration from established international schemes such as ICDL while adapting them to the specific competences and objectives of the CTA project.

Together, the assessment and certification models provide a **flexible yet coherent system**: one that can be tailored by modules to their pedagogical context, while still offering a shared reference point for recognising individual learning progress and providing credible, transferable evidence of achievement.

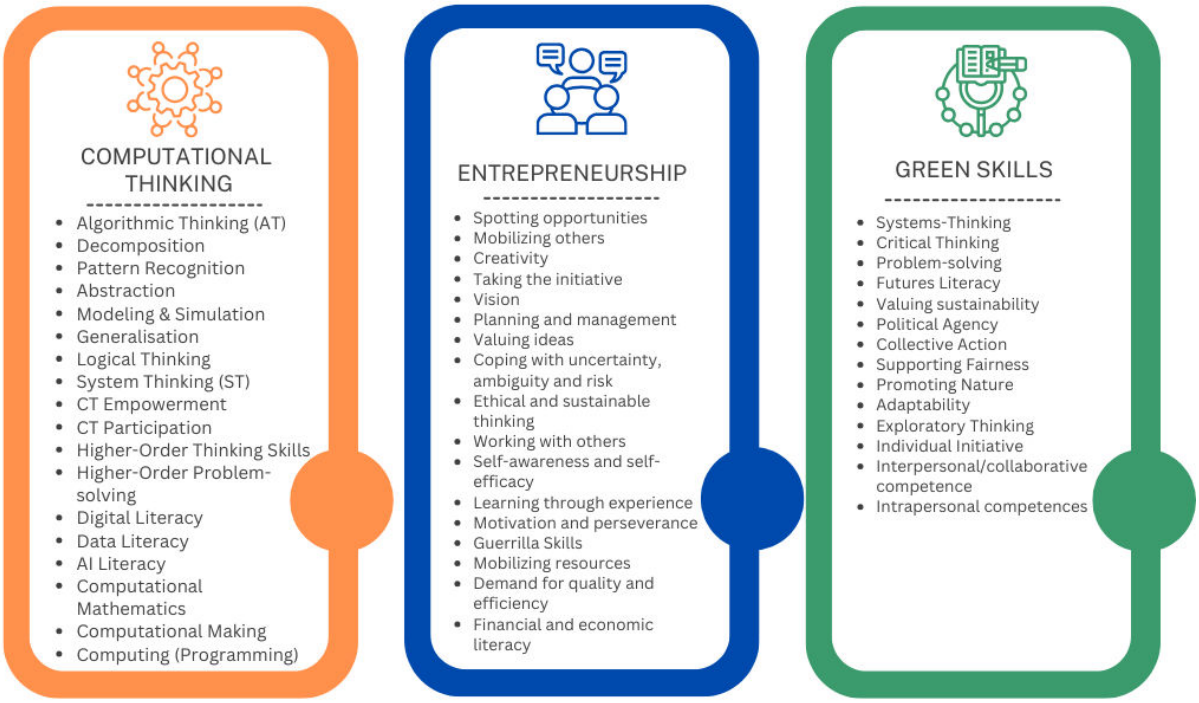


*Figure 4.1. Competence lists for Computational Thinking (C1), Entrepreneurship (C2), and Green Skills (C3)*

## 4.1. Assessment model

The assessment model in ComeThinkAgain (CTA) is conceived as a **meta-framework** that offers guidance rather than prescription. Its purpose is to provide module designers and instructors with a **flexible pathway** for assessing competences C1–C3, while leaving space for local adaptation to context, pedagogy, and learner needs. At its core, the model is grounded in **seven key principles** (Figure 4.2): assessment should be authentic, process-oriented, reflective, peer-based, personalised, learner-centred, and aligned with learning objectives. These seven principles were identified through a review of relevant assessment literature, EU competence frameworks (e.g. DigComp, EntreComp,

GreenComp), and best practices from partner institutions. Together, these principles ensure that learners are evaluated not only on outcomes, but also on the ways they apply, internalise, and share competences across computational thinking, entrepreneurship, and green skills.

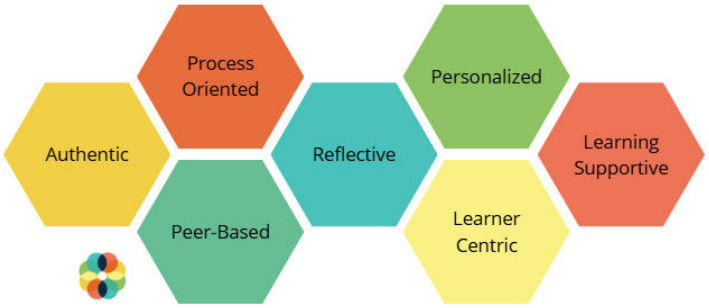


*Figure 4.2. Seven key assessment principles of CTA framework*

- **Authentic assessment** situates tasks in real-world or simulated contexts that mirror challenges learners are likely to encounter beyond the classroom. By engaging with meaningful, practice-based problems, learners demonstrate their ability to transfer knowledge and skills to new situations, strengthening both motivation and long-term retention (Wu et al., 2015).
- A **process-oriented approach** values the strategies, reasoning, and problem-solving steps that learners apply, rather than focusing exclusively on final results (Miao & Hermans, 2009). This perspective is crucial for competences such as computational thinking, entrepreneurship, and green skills, where iterative exploration, creativity, and adaptability are as important as the final product.
- **Reflection** enables learners to critically examine their own progress, recognise strengths, and identify areas for improvement (Praveena et al., 2025). Practices such as journals, guided self-assessment, or digital portfolios help consolidate learning, deepen understanding, and foster self-regulation that extends beyond the immediate assessment.
- **Peer learning and peer-assessment** provide opportunities for collaboration, constructive feedback, and knowledge sharing. By engaging with the perspectives of others, learners develop communication skills, broaden their problem-solving approaches, and gain confidence in applying competences in group contexts (Altintas et al., 2016; Sitthiworachart & Joy, 2004).
- **Personalised assessment** recognises that learners progress at different paces and bring diverse backgrounds, experiences, and motivations to the learning process. By tailoring assessment tasks and feedback to individual needs, the model ensures that each learner has meaningful opportunities to demonstrate competence and growth (Arslan et al., 2025).
- A **learner-centric approach** positions learners as active participants in their assessment rather than passive recipients. It emphasises agency, responsibility, and engagement with the assessment process, aligning activities with individual learning goals while ensuring that achievement of the broader learning objectives remains central (Aluvalu et al., 2024).
- Assessment should always serve the broader purpose of **supporting learning** rather than acting solely as a judgment tool. By aligning assessment design with clearly defined learning objectives, the CTA model ensures coherence between what

is taught, what is practiced, and what is evaluated. This alignment guarantees that learners are assessed on meaningful competences, while also receiving feedback that helps them progress towards intended outcomes (Prashanti & Ramnarayan, 2019).

### 4.1.1 Multi-faceted Evidence Collection

To capture the richness of transversal competences, assessment must go beyond final products and include diverse forms of evidence. Within the CTA framework, this is expressed through the idea of a **meta-portfolio**: a flexible structure that can be shaped by each module or instructor according to their design. The meta-portfolio provides a guiding logic for bringing together evidence from multiple sources, ensuring a balanced view of both process and product. Possible forms of evidence that may be included are:

- **Project Artefacts**: Authentic outputs such as algorithms, business plans, or sustainability action reports. These artefacts are complemented by intermediate drafts, prototypes, and revisions, demonstrating how ideas evolved through iteration and feedback.
- **Process Documentation**: Logs, plans, or meeting notes that make the often "invisible" aspects of competence development visible, for example, how learners decomposed a problem (C1), mobilised resources (C2), or analysed interdependencies (C3).
- **Reflective Evidence**: Structured journal entries that encourage learners to analyse their decisions, evaluate their strengths and weaknesses, and plan for future improvement.
- **Collaborative Evidence**: Peer-assessment records, screenshots of collaborative work, or co-created outputs that demonstrate contributions to teamwork and peer learning.

By drawing on such evidence types, the meta-portfolio serves as a **toolbox for capturing competence development**. This flexibility strengthens both the validity and comparability of the assessment while respecting the diversity of pedagogical approaches across modules.

### 4.1.2 Assessment Instruments Toolbox

To generate evidence for the meta-portfolio, CTA suggests a **toolbox of possible assessment instruments** that modules and instructors can select from and adapt to their specific context. Each of these instruments illustrates how the seven CTA principles (authenticity, process orientation, reflection, peer learning, personalisation, learner-centricity, and alignment with learning objectives) can be operationalised in practice, while contributing different perspectives on C1–C3 competences. Examples include:

- **Reflective Learning Journal**: A structured tool where learners record and analyse their experiences, challenges, and progress. Journals are important because they make invisible aspects of learning, such as problem-solving strategies or value-based reasoning, explicit and assessable. They encourage metacognition and help learners connect specific tasks to broader competence development.
- **Peer- and Self-Assessment (rubric-based)**: Mechanisms for learners to evaluate their own work and that of their peers against shared criteria. These instruments promote learner agency, build evaluative judgement, and reduce reliance on instructor-only evaluation. They strengthen reliability by adding multiple perspectives and make assessment a collaborative learning opportunity.

- **Scenario-based Simulations**: Realistic, problem-based situations where learners must apply competences under authentic conditions. Such tasks are important because they test not only knowledge but also transfer, adaptability, and decision-making in complex contexts. They provide direct evidence of how learners would act in real-world settings, which is especially valuable for transversal competences.
- **Project-based Tasks**: Integrative assignments that result in a tangible product or solution addressing a real need. These tasks are central because they bring together multiple competences, require sustained effort, and often involve collaboration. They demonstrate both achievement and process, offering rich evidence for summative evaluation.
- **Self-assessment Checklists**: Structured descriptors that allow learners to track their progress against competence indicators. These are useful for fostering autonomy and learner responsibility, while also providing consistent data points across individuals. When aggregated, checklists support comparability and help identify learning needs without adding a heavy workload for teachers.

Table 4.1 demonstrates how such instruments *may* be mapped to types of evidence, CTA principles, and C1–C3 applications. It is a **flexible reference**, showing how different modules might combine instruments to generate diverse, meaningful evidence in ways that are scalable and sustainable.

*Table 4.1. Mapping of Possible Assessment Instruments to Evidence Types, CTA Principles, and C1–C3 Applications*

| Possible Instrument | Type of Evidence | CTA Principles Alignment | C1–C3 Example Applications | Scalability & Sustainability |
|---|---|---|---|---|
| **Reflective Journal** | Reflective Evidence | Reflective, process-oriented, personalised, learner-centric | C2: Learners reflect on the challenges of pitching a business idea, documenting how they dealt with uncertainty and risk. | Low-cost, minimal tech needs; sustainable as text/audio entries. |
| **Peer- & Self-Assessment** | Collaborative Evidence;<br>Reflective Evidence | Learner-centric, reflective, supports reliability, process-oriented | C1: Learners use a rubric to evaluate each other's algorithms for efficiency and clarity, identifying strengths and areas for improvement. | Reduces teacher load; scalable if rubrics are standardised. |
| **Scenario-based Simulations** | Project Artifacts;<br>Process Documentation | Authentic, aligned with objectives, process-oriented | C3: Learners participate in a climate-policy negotiation role-play, balancing environmental, social, and economic trade-offs to reach an agreement. | Needs moderation, but scalable with templates/case banks. |
| **Project-based Tasks** | Project Artifacts;<br>Process Documentation | Authentic, process-oriented, reflective, aligned with objectives | C2: Learners design and prototype a digital service that addresses a real community need, producing a business plan and pitching it to stakeholders. | Scalable if project templates & rubrics are shared; may need mentoring capacity. |
| **Self-assessment Checklists** | Reflective Evidence | Personalised, learner-centric, reflective, aligned with objectives | C3: Learners track their progress in adopting sustainable practices, e.g. reducing waste in a project. | Very low resource needs; scalable across contexts. |

Taken together, these instruments showcase how assessment can be made cumulative rather than fragmented: each *can* generate evidence that contributes to a learner's **meta-portfolio**. In this approach, the portfolio is not a fixed deliverable but a **flexible structure** that modules may shape in ways that fit their pedagogical design. By bringing together project artefacts, process documentation, reflective insights, and collaborative contributions, the meta-portfolio supports both product- and process-oriented views of competence development. Figure 4.3 summarises how different types of instruments can be mapped to these categories of evidence, offering a holistic but adaptable path toward capturing C1–C3 competences.

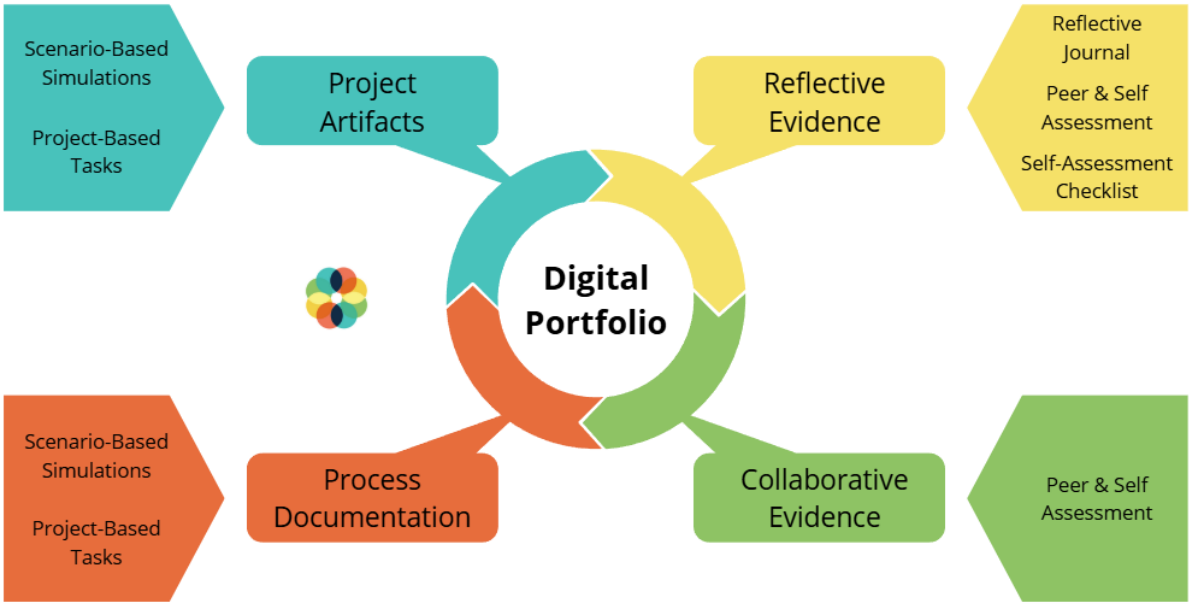


*Figure 4.3. Illustrative relationship between assessment instruments, evidence types, and the learner's digital portfolio.*

### 4.1.3 Rubrics for Validity, Reliability and Comparability

Since the instruments outlined in 4.1.2 can generate diverse forms of evidence, the CTA framework proposes a **meta-rubric** as a common reference point for ensuring transparency and coherence. The meta-rubric serves as a **flexible scaffold** that modules and instructors can adapt to their own tasks and contexts. Its purpose is to support:

- **Validity**, by linking criteria directly to competence descriptors (e.g., abstraction in C1, creativity in C2, systems-thinking in C3).
- **Reliability**, by offering clear performance levels so that different assessors reach similar judgments.
- **Comparability**, by applying common standards across diverse contexts and learners.

An example of the CTA meta-rubric (see Table 4.2) outlines core dimensions such as competence application, process orientation, reflection, collaboration, and learner agency. This table serves as a prototype, showing how transversal competences can be translated into transparent descriptors and performance levels. In practice, trainers will adapt this

meta-rubric into task-specific rubrics, ensuring that abstract skills are turned into observable behaviours that can be assessed consistently across C1–C3 activities.

*Table 4.2. CTA Meta-rubric for assessing transversal competences (C1–C3)*

| Criterion | Emerging (1) | Developing (2) | Proficient (3) | Advanced (4) |
|---|---|---|---|---|
| **Competence Application** Authentic; Aligned with learning objectives | Limited understanding; competences applied superficially or with errors. | Applies some competences but inconsistently; partial achievement of objectives. | Applies competences accurately and effectively to meet objectives. | Applies competences creatively and flexibly in authentic contexts, exceeding expectations. |
| **Process Orientation & Documentation** Process-oriented; Learner-centric | Focuses only on final result; process not visible. | Some evidence of process (drafts, logs), but limited depth. | Clear documentation of steps, reasoning, and revisions. | Insightful analysis of process, with critical evaluation and iteration. |
| **Reflection & Self-Awareness** Reflective; Personalised | Describes activities without reflection. | Some analysis of strengths and weaknesses, limited links to learning. | Connects reflections to learning goals; identifies areas for growth. | Critically examines assumptions, integrates feedback, and plans future action. |
| **Collaboration & Peer Learning** Peer-based; Learner-centric | Minimal contribution; limited peer interaction. | Participates when prompted; gives/receives basic feedback. | Active contributor; engages constructively with peers. | Proactive leader; supports, mediates, and elevates team performance. |
| **Learner Agency & Personalisation** Personalised; Learner-centric | Relies on instructor direction; limited initiative. | Some choice in tasks; partial ownership of learning. | Chooses relevant tasks; shows initiative and ownership. | Designs/adapts tasks creatively; demonstrates strong autonomy. |

### 4.1.4 The Cycle of Formative and Summative Assessment

Within the CTA framework, assessment is conceptualised first and foremost as **assessment as learning**. This means that assessment is not an external measurement imposed at the end of a process, but an integral part of the learning journey itself. Learners are placed at the centre, actively engaging in self-reflection, peer feedback, and the construction of evidence of their own growth. In this way, assessment becomes both a driver of competence development and a mechanism for learners to take ownership of their progress.

**Formative assessment (assessment for learning)** provides ongoing feedback throughout the process. Instruments such as reflective journals, peer-review sessions, and mentor guidance help learners adjust strategies, strengthen competences, and connect learning activities with objectives.

Together, these two dimensions (*assessment as learning* and *assessment for learning*) create a continuous cycle of development. This integrated model ensures that the assessment not only measures progress but also actively supports competence development across C1–C3.

While the emphasis of CTA is on formative processes, it is recognised that **summative assessment still plays a role**, not as routine, but specifically within the **certification framework**. Summative assessment functions as an external validation step, ensuring that competences demonstrated through formative evidence can also be recognised in a formal, standardised manner. This certification function is developed in detail in Chapter 4.2.

### 4.1.5 The Role of Mentors and Facilitators

While CTA places learners at the centre of the assessment cycle, mentors and facilitators can play an essential role in ensuring that the process is meaningful, fair, and reliable. Within the CTA framework, their function is not to impose assessment from the outside, but to help create conditions in which learners can generate valid evidence of competence and engage critically with their own progress.

In formative assessment, mentors may guide reflection by providing structured prompts, modelling critical thinking, and helping learners connect their experiences with the intended competences (C1–C3). In collaborative activities, facilitators can moderate peer- and self-assessment to ensure constructive feedback and maintain a respectful, supportive environment. At summative checkpoints, teachers may help safeguard reliability and comparability by applying CTA rubrics consistently and validating the evidence collected in digital portfolios.

In this way, the role of mentors and facilitators is best understood as **scaffolds rather than judges**: they design authentic tasks, mediate the feedback process, and ensure coherence across different learners and contexts. At the same time, the framework leaves space for modules to define these roles in ways that best align with their pedagogical design and resources.

## *4.2. Certification model*

While assessment in CTA ensures that competences are developed, documented, and evaluated in a transparent way, certification provides the formal recognition of these achievements. In other words, assessment captures the learning process and outcomes, whereas certification validates them in a way that is credible, portable, and comparable across contexts. Crucially, the CTA certification model builds directly on the digital portfolio and rubric-based assessments described in Section 4.1: the evidence generated through reflective journals, project artefacts, simulations, and peer assessments provides the foundation for awarding credentials. In this way, certification is inseparable from assessment: it transforms curated evidence of learning into formally recognised qualifications that can support learners' educational and professional trajectories.

The certification model of the ComeThinkAgain project (CETS – micro-Certification based Education Training System) provides a transparent, credible, and learner-centred framework for validating the achievement of competences in computational thinking (C1), entrepreneurship (C2), and green skills (C3). It is designed to ensure comparability across contexts, while giving learners recognition that is both meaningful for their personal development and trusted by educators and employers.

### 4.2.1 Principles underpinning the model

The CETS certification approach is guided by four principles:

- **Transparency**: Certification is based on clearly defined criteria, aligned with competence descriptors, and communicated openly to learners and stakeholders.
- **Credibility**: Independent testing procedures and rigorous assessment rubrics ensure that awarded credentials reflect genuine achievement.
- **Comparability**: By referencing European frameworks (e.g., DigComp, EntreComp, GreenComp, EQF), certificates can be understood across institutions, sectors, and borders.
- **Learner-centredness**: The system builds on learner agency, allowing modular pathways and stackable recognition that reflect individual learning journeys.

Together, these four principles reflect recurring themes across EU competence frameworks and established certification models: a system must be trusted (credibility), clear (transparency), portable across contexts (comparability), and supportive of learners' individual journeys (learner-centredness). These considerations guided their selection as the foundation of the CETS model.

### 4.2.2 ICDL as a foundation

To ensure robustness and trust, the CETS certification model takes inspiration from the **ICDL (International Certification of Digital Literacy)** framework. ICDL has issued more than 17 million certificates worldwide and is recognised for its consistent quality assurance, independent testing, and long-term success in certifying digital competences (*Home - ICDL International Certificate of Digital Literacy*, n.d.).

A key strength of the ICDL model is its **syllabus-driven structure**, which ensures that every learning goal is covered systematically across assessments. Each module is supported by **at least two independent testing streams**, guaranteeing reliability and reducing the risk of learners preparing for a single fixed test. Tests combine **theoretical questions with in-application, practical tasks**, meaning that both knowledge and applied skills are assessed. Finally, ICDL ensures transparency and comparability by requiring controlled testing conditions and by providing a **Characterisation Test Template (CTT)** to guide test design for national operators.

These features make ICDL a strong reference point for CETS, demonstrating how a modular and scalable certification system can achieve both credibility and international recognition.

### 4.2.3 A tiered system of certification

Building on the principles presented in 4.2.1 and inspired by the ICDL model, the ComeThinkAgain (CTA) project defines a tiered certification structure within the CETS framework. This structure ensures that learners receive recognition at different levels of achievement, from focused micro-credentials to advanced full certification. Table 4.3 summarises the three types of certification, their criteria, and their added value.

*Table 4.3. CTA types of certification, their criteria, and their added value.*

| Certification Type | Description | Criteria for Achievement | Purpose / Added Value |
|---|---|---|---|
| **CETS Micro-Credential** | Digital credential awarded for successful completion of a single CTA module (focused on a specific competence within C1–C3). | Completion of module activities and portfolio.<br>Passing summative assessment aligned with rubrics.<br>Evidence mapped to competence descriptors. | Recognises focused skill acquisition; stackable towards higher-level certificates; transparent evidence for learners and employers. |
| **CETS Profile Certificate** | Credential bundling a curated set of CTA modules around a thematic pathway (e.g. Green Skills for VET Trainers, Computational Thinking for Educators, etc.). | Successful completion of all required micro-credentials in the pathway.<br>Portfolio evidence showing integration of competences.<br>Peer/self-assessment confirming collaboration and transversal skills. | Provides recognition of applied competences relevant to roles or sectors; supports employability and career progression. |
| **CETS Full Certificate** | Highest-level recognition within CETS. Demonstrates mastery across C1–C3 and ability to integrate competences in complex, real-world contexts. | Completion of all required modules in the program.<br>Learners must demonstrate engagement with the full learning pathway and fulfil all formative and summative assessment requirements specified in each module. | Provides recognition of comprehensive learning, signals a learner's commitment to completing the full training pathway, and readiness to apply these competences in diverse contexts. |

By structuring certification in this way, the CETS framework supports progression, transparency, and comparability across contexts. Learners gain recognition for short, targeted achievements, while employers and educators can rely on consistent, evidence-based standards across all certification tiers. This tiered progression is illustrated in Figure 4.4, where micro-credentials form the foundation, build into profile certificates, and culminate in full certification at the top of the pyramid.

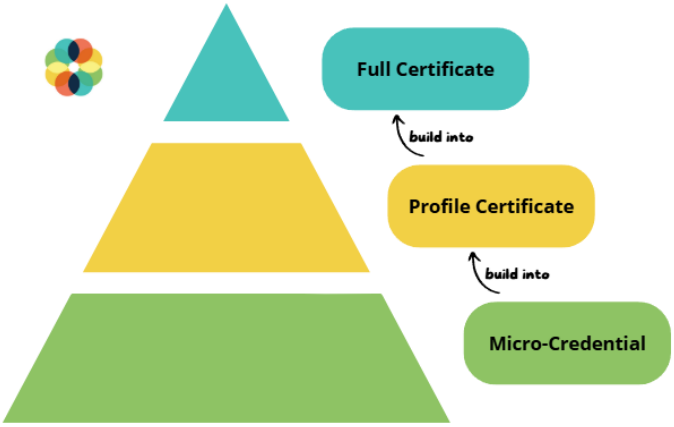


*Figure 4.4. Tiered certification structure of the CETS model, showing how micro-credentials can be stacked into profile certificates and ultimately build towards full certification.*

### 4.2.4 Issuance of credentials

All CETS certifications will be issued in **digital and printable formats**:

- **Digital Badges** (e.g. Open Badges standard) will serve as portable, verifiable micro-credentials containing metadata on the issuing institution, criteria, and evidence of achievement. Learners can share these badges on professional platforms such as LinkedIn.
- **Printable Certificates (PDF)** will be available as formal documentation for institutional and employer recognition, updated as learners accumulate further micro-credentials and profile pathways.

By combining transparency, credibility, comparability, and learner-centred design with a proven certification model, CETS provides a robust system that can scale across institutions and contexts while supporting the lifelong learning needs of diverse learners.

# 5 CONCLUSION

This report has outlined the conceptual framework for assessment and certification within the *ComeThinkAgain (CTA)* project. By integrating innovative assessment instruments, rubric-based evaluation, and a tiered certification model, CTA provides a coherent and sustainable approach to competence validation across C1 (computational thinking), C2 (entrepreneurship and innovation), and C3 (green skills).

Directly addressing the guiding questions presented in Section 1.2, the findings can be summarised as follows:

- **How can C1–C3 skills be assessed effectively, ensuring validity, reliability, comparability, and scalability beyond the project context?** CTA suggests a range of possible instruments (reflective journals, peer/self-assessment, scenario-based and project-based tasks, self-assessment checklists) that generate diverse evidence (modules can adapt or select from these depending on context). Evidence can be curated in digital portfolios, adapted to local pedagogical choices, and evaluated with rubrics that ensure validity (clear link to competence descriptors), reliability (transparent performance levels), and comparability (shared standards across contexts). Scalability and sustainability are supported by low-cost tools, standardized rubrics, and digital delivery.
- **How can assessment not only measure but also support learners in acquiring competences, affirming knowledge and skill development in line with a formative, constructionist approach?** Assessment in CTA is conceptualised as *assessment as learning*, and complemented by *assessment for learning*. Together, these two dimensions create a **continuous cycle** in which assessment not only measures progress but also drives competence development, helping learners to connect activities with intended outcomes and to take ownership of their learning. Summative assessment retains a role, but mainly within the **certification framework**, serving as a validation step that ensures competences demonstrated through formative processes can also be recognised formally.
- **What principles should underpin a transparent and credible certification system that supports learners, educators, and employers alike?** Building on the ICDL model, the CTA Certification Model is structured in three tiers: *Micro-Credential* (single module), *Profile Certificate* (stacked modules), and *Full Certificate* (advanced modules with capstone project). Issued as digital badges and certificates, these qualifications are transparent, credible, and aligned with European frameworks. By linking certification directly to portfolio evidence and rubric-based validation, the system ensures trustworthiness and recognizability for all stakeholders. The diagram below (Figure 5.1) illustrates this process, showing how assessment instruments generate evidence, how the digital portfolio and rubrics serve as the container and validator of that evidence, and how validated evidence feeds directly into the CTA certification model.

Together, these elements form a coherent and sustainable model that not only measures competences but also actively nurtures them, while ensuring certification is both transparent and credible. In this way, the CTA framework offers a forward-looking approach that bridges pedagogy, assessment, and certification, providing value for learners, educators, and employers alike.

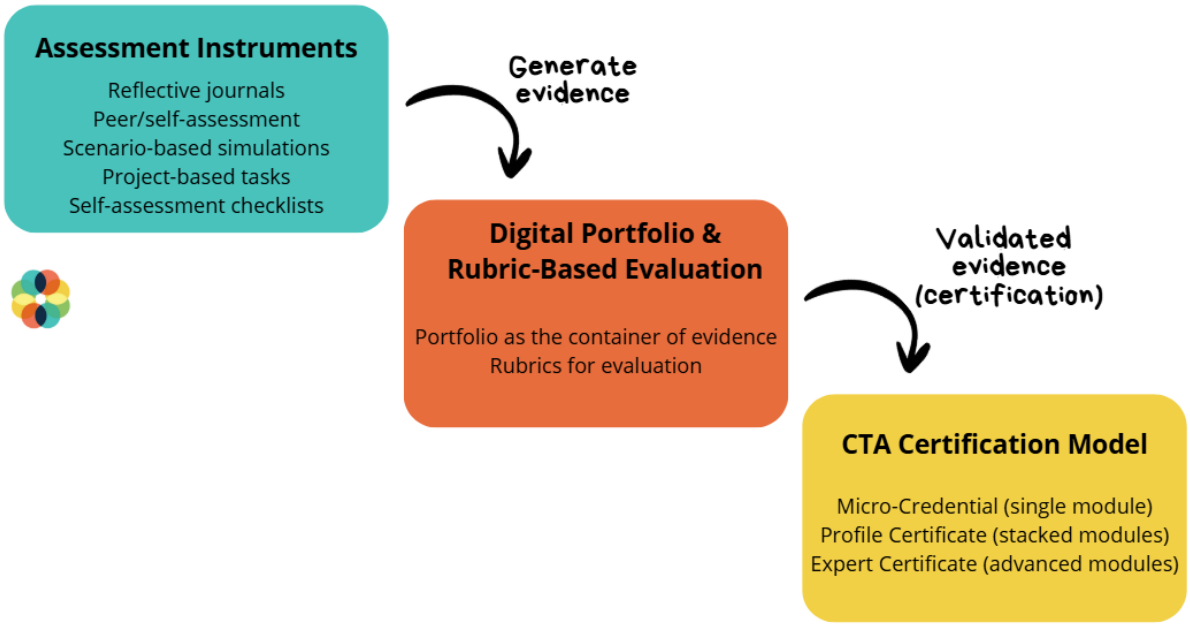


*Figure 5.1. Flow from assessment instruments to certification in CTA*

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# CITATION



**Report title**: Concept for Assessment and Certification

**Report author:** ComeThinkAgain Project

**Website:** https://comethinkagain.eu/