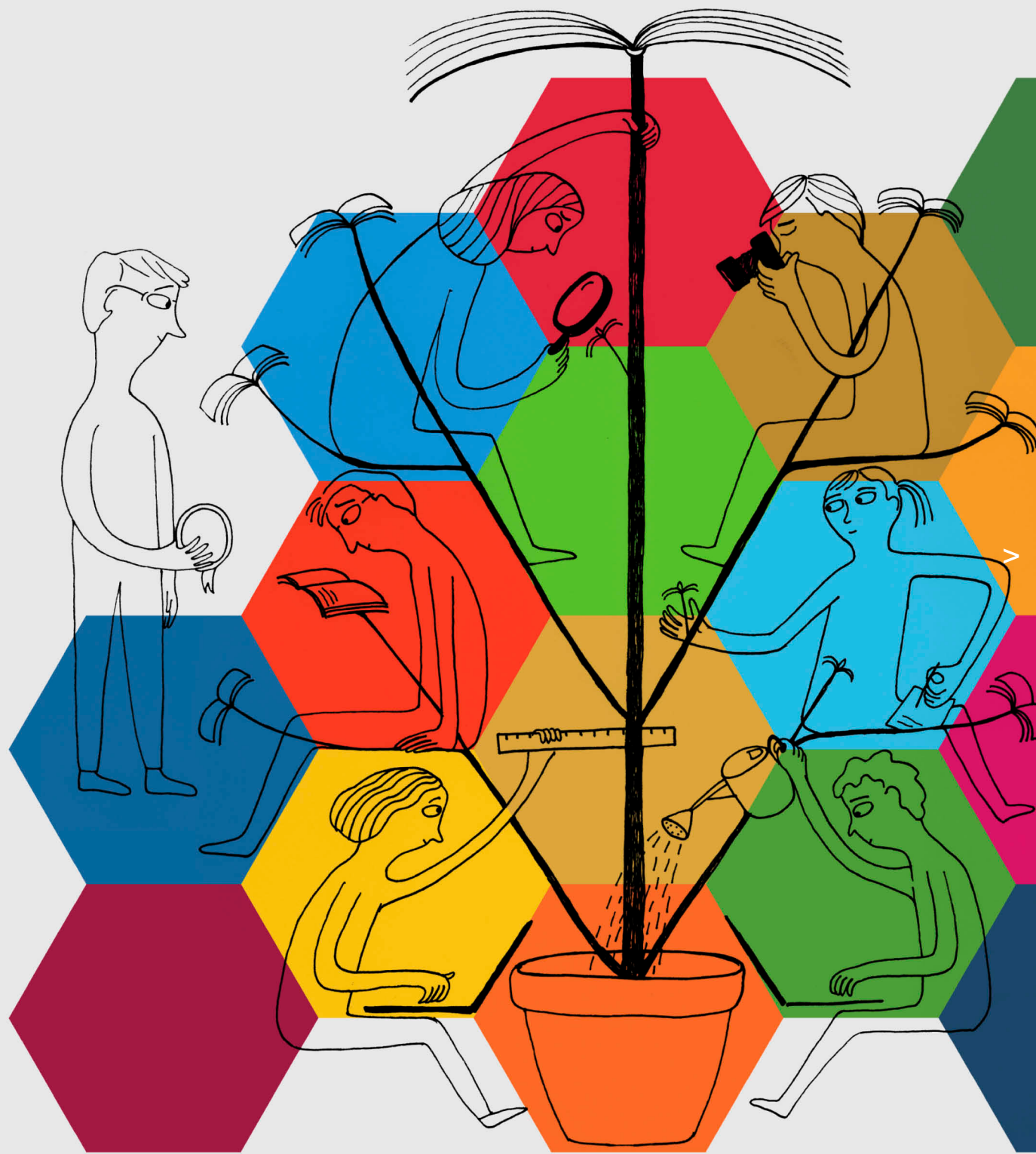


EduSTA Erasmus+ Teacher Academy - Constructing an Academy for Sustainable Future Educators through Digital Open Badges

Edited by Eveliina Asikainen,
Sanna Brauer, Hanna Davis
and Liisa Marttila





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EduSTA Erasmus+ Teacher Academy - Constructing an Academy for Sustainable Future Educators through Digital Open Badges

Academy for Sustainable Future Educators - A Platform for the Meeting
of Transformative and Competence-based Learning in Teacher Education

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Project Leader's Introduction

It is my great pleasure to introduce this collection of texts that presents the Erasmus+ Teacher Academies project Academy for Sustainable Future Educators – EduSTA. This project received funding in 2022 among the 11 first Teacher Academies: Erasmus+ flagship projects contributing to the needs of strengthening the teaching profession and support the development of the European Education Area.

EduSTA was motivated by the urgency to upskill and reskill teachers to meet the policy priorities articulated in European Green Deal, and to educate workforce that can carry out the Ecological Transition. On conceptual and pedagogical level, the starting point of the project was the identification of the gap between theoretical definitions of teachers' sustainability competences and the practices of teaching and learning (Vare et al. 2019; Corres et al., 2020), and the commonly agreed fact that teacher education for sustainable development is scattered (see Mulá & Tillbury 2023).

Teachers' capabilities to act as active change makers in the ecological transition, and to educate citizens and workforce to meet future challenges is key to a profound transformation in the green transition. In very general terms, teachers' task in this world should be to promote Learning for Sustainability (LfS): "nurture a sustainability mindset from childhood to adulthood with the understanding that humans are part of and depend on nature. Learners are equipped with knowledge, skills and attitudes that help them become agents of change and contribute individually and collectively to shaping futures within planetary boundaries" (Bianchi et al., 2022, 13). However, many teachers do not feel well equipped to practice Education for Sustainable Development, even if they are committed to it (Mulà & Tilbury, 2023).

There are helpful frameworks that describe and define different aspects of sustainability. For instance, the United Nations has introduced the Sustainable Development Goals (SDGs), and the European Union has developed the GreenComp sustainability competence framework. However, while these frameworks are valuable in describing what sustainable development goals and competences are, teachers' work adds another layer of challenge: How do the sustainability competences translate into teachers' competences that help teachers in educating their students in a transformative way? What does it take for a teacher to be a change agent? Further, how can teachers be supported and recognized in a systematic and rewarding way as they are developing and cultivating these skills?

EduSTA was motivated by the urgency to upskill and reskill teachers to meet the policy priorities articulated in European Green Deal, and to educate workforce that can carry out the Ecological Transition.

The umbrella concept of Teacher's Competence of Education for Sustainable Development (TCESD) can be described as knowing, doing and being of 1) teacher as a vehicle for pedagogic change and developing transformative learning experiences, and 2) as a catalyst through which institutional learning and structural changes might be better and more speedily progressed to support ESD (Rieckmann, 2012).

The research and development projects on teachers' competence in Education for Sustainable Development (TCESD) have produced several con-

ceptual frameworks and various projects on developing teacher education built on these frameworks (Corres et al 2020). However, these frameworks and pilots built on them have had only minimal effect on teacher education as shown by Mulà & Tilbury (2023, 28). Paul Vare, one of the developers of A Rounder Sense of Purpose framework, suggests that complexity and detailedness of the frameworks make them difficult to apply in teacher education (Vare et al 2019; Vare 2022). These outspoken needs to operationalise sustainability competences and to create direct links with everyday tasks such as curriculum development, pedagogical design, and assessment on all levels of education served as the starting point of EduSTA.

Collaboratively produced operationalisation of Key Sustainability Competences in the teaching profession implemented through a jointly developed educational offering and open digital badge-driven learning pathways.

The second important starting point of EduSTA relates to the observation that there are plenty of good teaching and learning materials and professional development programmes. Many teachers utilise these to develop their mastery of ESD – but do not get recognition. This relates to the previously described fact that the competence frameworks have not been widely adopted in teacher education. Further, although even if it is stated to be critical for educating citizens for a sustainable and just world, there are not many formal requirements for these competences (e.g. Mulà and Tilbury 2023).

Given the abstract nature of existing competence frameworks, combined with the lack of procedures for recognising teachers' sustainability competences, we made the decision to base EduSTA on the development of digital-open-badge driven pathways. This was supported by earlier good

experiences with the development of Digital Open Badges in teacher education (e.g. Brauer 2019). This decision led to a novel approach to combine the green and the digital in teacher education, as called for by (Mulà and Tilbury 2023). During the project, this was realized through developing the digital open badge constellation Educator for Sustainable Future and piloting the badges in diverse teacher educational contexts in all partner countries.

In the project plan the main objective of the project was formulated as a “collaboratively produced operationalisation of Key Sustainability Competences in the teaching profession implemented through a jointly developed educational offering and open digital badge-driven learning pathways.” In practice, this meant studying existing frameworks, finding their common elements which could be operationalised into measurable competences, piloting the produced assessment framework (digital open badge constellation) in the partner organisations, and agreeing on ways of using the framework after the project. In this publication we present all these phases.

The EduSTA represents a wide array of educational contexts, both geographically and through different levels of education. The project was coordinated by Tampere University of Applied Sciences (TAMK, Finland) with University of Gothenburg (GU, Sweden), Hanze University of Applied Sciences (Hanze, the Netherlands), Czech University of Life Sciences Prague (CZU) and University of Girona (UdG, Catalonia) as partners, and Association for Teacher Education in Europe and Tampere Vocational College as associate partners. TAMK, GU and CZU educate vocational teachers. Hanze represents professional development of university teachers and UdG initial teacher education of primary and secondary teachers.

The project was organised in seven Work Packages. The main development took place in WPs 2–5 while WP1 focused on project management, WP6 on quality and WP7 on dissemination and exploitation. WP2 produced a Context and Competence analysis of existing sustainability frameworks and of teachers' educational needs linking to these competences. This work resulted in identifying the main competence areas of teachers' sustainability competences. WP3 and WP4 worked in close cooperation developing the pedagogical models and designing the digital open badge constellation. In

WP5 all partners tested the digital open badges either in initial teacher education or in professional teacher education programmes. After the pilots, the digital open badge constellation and educational models were revisited to refine the products after final release.

In this collection, **Part 1 Background of the project** dives into the starting points of the project, discussing the idea of combining the development of more concrete definitions of teachers' sustainability competences with digital open badges as a tool, the nature of transformative learning, and how digital open badges can support transformative and process-oriented learning. We have been aware of the tension between digital, competence-based and transformative approaches throughout the project. At the same time, this tension has provided a good surface for reflection and learning during the project, which has resulted in seeing the complementing features of the approaches.

Part 2 Sustainable Future Educator Badge Constellation describes the design process and the contents of the badge constellation. It starts with a summary of the process of identifying the competence areas (described in detail in Ametller et al 2024) and proceeds with reflecting on the badge design process (based mainly on Asikainen et al 2025). We also present the badge constellation and general experiences of piloting.

Part 3 Partner experiences and reflections provide important insights to learnings of partners in different phases of the project, and reflections of the external evaluators, Jan-Willem Noom and Dermot O'Donovan. The partner experiences reflect upon badge design, pilots and dissemination.

This project has changed all partners' views of combining transformative learning, competence-based learning and digital open badges. I hope you will find our experiences useful for developing your own work.

In the light of Finnish midsummer night,
Tampere June 2025
Eveliina Asikainen
Project Leader and Primary Investigator of EduSTA





Part 1

Background of the Project



Transformative Learning for Sustainability and Futures Literacy

Lauren Verheijen & Petra Cremers, Hanze University of Applied Sciences

Discussions on how to integrate sustainable development within higher education have massively evolved over the last – nearly – five decades. What was initially presented as a fringe educational topic has now become central to claims regarding the purpose and nature of education and learning (Sterling, 2004). The evolution of these discourses is profound yet everything but linear, sometimes even incoherent and conflicting. Incoherence in some instances has even been a contributor to a fragmented understanding of ESD, as mirrored by its varied implementation in educational practise. In other cases, lack of clarity has created resistance by the mainstream to implement ESD.

In this chapter we discuss these discourses and how they relate to the issue of designing (transformative) learning and education with regards to sustainable development. To conclude, Futures Literacy as a key component of sustainability competence is explored through the lens of transformative learning design. We start our discussion on the main discourses on ESD by taking a step back to discuss the nature of sustainability issues (or problems) and how it relates to the challenge of designing education and learning.

Complicated or Complex?

One of the frames commonly found in publications and competence frameworks surrounding ESD is that of developing skills, knowledge and attitudes to be able to solve real-world sustainability problems. For problems with clear-cut definitions this is a very reasonable approach. Yet, sustainability issues are inherently complex, characterized by uncertainty, complexity and having an emergent character. Such challenges are often labelled as 'wicked problems.' Unlike problems with clear solutions, wicked problems are multifaceted, involving interdependent variables that evolve over time and differ across contexts. This complexity stems from the interconnections between ecological, social, and economic systems, making sustainability challenges unpredictable and resistant to simple solutions.

Thus, when working on transitions towards a more sustainable world, our actions can have unexpected consequences. Within sustainability competence frameworks this understanding is often framed in relation to 'systems thinking', acknowledging that sustainability challenges exist within a web of interrelated components and evolve in non-linear, sometimes even unpredictable, directions. Instead of solutions, systems interventions might be designed, rooted in causal loop understanding, anticipating the unanticipated and acknowledging complexity. Linear solutions and linear paths might be easier to oversee, but when 'solving' for sustainability, they leave us with a visor across all that is happening beyond the simple problem definition.

Problems for which results can be predicted or calculated, and where the circumstances are relatively stable, are labelled 'complicated'. By teaching students to work towards solutions embedded in learning that is goal-oriented, we prepare them for addressing complicated problems. Instead, the unpredictable and dynamic nature of sustainability issues demands an educational approach that fosters resilience and critical thinking, essential to dealing with complexity. Educators are encouraged to create learning environments that allow for exploration, dialogue, and iterative problem-solving. This shift in educational design not only aligns with the nature of sustainability challenges but also prepares learners to become proactive agents of change in addressing these global issues.

Levels of Sustainability Education

Outlining the differences between complex and complicated problems introduces the conflicts that can also be found between the various discourses on sustainability education. On the one hand, humanity is presented with problems we want to solve, on the other, attempting to solve them leaves us only with the emergence of new problems. It feels like a trick-question, but it doesn't have to be if we frame the exploration of knowledge and perspectives in relation to our ability to understand the sustainability issues we are addressing. Stephen Sterling (2014), in his seminal work on Education for Sustainable Development (ESD), categorized the various discourses on ESD present in both literature and practice into three distinct levels, with each level representing a progressively deeper engagement with sustainability.

ESD Level 1: Education **about** Sustainability

This level focuses on imparting knowledge about sustainability concepts and issues. It is primarily informational, aiming to raise awareness and provide factual understanding. The educational design at this stage remains largely traditional, emphasizing content delivery and knowledge acquisition.

ESD Level 2: Education **for** Sustainability

At this level, education moves beyond awareness to fostering skills and attitudes that support sustainable practices. The approach becomes more action-oriented, encouraging learners to apply their knowledge in practical contexts. Educational methods include project-based learning, community engagement, and the development of problem-solving skills relevant to sustainability challenges.

ESD Level 3: Education **as** Sustainability

The third level represents a transformative approach where sustainability is not just a subject of study but is embedded in the very fabric of the educational process. This level calls for a fundamental rethinking of

educational paradigms, emphasizing holistic, participatory, and transformative learning experiences. It seeks to align educational values, practices, and environments with the principles of sustainability, fostering systemic change in both learners and institutions.

Respectively, each level might be equated with first, second and third-order learning as the emphasis shifts from knowledge acquisition to critical questioning to epistemic change. All levels acknowledge the necessity of value-change, though with varying degrees of sense-making in relation to the worldviews one holds and how those might change in relation to addressing sustainable development.

When these levels were first introduced, they appeared to be complementary approaches for the integration of sustainability into education – potentially even sequential, with increasing complexity and engagement with

The unpredictable and dynamic nature of sustainability issues demands an educational approach that fosters resilience and critical thinking, essential to dealing with complexity.

deep sustainability. However, evolving ESD theory and practice over the past decade has highlighted an urgent need to transform education systems – in line with ESD III – conflicts with the integration of education about (ESD I) and education for (ESD II) sustainability. This shift raises concerns that continued focus on ESD I and II may inadvertently sustain a competing agenda rather than fostering transformative change. Fortunately, growing consensus is found in the illustration of how the concept of education

as sustainable development (ESD III) has become increasingly central to educational discourse on sustainability, shown when MacIntyre, Tilbury, and Wals (2024) traced the evolution of these narratives about education and learning over the past five decades.

Yet, the adoption of ESD III is far from uniform. Factors such as geographic location, cultural context, and educational level (primary, secondary, or tertiary) significantly shape how ESD is understood and implemented in practice. Even within an EU project like EduSTA, these contextual differences have posed a design challenge: how to develop competence badges that both align with ambitious ESD goals and remain applicable across diverse partner institutions.

Transformative Learning

Following the discourse on ESD III, one could argue that its core ambition lies in contributing to societal transitions – which are inherently non-linear and open-ended – through the transformation of educational systems (Sterling, 2014; Garcia-Alvarez et al., 2022). UNESCO recognized the complexity of this endeavour when shaping its vision for ESD, aligning it with a competence framework (UNESCO, 2017) that encompasses the knowledge, skills, and attitudes professionals should hold to navigate sustainability challenges. Such logic can be seen back in also newer frameworks targeted at citizens, such as the EU Green Comps.

A key challenge, however, lies in the paradox of aligning formal educational systems that are predominantly outcome-oriented with this ambition. This tension underscores a fundamental conflict in ESD discourse: while there is a clear agenda for equipping sustainability professionals with specific competences, there is also a pressing need to move beyond outcome-based learning to create space for learner transformation.

In educational design, this discussion is closely tied to pedagogies that foster transformative learning, defined by Mezirow (2002, p. 1) as “the process of effecting change in a frame of reference”. The growing emphasis on transformative pedagogies within ESD highlights the need to build capacity

for navigating uncertainty, complexity, and ambiguity (Cremers, 2024) – key elements in sustainability competence frameworks and the framing of sustainability challenges. From a learning design perspective, transformative learning calls for a fundamental shift away from outcome-oriented

From a learning design perspective, transformative learning calls for a fundamental shift away from outcome-oriented approaches and toward process-driven learning.

approaches and toward process-driven learning. In the context of ESD, this shift invites learners to critically examine and challenge existing norms and the status quo, opening new possibilities, trajectories, and pathways for societal innovation (Verheijen, 2022). This is particularly crucial given that sustainability challenges often present as ‘wicked’ problems – resistant to definitive solutions – requiring a move away from problem-solving toward problem-loving as a mindset for sustainability. Two key design principles for ESD therefore emerge: (1) transformative learning must be process-oriented, and (2) it must remain open-ended. Any attempt to structure or steer learning through predefined outcomes must account for these principles to avoid undermining the very transformations ESD seeks to enable.

Some scholars have pushed the lens on transformative learning further to address education’s ability to be ‘transgressive’, highlighting the importance of not just shifting frames of reference, but the necessity to do so through the integration of multiple disciplines and actors to enact transformations in praxis (Lotz-Sisitka et al., 2015). Dealing with the challenges of sustainability is not just a thought experiment to explore alternative frames of reference but should also stress education’s ability to engage with the world in

a creative way, embrace uncertainty, and learn from what happens when trying to bring about change. In other words, building the 'capacity to disrupt' (Wals, 2022).

When translating these ideas to educational design, educators should focus on designing learning experiences that are iterative and adaptive, incorporating feedback loops that allow for continuous reflection and improvement. This dynamic approach to educational design aligns with the evolving nature of sustainability challenges and supports the development of learners' capacities to navigate complexity and uncertainty. To make this concrete, we explore the development of Futures Literacy through transformative learning as a means of building transformative capacity in learners.

Building Transformative Capacities in Education

As transformative learning cultivates the ability to question assumptions, embrace complexity, and foster critical reflection, it naturally leads to another essential educational capacity: the ability to imagine and explore possible futures. Futures literacy builds on this transformative foundation, equipping learners not just to navigate present challenges but to anticipate, envision, and co-create future scenarios (Kazemier et al., 2021). In many ways, futures literacy mirrors the complexities of sustainability issues we've explored here. Sustainability challenges are not tidy puzzles waiting to be solved; they are ever-shifting, interconnected webs of uncertainty that require a certain set of competencies, including the ability to acknowledge assumptions and anticipate potentialities (Redman & Wiek, 2021). Futures literacy invites learners to step into this ambiguity, embracing it as fertile ground for creativity and innovation. By fostering a mindset that welcomes the unknown, futures literacy helps individuals see beyond immediate concerns, encouraging them to explore a multitude of potential pathways and outcomes (Laherto & Rasa, 2022). This approach is not about predicting the future but about cultivating the capacity to imagine diverse possibilities, understand their implications, and adapt thoughtfully as circumstances evolve (Miller, 2018).

While transformative learning encourages reflection on current realities and fosters a critical mindset, futures literacy extends this process into proactive engagement with the uncertainties of tomorrow. Redman and Wiek (2021) identify anticipatory competence – the ability to think critically about possible futures – as one of the key competencies necessary for sustainability transformations. Recognizing this, UNESCO (2021) has emphasized the need for transformative education that strengthens students' futures literacy as a way to empower them in shaping a more sustainable world. Similarly, the Green-Comp framework (Bianchi et al., 2022) explicitly integrates futures literacy as a core sustainability competence, defining it as the ability to envision alternative sustainable futures by imagining and developing scenarios and identifying steps to achieve a preferred future. These frameworks highlight that the challenge of sustainability education is not only to foster deep reflection on existing systems but also to equip learners with the tools to anticipate, shape, and act upon emerging sustainability challenges.

This interplay between transformative learning and futures literacy calls for a reimagining of educational design principles. Learning environments must become spaces where emergence is not just tolerated but celebrated – where the process of learning is as valuable as the outcome. Just as sustainability challenges defy simple solutions, educational experiences should be crafted to encourage exploration, iterative thinking, and the courage to navigate uncharted territories (Laherto & Rasa, 2022). Futures literacy embodies these ideals, urging educators to design curricula that are dynamic, fluid, and responsive to the unexpected twists and turns that define both learning and life. Kazemier et al. (2021) illustrate this through a case study on faculty development in higher education, where futures literacy training helped educators embrace complexity, navigate uncertainty, and integrate futures-thinking strategies into their teaching. Their study found that fostering futures literacy requires pedagogical approaches aligned with transformative learning, particularly those emphasizing critical reflection, scenario-building, and speculative design.

As such, principles for learning design in sustainability education should reflect the emergent, process-focused, and exploratory nature inherent in both transformative learning and futures literacy. Just as transformative

learning emphasizes open-ended inquiry and critical reflection, futures literacy requires educational environments that prioritize curiosity, imagination, and the ability to engage with uncertainty. Educators should design curricula that encourage students to explore diverse scenarios, question existing paradigms, and collaboratively envision alternative futures. This approach not only prepares learners to address current sustainability challenges but also equips them with the competencies to anticipate and adapt to future developments.



Digital Open Badges and Micro-Credentials for Sustainability

Sanna Brauer and Sanna Ruhaalahti, Tampere University of Applied Sciences

The European Approach to Micro-Credentials

The contemporary manifold landscape of sustainable education encompasses professional certificates in green environmental principles and sustainability in diverse industries, issues, and disciplines (Halttunen et al., 2024). According to the European Union, EU (2022) micro-credentials could play an active role in delivering EU policy initiatives to advance the digital and green transitions. Regarding Council Recommendation micro-credentials could:

(i) underpin the goals of the Digital Education Action Plan 2021–2027 (European Commission, 2023) to help provide flexible, accessible learning opportunities for digital skills; and (ii) deliver on the targets of the Commission's '2030 Digital Compass' plan to develop a digitally skilled population and highly skilled digital professionals in Europe by 2030. Micro-credentials could also play a role in delivering on the European Green Deal (European Commission, 2021), which is Europe's growth strategy aiming to transform its economy and society and put them on a more sustainable path.

The development of educational provision in our time has been characterised by ever-increasing qualitative and quantitative ambitions for educational outcomes. Recent years have seen an increased interest in competence-based education, training and learning in higher education, leading to the development of numerous technical, pedagogical applications and theoretical guidelines (Brauer, 2021). Currently, new "alternative credentials" – such as micro-credentials, digital open badges and industry-recognised certificates (OECD, 2020) are gaining popularity as an alternative approach to formal, degree-driven competence development (Brauer & Korhonen, 2022). The term "micro-credentials" has been defined in a variety of ways in different settings. In the context of the EduSTA project, the European

approach to micro-credentials (EU, 2022) has been adopted, with the suggestion being put forward that micro-credentials could assist in the certification of the outcomes of small, tailored learning experiences.

A Shift from a Focus on Outcomes to a Focus on the Learning Process

As previously mentioned in this report, from a learning design perspective, transformative learning necessitates a shift from a focus on outcomes to a focus on the learning process. Whilst competence-orientation is frequently regarded as being at odds with transformative learning, this is a narrow interpretation. A number of approaches to competence-based learning exist, encompassing formal, non-formal and informal settings, and allowing the identification and recognition of a range of both tangible and abstract competences. Further, the terms 'learning outcome' and 'competence' are

Micro-credentials could assist in the certification of the outcomes of small, tailored learning experiences.

often used interchangeably (Gehart, 2011; Gruppen et al., 2016; Tekian et al., 2015). However, competence is best characterised as both a dynamic process and a developmental outcome that can be applied in daily practices (Brauer, 2019; Peterson & Lundquist, 2021). Moreover, if competence becomes synonymous with an outcome-oriented approach, researchers and educators may fail to recognise the transformational processes that lead to competence outcomes, resulting in an incomplete understanding of competence development and potentially hindering efforts to improve educational practices (Peterson & Lundquist, 2021). Nevertheless, we need to remember that promoting transformative learning also involves the complex nature of

critical reflection, constantly evolving relationships, changing perspectives, and a variety of contexts (Taylor, 2007).

Digital open badge-driven learning (Brauer, 2019) is based on individual choice, active student participation and the opportunity to deepen the skills and knowledge an individual needs in working life (Figure 1). The elements of outcomes-based education (e.g. goals) are, in this context, formatted as objectives. The objectives of competence-based learning processes are designed to facilitate active participation, problem-solving, and collaboration. The objective and achievement are both individual for each participant. It is essential that participants apply the knowledge they have acquired, rather than merely attending training sessions. Furthermore, within the education sector, teachers are key actors who should have the opportunity to accumulate competences and progressively deepen their understanding of transformative learning, which is an important pedagogical approach as it emphasises the development of agency and inclusivity (Sterling, 2014). The format, expense and time commitment required for industry-recognised sustainability certificates, which are intended to equip individuals with the skills required for specific occupations, may not always align with the educational professionals' needs in terms of practical applications (Halttunen et al., 2024).

**From a learning design perspective,
transformative learning necessitates a
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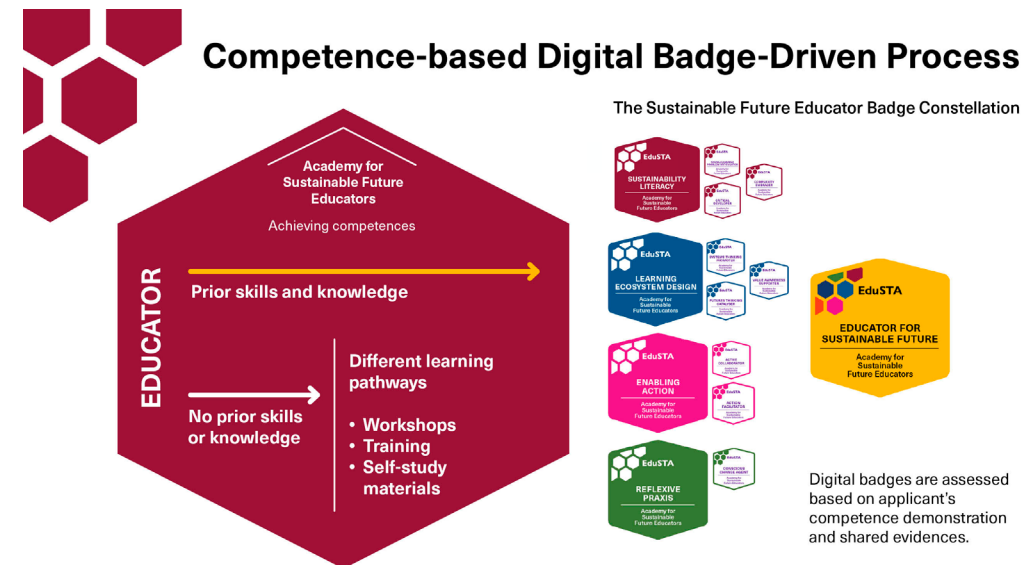


Figure 1. Model of Competence-based Digital Badge-Driven learning process used in EduSTA.

Progressive Engagement and Deeper Learning with Open Badges

Digital open badges represent a concept that lends itself to application in a variety of contexts, consolidating a broad spectrum of skills and knowledge acquired over time and in diverse settings. A badge is an electronic micro-credential that can be used for identification, recognition and promotion of competences acquired through formal, non-formal and informal learning (Brauer & Korhonen, 2022). Moreover, it is of particular significance that an individual can manage and maintain their own achievements, determining the manner and combinations through which to showcase their competence. This is in line with the EU's recommendation on micro-credentials (2022) and supports broader strategic goals to develop workplace learning and validation of acquired skills (Brauer & Korhonen, 2022; Halttunen et al., 2024). Digital open badges developed in EduSTA-project seek to meet the quality indicators and European standard elements to describe a micro-credential (EU, 2022).

< The competence objectives outlined in the open badges provide a clear vision of the competences expected of proficient sustainability professionals engaged in the educational sector. The assessment criteria and provided learning resources guide badge applicants in the development of the necessary knowledge and skills (Brauer & Korhonen, 2022) following a competence demonstration that facilitates communication and collaboration with others (Brauer et al., 2018). In conclusion, it is evident that the badges offer a unique opportunity for experiential learning and the application of new sustainability competences in authentic settings, thereby facilitating genuine transformation in the learner.

Through the formulation of competences objectives, assessment criteria and demonstration of competences, the recipients of the badges not only know, but can also concretely do and change the world one step at a time, transforming our educational system on a fundamental level. In this way, the badges empower teachers and engage them as change agents. Therefore, the digital open badge-driven learning (Brauer, 2019), structures of badge constellations and advancing challenges, reflect a model of progressive engagement with and deeper learning for sustainable development

(Sterling, 2014). The learning process model (Brauer, 2019) allows scaffolding (Brauer et al., 2019) for a continuum of learning strategies (information-communication-engagement) enabling agency and reflective action (Brauer et al., 2025) to achieve an individual, group, community and institutional ability to participate effectively in owned change in sustainability (Sterling, 2014).

Through the formulation of competences objectives, assessment criteria and demonstration of competences, the recipients of the badges not only know, but can also concretely do and change the world one step at a time, transforming our educational system on a fundamental level.

>



Part 2

The Sustainable Future Educator Badge Constellation

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Identifying Competence Areas and Teachers' Educational Needs

Jaume Ametller Leal, University of Girona

This chapter describes how we identified the EduSTA key competence areas for teachers' sustainability competence. In selecting the competences, we followed three main criteria: 1) they should align with core ideas from widely accepted competence frameworks, 2) they should be crucial for teachers, and 3) they should be operationalizable. By "operationalizable," we mean that the competences can be demonstrated and assessed through teaching practice or other school-related activities.

We will first present the results of a literature review which was conducted to identify teachers' core sustainability competences from existing influential competence frameworks (first criterion). We will then summarize findings from interviews and focus groups with teachers, Education for Sustainable Development (ESD) experts, and policymakers in the partnering countries. The purpose of these interviews and focus groups was to gain a deeper understanding of the competences teachers need for ESD and how these competences should be fostered (second criterion). We will then introduce our proposal for ESD teacher competences, drawing on these insights and the work of the EduSTA team to make them actionable (third criterion). Finally, we will outline some ideas for future development.

Over the past four decades, Education for Sustainable Development (ESD) has become a significant focus of all levels of education (McKeown, 2013) due to the need for systemic changes towards sustainability and the key

role education plays in this shift. This is reflected in policy documents and academic research, which identify that a crucial aspect to successfully implement ESD is improving teacher education. The goal is to foster the educators' development of competences that will enable them to be agents of change for sustainability. Over time, several competence frameworks have

EduSTA focused on redefining existing Teacher Competences for Education for Sustainable Development (TCESD) to operationalize them so that they can contribute to closing the gap between theoretical projects for ESD and educational praxis.

been developed to serve this purpose. Rather than developing an alternative framework, EduSTA focused on redefining existing Teacher Competences for Education for Sustainable Development (TCESD) to operationalize them so that they can contribute to closing the gap between theoretical projects for ESD and educational praxis.

Our proposal, therefore, aimed to consolidate existing frameworks and operationalize them for practical use in teacher professional development, more specifically, driven by open badge and micro-credential accreditation. We intended these TCESD to underpin a teacher education proposal articulated through a constellation of micro-credentials. Therefore, their definition ought to convey a clear vision of the competences so that it was possible to define assessment criteria that were connected to what educators do. Furthermore, for this framework to be useful in teacher education it had to reflect the contextual requirements shaped by existing policy while it had to enable educators to go beyond the existing educational system to move

towards a transformative education. Hence, we needed a framework that provided an operational definition of competences that build the capacity of teachers to develop elements of the different levels of ESD as required by their context while being able to promote a transformative education (education as sustainability) within their professional context. This was achieved through a review of the literature and policy documents from five European countries, along with interviews and workshops with policy makers, experts, and educators (see Ametller et al. 2024 for a detailed description).

Competence Analysis

Reviews on TCESD (Lohmann et al., 2021; Yue et al., 2021, Fisher et al., 2022) have shown that existing frameworks of teachers' sustainability competences share many commonalities, with differing emphases on specific elements. These frameworks typically outline a variety of elements such as areas, topics, and goals for ESD alongside general goals for Sustainable Development (SD). Based on the results from previous reviews and, particularly, on their impact on policy initiatives and other ESD proposals, we focused our analysis on six major frameworks: UNECE (UNECE, 2011), CSCT (Sleurs, 2008), A Rounder Sense of Purpose (2019), KOMBiNE (Rauch and Steiner, 2013), Bertschy et al. (2013), and Cebrián and Junyent (2015).

The review of the literature on ESD (Education for Sustainable Development) teacher competences since 1990 aimed to identify core common competences present in influential frameworks. The team reviewed 169 documents, including the six frameworks mentioned above along with the GreenComp framework (Bianchi et al., 2022) for students' competences.

Since UNECE is the most referenced framework in literature, we used it as the starting point of our analysis, which was underpinned by two main elements: defining competence as a combination of knowledge, skills, and attitudes, and adopting the GreenComp framework as the ESD reference framework due to its alignment with current EU policies.

The UNECE framework uses a matrix with two axes: one for ESD characteristics (holistic approach, envisioning change, achieving transformation) and

one for learning experiences (learning to know, do, be, and live together). The GreenComp framework similarly addresses these elements but with a focus on values, complexity, and sustainability actions. Both frameworks highlight the importance of action in ESD, not just as an additional competence, but as a core feature that influences all competences, emphasizing urgency and change. The analysis compared the UNECE and GreenComp frameworks, focusing on their axes and identifying common elements. The team proposed changes to these axes to better align the elements. Additional elements like agency, the global-local relation, the past-present-future connection, uncertainty, and an action-oriented approach were identified as essential for ESD, though not explicitly included in other frameworks.

Our analysis showed that identity elements are central to ESD, which relates to personal investment in change, and are connected to learning to live together and cooperation. From the CSCT proposal we added another dimension highlighting knowledge areas like systems thinking and its role in SD. These elements, along with the integration of values, ethics, and reflexivity, shaped our take on competences in ESD. Table 1 summarises the analysis of competence frameworks.



Table 1. Analysis and comparison of four competence frameworks (GreenComp, RSP, UNECE and CSCT) on relation to Sustainable Development/Education for sustainable Development characteristics and Competence dimensions (Ametller 2024).

Elements	GreenComp	RSP	UNECE	CSCT
(E)SD characteristics	Embracing complexity	Holistic approach	Holistic approach	Systems thinking
	Envisioning futures	Envisioning change	Envisioning change	Visioning
	Acting for sustainability	Achieving transformation	Achieving transformation/learning to live together – cooperation	Teacher in the educational institution/ Teacher in the society/ Networking
Competence dimensions	Embodying value/ Attitudes	Reflexivity/Involvement	Learning to be/ Learning to live together – empathy	Teacher as an individual/Values and ethics/Reflecting
	Knowledge	Integration	Learning to know	Action
	Skills	Practice	Learning to do	Knowledge

We found that while many existing frameworks provided a broad range of competences, they often lacked clear, actionable guidance for teachers' professional development.



Table 2 outlines the core elements for ESD teacher competences, combining characteristics of ESD and pedagogical competences. These elements, including holistic approaches, envisioning change, and action orientation, aim to serve as the foundation for developing practical, operationalized teacher competences in ESD. In summary, we found that while many existing frameworks provided a broad range of competences, they often lacked clear, ac-

tionable guidance for teachers' professional development. Our comparative analysis of six of these frameworks resulted in a set of core elements and competences along three dimensions. We focused on practical, action-oriented competences essential for supporting teachers in developing the skills necessary for sustainable education.

Table 2. Core elements for an ESD teacher competences framework in EduSTA.

Elements	EduSTA core elements
(E)SD characteristics	Holistic approach
	Envisioning change
	Achieving transformation/learning to live together - cooperation-
Pedagogical / competence dimension	(Identity elements: values, attitudes, investment agency) Learning to be/Learning to live together -respect/ Reflectivity
	Learning to know
	Learning to do
Orientations	Considering global-local
	Considering past-present-future
	Integrating uncertainty
	Action oriented

Context Analysis

Our next task was to turn the above core elements into an operational framework relevant for professional development. We collected data from national educational policies and gathered the opinion of ESD experts and practitioners via interviews and workshops. All the partners' studies and the original analysis are presented in Ametller et al (2024). For a TCESD proposal to be operational, it must be pertinent to professionals in the field of ESD. This necessitates that these TCESDs align coherently with the contexts in which they are to be developed and implemented. To achieve this, we collected information from different sources in each of the five countries presented in the EduSTA academy. The make-up of the academy was designed to provide a variety of educational contexts relating to ESD, both in respect to the phases of teachers' careers, educational levels, and geography. All these bring variety to the contexts of practicing ESD.

Initially, we gathered information regarding the policy framework. This involved reviewing grey literature related to Education for Sustainable Development (ESD) and conducting interviews with policymakers. These efforts enabled us to obtain a comprehensive understanding of the expectations and requirements for educators at various educational levels concerning ESD.

We conducted interviews with teachers in each of the partner countries. Our objective was to comprehend how educators perceived the policy context and its impact on actual practice. We aimed to gather insights from both pre-service and in-service teachers regarding their expectations for professional development concerning Education for Sustainable Development (ESD), focusing on both content and delivery methods.

Additionally, we conducted interviews with experts in Education for Sustainable Development (ESD), comprising both researchers and teacher educators. Our objective was to gather insights into the primary challenges associated with ESD and its integration into teacher education within their respective national contexts.

The data analysis concentrated on the perspectives of teachers, ESD experts, and policymakers regarding ESD teacher competencies. The key findings were structured around several important questions.

Question 1: What do we expect from a competent teacher regarding ESD?

Teachers, ESD experts, and policymakers emphasized four main dimensions of competence:

- **Know-what:** Teachers must understand sustainable development from a transdisciplinary perspective, including natural sciences and concepts like systems thinking, transformative learning, and futures literacy.
- **Know-how:** Competent teachers should use active, student-centered pedagogies (e.g., project-based learning, inquiry-based learning) and be familiar with technology and digital literacy. They should also link lessons to real-life experiences.
- **Know-being:** Teachers must serve as role models, demonstrating empathy, building trust, and fostering a love for learning in their students. They should embrace innovation, admit limitations, and engage in meaningful dialogue.
- **Know-acting:** Teachers should possess leadership, networking, and community-building skills, with the ability to lead sustainability projects and encourage democratic participation.

Question 2: What is the situation around teacher training for ESD in partner countries?

Across various countries (Finland, Sweden, the Netherlands, Czechia, and Catalonia), there is consensus on the need for specific ESD training. This includes addressing gaps in science-related knowledge and implementing transdisciplinary approaches like systems thinking and critical thinking. However, approaches to integrating ESD into teacher training vary:

- Finland focuses on holistic institutional development, while Sweden integrates ESD into teacher education courses.
- The Netherlands has a national plan, and in some countries, like Czechia, vocational education is actively incorporating ESD. Challenges include lack of mandatory training, insufficient resources, and the need for greater integration of ESD in various educational sectors.

Question 3: What are the key requirements for ESD teacher training?

- **Networking opportunities:** Teachers should engage in both local and international networks, collaborating with other schools, universities, and social actors.
- **School and professional orientation:** Practical training should be incorporated, with excursions, seminars, and real-world perspectives.
- **Digital learning:** Teacher training should embrace digital technologies and sustainability-focused digital tools.
- **Values awareness and emotional management:** Training should include diversity, sustainability values, and coping with eco-anxiety.
- **Learning and assessment methodologies:** There is a shift towards transformative learning approaches, including collaborative and problem-based learning. Assessment should focus on self-assessment and peer feedback.

Question 4: What are the challenges faced when embedding ESD in national contexts?

Despite policy recognition of ESD, challenges exist, such as the lack of specific ESD training programs for pre-service and in-service teachers. While some countries include ESD in teacher education, its implementation is often not mandatory. Proposed solutions include:

- **Pre-service training:** Compulsory ESD training within the curriculum, aligned with current legislative frameworks.
- **In-service training:** Creating a certification process for teachers to recognize and validate their ESD competencies and encourage professional development.

There is a strong drive to embed ESD into the educational landscape, with sustainability integrated into curricula and policy. However, challenges remain, particularly the absence of structured, mandatory ESD training for both pre-service and in-service teachers. To address this, proposals include postgraduate courses, professional development, peer support, and the establishment of specialized teaching profiles for ESD.

EduSTA Proposal for Competence Areas

We have summarized the results of our literature review and cross-analyses of contextual data collected from the five countries participating in the EduSTA project. Based on these insights, we designed the EduSTA proposal of operationalized competence areas necessary for teachers to effectively practice Education for Sustainable Development (ESD) (see table 2). The EduSTA framework aimed to build upon existing ESD teacher competence frameworks, rather than replacing them, by offering a practical approach to the core competences needed for ESD. It served as the foundation for the creation of open digital badges, designed to recognize and accredit these

After analyzing data from teachers, ESD experts, and policymakers, the EduSTA team developed a framework outlining key competences for ESD educators.

competences, whether developed through formal education, informal learning, or workplace experiences. The framework also informed the design of training proposals to help teachers enhance these competences, with a focus on connecting them to real-world teaching practices.

After analyzing data from teachers, ESD experts, and policymakers, the EduSTA team developed a framework outlining key competences for ESD educators. The framework includes three core competences (Sustainability literacy, Educational competence, and Enabling action competence), supported by a fourth competence (Reflexive competence), which together contributed to forming the identity of an ESD educator.

1. **Sustainability Competence:** The ability to integrate knowledge, behaviors, and actions for sustainable development relevant to the educator's societal context.
2. **Educational Competence:** The ability to apply appropriate educational methods in various contexts, based on a vision of ESD.
3. **Enabling Action Competence:** The ability to anchor ESD in society by enabling students to take action on societal issues and within education systems.
4. **Reflexive Competence:** The ability to reflect on and align processes, decisions, and ESD implementation.

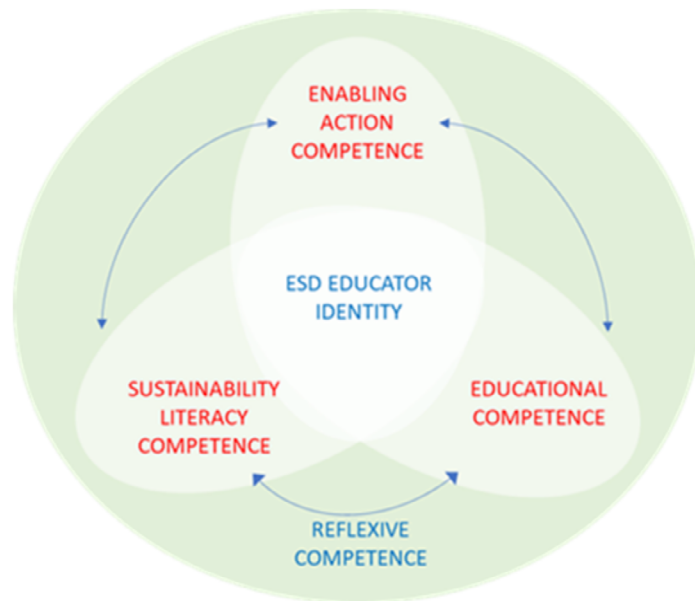


Table 3. First proposal of EduSTA ESD teacher competences.

Elements	EduSTA core elements
(E)SD characteristics	Holistic approach
	Envisioning change
	Achieving transformation/learning to live together - cooperation-
Pedagogical / competence dimension	(Identity elements: values, attitudes, investment agency) Learning to be/Learning to live together -respect/ Reflectivity
	Learning to know
	Learning to do
Orientations	Considering global-local
	Considering past-present-future
	Integrating uncertainty
	Action oriented

This proposal (table 3) was developed through a dialogic process with- in the EduSTA consortium, ensuring that it was aligned with the views of teachers and experts while being grounded in literature. Although feedback was gathered from various sources, the consortium focused on creating a coherent set of operationalizable competences. This proposal served as the starting point of the design process of the badges, which is summarised the next chapter and thus set the ground for the entire Sustainable Future Educator badge constellation later described by Ruhalahti & Asikainen.

Designing the Badges – Process and Reflections

Eveliina Asikainen, Tampere University of Applied Sciences

The work described in previous section provided the starting point for designing the digital open badges. In this section we first describe the main phases of the design process and discuss the negotiations that took place during the process. The process has been analysed and discussed more in detail in Asikainen et al (2025) and Verheijen et al (2025).

The designing was conducted in four transnational Badge Design Teams (BDTs) to ensure that educational contexts presented in the project would be represented as evenly as possible in the badge design process, and to provide BDTs with the needed expertise. The main task of the Badge Design Teams was to divide the identified competence areas into small enough competences, describe the competences, agree on assessment criteria and finally, design a demonstration of the competence. The BDTs worked actively from April to November 2023 (Figure 2.) in their own MS-Teams Channels. The BDTs work was supported with the following measures

- an introduction to the principles of competence-based Digital Open Badges (DOBs),
- a timeline and milestones of the work,
- communal meetings,
- a design template following the Open Badge Standard.

Three communal meetings in Zoom environment in April–May 2023 served to share the state-of-art and discuss open questions, peer reviewing, and facilitation and guidance. Moreover, Dr Sanna Ruhalahti provided guidance

on badge-design, and Dr Eveliina Asikainen on questions related to an environmental and sustainability education.

The BDTs submitted their first drafts of the competence objectives, micro-badge definitions and assessment criteria by the end of July 2023. These were reviewed by Eveliina Asikainen to present the first suggestion of the DOB constellation. The names of the badges, which describe teacher's different roles in promoting sustainability were discussed with all BDTs. These discussions BDTs' feedback resulted in some small changes in the names of the DOBs. After that the design work focused on developing the tasks for competence demonstration and curating learning materials alongside with refining competence objectives and assessment criteria. All the designs were finalised by the end of October 2023. After that work continued mainly in national teams to translate the English versions into national languages and prepare pilots. The BDTs revisited the badges after the pilots during November 2024 – February 2025 to make use of the feedback of pilots.



Design Timeline Diagram

YEARS 2023-2024

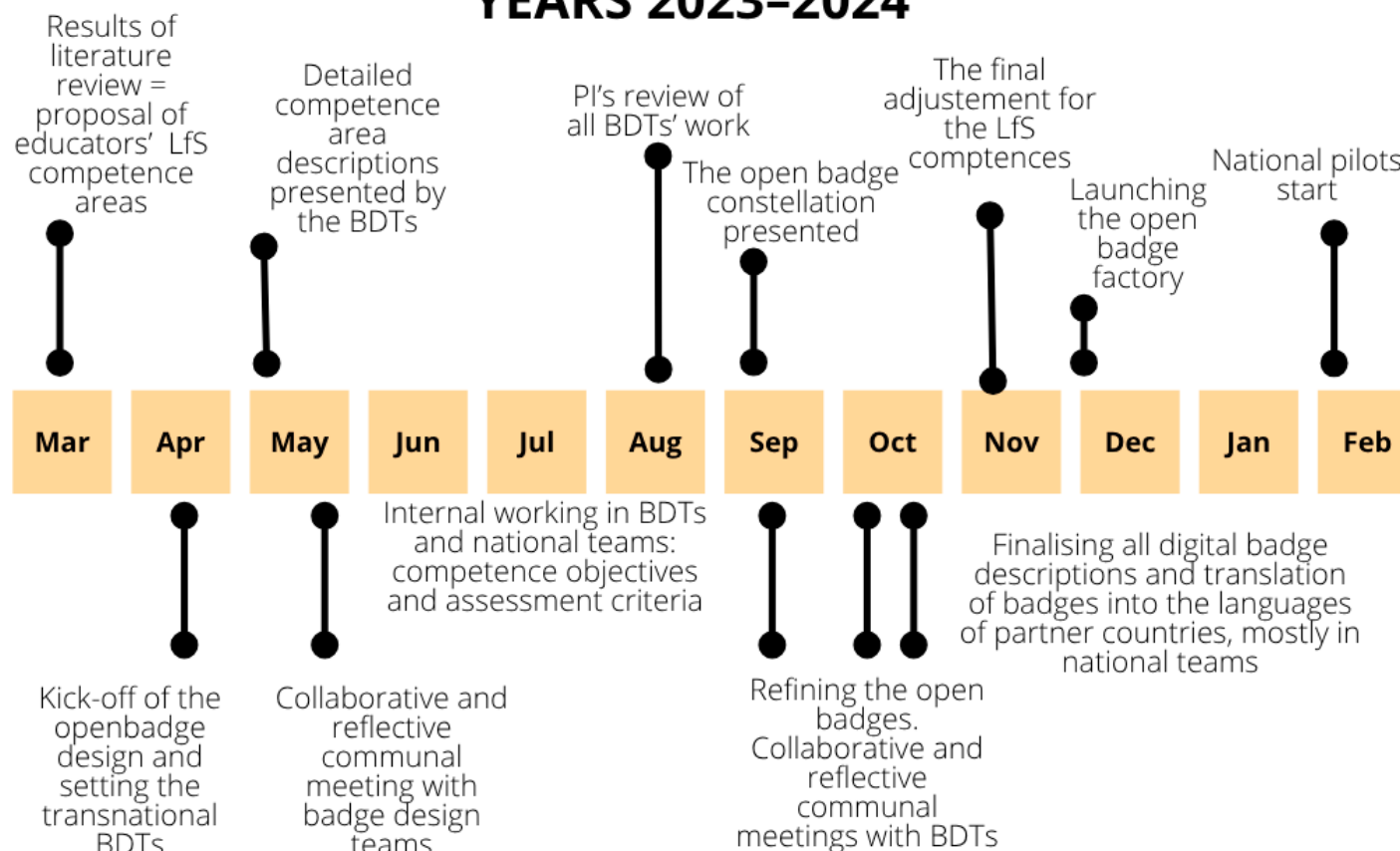


Figure 2. The timeline of the Design Process (Asikainen et al 2025).

Working in Transitional Multidisciplinary Teams

The main task of the Badge Design Teams was to move from abstract definition towards a concrete task description through a step-by-step process described in the design template. This proved difficult despite all support provided in the process. The heterogeneity of the of the group members resulted in a major challenge to find a common language to discuss quite abstract issues like sustainability, pedagogies, and competences. The reasons for this lie in differences in professional backgrounds, level of expertise in Education for Sustainable Development, and language skills.

This difficulty was manifested in the tendency of the discussions in the Badge Design Teams to stay at the level of abstract definitions and concepts. It proved hard for the teams to get to a more concrete level of thinking and to describe everyday practices and situations of teachers' work where the competences could be demonstrated, let alone the ways to demonstrate them. The tension between transformative learning and competence-based learning could also be detected in the discussion. There was some fear that the badges would guide towards shallow learning instead of deep and transformative learning processes. In this discussion, Stephen Sterling's (2014) levels of ESD provided a tool for assessing competence descriptions and making them appropriately demanding. The latter challenge had still to be reconciled with the badge design principles, specifically with the need for the badges to be small and specific.

In addition to the ESD levels, the GreenComp framework (Bianchi et al. 2022) provided a tool to discuss the competences required of teachers in order to help their students acquire the GreenComps. For example, the discussions in the team responsible for the Sustainability Literacy badges started with the question of what teachers should know about sustainable development and sustainability, whereas the final badge descriptions deal with questions of how teachers should connect and use sustainability related knowledge in their work and how they should deal with uncertainties and contradictions in SD knowledge in their work in order to facilitate Learning for Sustainability as described in GreenComps. This presents a shift towards the competence of integrating knowledge into teachers' work and dealing with knowledge(s) and knowing.

Finally, understanding and following the badge design principles themselves caused some confusion. The metadata of digital open badges (DOB) should provide a detailed description of the competence criteria, including the evidence required in the form of a practical task that fully engages the applicant's potential, and the criteria should specify the level of difficulty, and the evidence required to demonstrate competence (Brauer et al., 2018).

A shift towards the competence of integrating knowledge into teachers' work and dealing with knowledge(s) and knowing.

In addition, the level of the challenge should vary in complexity and scope, rather than increasing linearly, to maintain and cultivate student interest (Brauer, 2019). One reason why meeting these criteria was demanding was that the designed badges should be applicable both in initial teacher training (ITE) and in professional development programmes of teachers. Students in ITE don't have the same possibilities for demonstrating their competences as teachers working in schools and this had to be taken into consideration in the assessment criteria and competence demonstrations.

In addition to the structured process, feedback and facilitators' interventions, the BDTs created their own ways to help in proceeding towards a shared understanding: reading shared literature, coining definitions in Padlet, and making mind maps. In addition, some national teams discussed the progress of different BDTs between the meetings and produced analyses of the relations of the competence areas and of possible overlaps. Nevertheless, discussing abstract issues in a foreign language in a manner that ensures all participants are heard equally proved to be very challenging.

Insights from the Badge Design Process

Based on our experiences, we have been able to identify three essential features that enabled a successful badge design process in EduSTA project. These could provide guidelines also in other processes aimed at operationalising abstract competences.

First, we had expertise in both the subject matter and of the design of digital open badge-driven learning process. Second, a process of regular peer feedback and expert support, both on the substance and on the process, helped to transform the confusion and frustration caused by the heterogeneity of team members into a thorough shared understanding. Third, setting milestones and providing a design template the process supported the process strongly. In addition to these, strong commitment and leadership was needed to guide the teams through the process in a manner that respected their work and yet did not compromise the rigorous principles of transformative learning or of competence-based learning. Regularly gathering and sharing questions and ideas with the entire project team was crucial. This approach enabled teams to focus on their specific competence areas while understanding how their work integrates with the overall competence.



The Badge Constellation

Sanna Ruhaalahti and Eveliina Asikainen, Tampere University of Applied Sciences

The areas of the four core competences outlined in the previous chapter needed to be operationalised with structured pathways. The EduSTA project addressed this need by focusing on the reskilling and upskilling of educators to ensure that they are equipped to develop a sustainably competent workforce. Therefore, the primary objective of EduSTA was to co-create digital badge-driven pathways with a collection of micro and milestone badges and a meta badge for sustainable future educators, forming a comprehensive set of badges that reflected the project's commitment to sustainability and educational excellence.

Focusing on the reskilling and upskilling of educators to ensure that they are equipped to develop a sustainably competent workforce.

Competence-based badges can be used as individual open badges or to compose sets of badges, i.e. badge constellation. Usually, open badges are divided into different themes to form a constellation of badges and con-

nected badge families (Brauer, 2019). The user interface of open badges (Open Badge Passport, <https://openbadgepassport.com>) also allows for the sharing of completed badges e.g. for Europass (<https://europass.europa.eu/en>), or different social media platforms such as LinkedIn or Facebook. The badge management platform (Open Badge Factory, <https://openbadgefactory.com/en/>) allows sharing badge constellations between organisations, thus enabling the stackability of badges (see Recommendation of European approach to micro-credentials EU, 2022). Digital open badges can be used to concretise and break down competence sets into practical, smaller activities. In this way, they can be used to support and encourage the educator's professional development.

The design of the badge constellation in the EduSTA project involved the creation of a structured collection of digital badges representing different competences in ESD (see Table 1). The open badge design was carried out in transnational badge design teams using a specific template to co-design the badges, and teams were using it as a guiding document. The development process followed Brauer's (2019) suggestion that the badge architecture should be designed in such a way that the metadata attached to the badge provides the necessary information for viewers to estimate the value and type of badge. The badge graphic design was provided by TAMK UAS.

For the development of the competence-based badge constellation, the EduSTA project team carried out an extensive context and competence analysis. The result of this analysis was the basis for the development of the competence-based badge constellation design. The main objective was to co-create a collection (badge constellation) of micro-badges, milestone badges, and a meta badge for the sustainable future educator. The constellation includes one meta badge, four milestone badges and nine micro-badges. These defined milestone badges are Sustainability literacy competence, Learning ecosystem design competence, Enabling action competence, and Reflective competence (see Figure 3).



Figure 3. The badge constellation of educator's sustainable competences.

The creation of digital open badges was an iterative process, incorporating extensive feedback from all participants involved in the pilot programs. Following the completion of the pilots and the subsequent survey analysis in January 2025, the Badge Development Teams (BDTs) convened to refine and enhance individual micro and milestone badges. This re-development process began with the English versions and was subsequently extended to other languages.

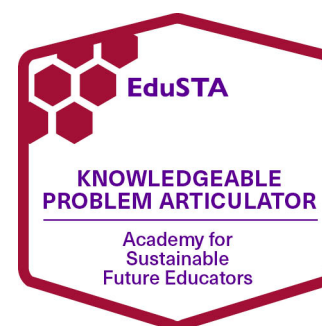
The badge constellation developed by the EduSTA project is vital for enhancing teachers' competences in sustainability. This constellation provides structured learning pathways, allowing teachers to systematically develop their skills through smaller, manageable badges. This approach not only offers flexibility and accessibility, enabling teachers to learn at their own pace, but also provides tangible recognition of their achievements, which can be shared on professional platforms. In sum, the badge constellation

is a powerful tool for supporting teachers' professional growth, motivating them, and ensuring their competences are acknowledged and valued at a broader level. The following sections present in more detail the micro-, milestone-, and meta badges developed.

Sustainability Literacy



The **Sustainability Literacy** milestone badge proves that the educator uses knowledge in a responsible way to further Sustainable Development through education. It is critical to note that this milestone badge does not measure (alone) teachers' knowledge about sustainable development and sustainability, but their ability to use the knowledge in their work. The milestone badge contains three micro badges: Knowledgeable problem articulator, Critical developer, and Complexity embracer. The micro-badges form a three-step pathway towards using more complex issues and taking them into teaching. Two of the three micro-badges have to be gained to reach the milestone badge.



Knowledgeable Problem Articulator understands the background and purpose of Sustainable Development and its interconnection to Education for Sustainable Development (ESD) in teachers' own educational context(s) and professional practices. This can be demonstrated by presenting understanding of the interconnection between sustainable development, ESD and their educational context(s), identifying examples of how they could connect sustainability related content in their educa-



tional context and work, pointing out obstacles that hinder them doing so, and reflecting the competence demonstration process.

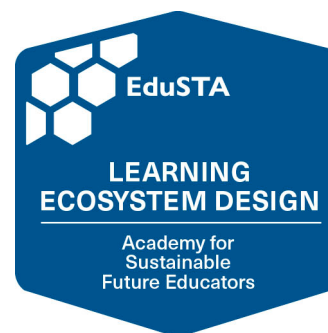
Critical Developer uses knowledge related to sustainable development, sustainability competences, Education for Sustainable Development, and guiding policy documents on implementing sustainable development in education to critically develop teaching or curricula. To demonstrate this, the badge applicants should present at least one reliable source of information in sustainability knowledge and justify the use of the source as part of their course or lesson, compare their course plans with guiding documents on implementing sustainable development, sustainability competence frameworks and/or ESD (e.g., in national curriculum and the learning resources of this badge), present changes or additions to develop your plans to better meet the requirements of the above-mentioned documents and consider possible reasons of uncertainty and contradictions in information and needs for updating information sources



Complexity Embracer is aware of and acknowledges complexity in their professional/daily practice. Teachers discuss and reflect upon uncertainties and contradictions with colleagues, students, and the community. To demonstrate this, they should design and facilitate a conversation that supports methods to create holistic broader perspectives on complex sustainability issues and report the situation with reflections on moments when embracing complexity was

practiced or evoked and on their role and attitude as a facilitator of complexity awareness.

Learning Ecosystem Design

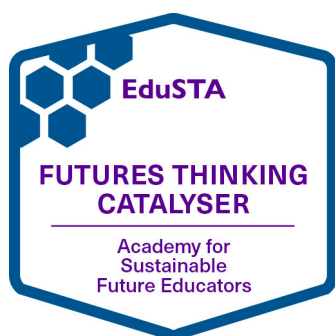


The Learning Ecosystem Design milestone badge proves that educator designs learning environments and processes that facilitate the development of Green Comps. During the design process we chose the three Green Comps which we regarded as the most important in developing any students' Learning for Sustainability. These were systems thinking, futures thinking and value awareness. Thus, the Learning Ecosystem Design milestone badge contains three micro badges: Systems Thinking Promoter, Futures Thinking Catalyser, and Value Awareness Supporter. To earn the Learning Ecosystem Design Milestone Badge, educators must achieve at least two of the three micro badges.

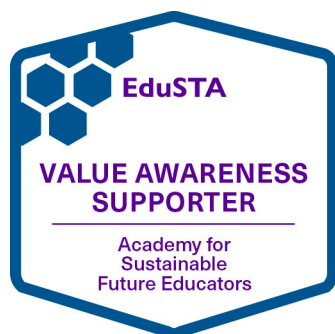
These three micro-badges share the logic of designing learning environments and processes that facilitate the development of Green Comps. The idea is to provide the applicant with possibilities to choose competences which best relate to the contents of their teaching. The potential options are as follows:



Systems Thinking Promoter can design teaching and learning processes, utilize learning environments, and implement pedagogical methods which help students to grasp the systems.



Futures Thinking Catalyser can design teaching and learning processes, utilize learning environments, and implement pedagogical methods that facilitate student's futures thinking.



Value Awareness Supporter can design teaching and learning processes, utilize learning environments, and implement pedagogical methods that help students to identify, evaluate, and reflect upon their values. Respectively, in each micro-badge the demonstration of the competence is to deliver a pedagogical manuscript or lesson plan for the learning process that supports students' competence of systems thinking, futures thinking or value awareness, and to justify and reflect the pedagogical choices described in the lesson plan.

Enabling Action



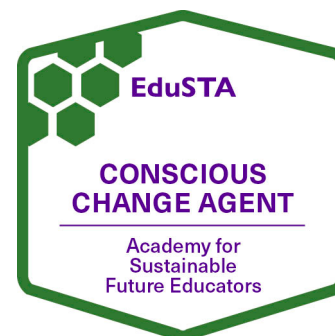
The **Enabling Action** milestone badge proves that the educator organises collaborative communal action and facilitates the development of students' agency. The Enabling Action milestone badge contains two micro badges: Active Collaborator and Action Facilitator. With this solution, we want to emphasize the dual nature of this competence area. First, the teacher should be capable of taking action and collaborating for sustainability as a member of the educational institution and even beyond it. Second, the teacher should find ways to encourage their students' agency. However, we know that taking both of these roles may not be possible in all positions or contexts. Thus, to earn Enabling Action Milestone Badge, the educator must achieve one of the following two micro badges:



Active Collaborator co-operates to strengthen communal action for sustainable future. This can be demonstrated by describing a sustainability challenge of their choice, as well as the action they have taken or are about to take, explain who the relevant collaborators for the challenge are, and why and indicating that they have taken the first steps towards the action plan.



Action Facilitator creates to their own students learning opportunities where they can take initiative and practical action to promote sustainability together with relevant collaborators. This is demonstrated by describing the learning opportunity that encourages students to take action outside their learning community, the ways of encouraging the students to take action in these environments and how this trigger and supports sustainable future and presenting the actual assignment given to students and its relation to acting for sustainability.



Conscious Change Agent reflects on the institutional and professional policies and practices and strives towards continuous personal and institutional learning in ESD by using tools of reflection in ESD to promote changes addressing challenges with hope and anticipation. This means that reflection leads to reflexive action. To do this the badge applicant should reflect the institutional policies related to ESD practise in their context, envision sustainable changes and ways to work for them and explore alternative courses for more sustainable action and hopefulness together with their colleagues.

Reflexive Praxis



The **Reflexive praxis** milestone badge proves that educators learn purposefully from their actions to improve in a dialogue with community, society, and science. During the design process we concluded that this competence area cannot be broken down into smaller micro badges. Thus, the Reflexive Praxis milestone badge contains one micro badge, Conscious Change Agent. To earn Reflexive Praxis Milestone Badge, the educator must achieve only one micro badge.

Sustainable Future Educator Meta Badge



To earn the Sustainable Future Educator meta badge, educators must have earned all milestone badges (4). This means that they have earned at least two Sustainability Literacy badges, two Learning Ecosystem Design badges, one Enabling Action badge, and one Reflexive Praxis badge.

Piloting Digital Open Badge-Driven Learning Pathways

Eveliina Asikainen, Tampere University of Applied Sciences

All partner organisations piloted at least one micro-badge in 2024. The pilots can be divided in two categories: 1) Pilots organised in as part of Initial Teacher Training (ITE), and 2) pilots organised as part of professional development or as a part of Vocational Teacher Education programme for participants with professional background. Open Badge Factory (OBF) was used as the piloting platform of the badging process. This section is based on the report of the Piloting Work Package and presents first the quantitative results of pilots and then discusses separately the ITE pilots and professional development pilots. The section ends with the general conclusions and reflections on piloting. Another section of the book, Partner experiences and reflections, provides insights into pilots written by each partner organisation.

The Extent of Piloting

Altogether 276 individuals participated in the pilots (table 4). 181 of them earned at least one badge, and total of 575 digital open badges were issued (table 5). This included 23 Sustainable Future Educator meta badges, 201 milestone badges and 351 micro badges.

Table 4. Number of individuals participating in the pilots in different countries.

Pilot	Number of participants in the pilots who received at least one badge	Number of participants who enrolled to the pilot
Catalan	13	13
Czech	68	122
Dutch	29	29
Finnish	52	93
Sweden	19	19
Total	181	276

Table 5. Issued Digital Badges in the pilots of EduSTA 2024.

Language of issued badges	Catalan (Spain)	Czech	Dutch	Finnish	Swedish	English	Total
Sustainable Future Educator (Meta badge)			5	18			23
Sustainability Literacy (Milestone badge)			7	27			34
Knowledgeable Problem Articulator (micro-badge)			10	35	19		64
Critical Developer (micro-badge)			3	22			25
Complexity Embracer (micro-badge)			4	12			16
Learning Ecosystem Design (Milestone badge)			7	25			32
Systems thinking promoter(micro-badge)	7		2	21			30
Futures Thinking catalyser (micro-badge)			7	26		11	44
Value Awareness promoter(micro-badge)			7	17		12	36
Enabling Action (Milestone badge)			6	26			32
Active Collaborator(micro-badge)			2	13			15
Action Facilitator (micro-badge)			4	14			18
Reflexive Praxis (Milestone badge)	13	56	7	25		2	103
Conscious Change Agent (micro-badge)	13	56	7	25		2	103
Total badges	33	112	78	306	19	27	575

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The country-specific figures provide insight into the piloting arrangements of partners. University of Girona focused on piloting System Thinking Promoter and Conscious Change Agent embedded in ITE courses. The Czech University of Life Sciences Prague piloted Conscious Change Agent also and issued 112 digital badges together while, the University of Gothenburg in Sweden, focused on piloting Knowledgeable Problem Articulator digital badges. The Dutch partner, Hanze University of Applied Sciences, tested all the digital badges as part of its professional development project of the personnel of Hanze University of Applied Sciences and finished with the badge amount of 78. Tampere University of Applied Sciences (TAMK) piloted the digital open badge from the constellation in three different settings: the personnel of Tredu VET college (an associate partner of the project), personnel of TAMK and two other universities of applied sciences, and an elective pedagogical course for VTE students in TAMK's Programme of Professional Teacher Training. These pilots concluded with 306 badges. In addition, all together 27 micro badges were issued in English in the Czech and Dutch pilots. The meta-badge badge Educator for a Sustainable Future was earned by five participants of the Dutch and 18 participants of the Finnish pilots.

Pilots in Initial Teacher Education Programmes

The badges were piloted in Initial Teacher Education programmes by the Catalan, Czech and Swedish partners.

University of Girona (UdG), Czech University of Life Sciences (CZU) and University of Gothenburg (GU) piloted the badges as part of their Initial Teacher Training (ITE) programmes. In UdG, two digital open badges Conscious Change Agent and Systems Thinking Promoter were embedded into the pre-existing second-year Primary and Early Childhood courses. The Conscious Change Agent badge was embedded in the course Geography in a Changing World, and Systems Thinking Promoter was embedded in the course, Scientific and Environmental Education Proposals for School. Applying the badge was not part of the assessment of the course, but the course contents and pedagogical arrangements guided the students towards the competence objectives. Because of the voluntary nature of the

badge and the fact that the course was situated towards the end of the term only 13 students (out of 33) applied and gained the Conscious Change Agent badge. 13 student (out of 33) applied for the Systems Thinking Promoter badge, as well, and eight were successful. Seven applications were returned for revision due to a lack of specificity in the proposals or the lack of depth in the reflections required to obtain the micro-badge.

At CZU, the target group of piloting was 89 future VET teachers two study programmes. Altogether 70 badges were gained through the pilots The badge Value Awareness Supporter was piloted as part of the Czech bachelor study programme Pedagogy for Teachers of Practical Training and in the lifelong learning programme Concurrent Pedagogical Study for CZU Students. From a total of 27 second year VET teachers 12 successfully earned this badge, which was an additional competence demonstration. The badge Conscious Change Agent was incorporated into an undergraduate BSc course titled Pedagogy for Teachers of Practical Training and it was integrated to an existing subject titled, School Pedagogy. In these courses, the badge application process was embedded in the courses as an exercise or activity that was part of the completion of the course, 58 out of 62 students earned the badge.

In GU, the badge Knowledgeable Problem Articulator was piloted as part of the course called Development, Work and Action Research for vocational teachers. This course is certified as sustainable, making it suitable for the EduSTA pilot. The course engaged VET student teachers from various sectors like IT, healthcare, agriculture, and more, helping them integrate sustainability into their teaching practices. A total of 19 VET student teachers participated across the two pilot phases (December 2023 and June 2024). All of them earned badges.

In all pilots in ITE programmes it was crucial to match some badges to existing courses in the curriculum. In the Swedish case the university's sustainability certification facilitated this process, in others it demanded from teachers' good knowledge of the curriculum and of the designed badges. Still, there were challenges in understanding the task for demonstrating the competence and the assessment criteria. Also, incorporating the badges

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demanded quite comprehensive redesign of the courses (see the Catalan and Czech partner experiences).

Another crucial phase was translating the badges in the local languages and finding supporting local materials in addition to the study materials listed in the English versions. On the other hand, the teaching personnel gained a better understanding of teachers' sustainability competences and their applicability through this process.

For the Catalan, Czech and Swedish partners this was the first time applying digital open badge-driven learning in ITE. Both teachers and students had to learn how to use new platforms and technologies. At least some Czech students were a little hesitant of the technology in the beginning.

Moreover, the practice-oriented competence demonstrations of the EduSTA badges presented a challenge for applying the badges in ITE. Still, for example the Catalan students were enthusiastic after they had successfully completed the courses, and most of them expressed that they had a deep understanding about the meaning of sustainability, and they had enjoyed the practical approach as well as the close support from the teachers. A student reflected: "This vision of systemic thinking makes you realize that easy answers always leave things out."

Pilots in Professional Development Programmes

Hanze University of Applied Sciences (Hanze) and Tampere University of Applied Sciences (TAMK) offered the entire constellation in their pilots. Hanze organized a face-to-face in-service learning module called ESD Atelier. Fourteen participants took part in the Hanze pilot. Additionally, there were people who obtained the badges independently and self-paced. In total 29 persons applied for one or more badges, a total of 46 micro-badges were successfully applied by the Dutch participants and the independent applicants, and five participants gained the meta badge Sustainable Future Educator. TAMK provided a digital platform with various levels of coaching for teaching personnel of TAMK, Tredu Vocational college, and students of Professional Teacher Training. Altogether 187 micro-badges were gained in

the Finnish pilots. The exact numbers are presented in the Finnish Partner Experiences Chapter.

The ESD Atelier was a track for teacher/ educational professional development in which a group of professionals committed themselves to attend seven meetings and to work on this subject in between the monthly sessions. The meetings were designed by the EduSTA members, based on the badges, to let colleagues walk the talk in a hands-on training aimed at integrating the education for sustainability in their own educational setting. Creative and critical dialogue were stimulated, sprouted from the knowledge that this is what helps transformative learning, and by giving participants autonomy and purpose. By defining their own learning goals their learning process was based on intrinsic motivation. Support on the badge constellation followed the format, consisting of hybrid – in person and online – learning, flexible structure, and coaching on demand.

The TAMK pilot was organised around creating a ThingLink landing page (Figure 4) with information on the constellation, individual badges, short videos guiding in the process of demonstrating competence and links to Open Badge Factory. The ThingLink was embedded in each target group's Moodle. Additionally, there was a tailored coaching programme for each target group.



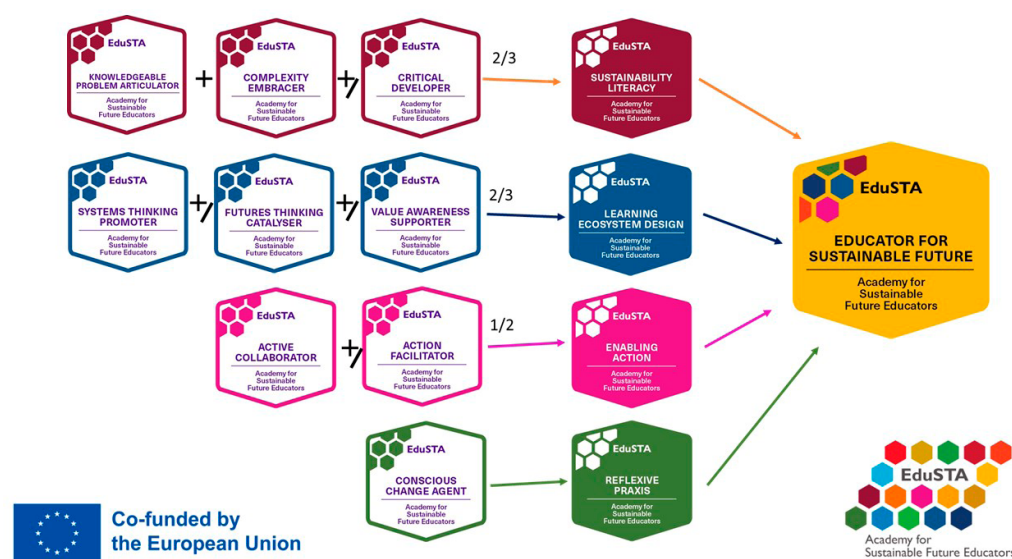


Figure 4. The ThingLink landing page.

Offering the entire constellation provided valuable insight to how the micro-badges work as parts of a whole. The pilot evaluations show that the combination of badges lead the participants to reflect on their sustainability competences from various, complementary perspectives. On the other hand, it is important to make the entire constellation and the interconnectedness of the badges visible from the beginning. Understanding the big picture helps participants get started and to see the micro-badges as pieces of a more holistic picture. This also helps them verbalize and demonstrate the different aspects of their sustainability competence.

The Dutch and Finnish pilots differed greatly in the chosen approach to organise digital-open-badge-driven professional development. While the Dutch process offered a great amount of interaction and demanded com-

mitment, the Finnish processes were based more on digital learning environments and coaching. Still, both approaches share the idea that competence-based learning and DOBs create a possibility for the participants to study and develop their own work, learn from their peers' experiences and get a recognition of their competences. In the Finnish pilot, attracting people to get started was one of the main problems. With the personnel of Tredu Vocational College this was solved by allocating some working time – two days – for participating the coaching. The teacher students were credited 5 ECTS for completing the Meta Badge. Anyway, more tools are needed to raise commitment to badges.

It should also be mentioned that the Dutch and Finnish contexts of using DOBs in professional development of teachers differ markedly. In Finland, DOBs have been used and researched as part of teachers' professional development already more than 10 years (Brauer, 2025) and they are a formal part of professional development in TAMK (Tapani et al., 2025). Thus, at least some participants of the Finnish pilots were already familiar with the logic of DOBs. Quite the contrary, the Dutch educators, in general, are not accustomed to receiving formal recognition by badges for their professional development, which may hinder the implementation of digital badges across educational settings. On the other hand, some Dutch participants were curious to experience what it is like to apply and obtain a badge and

The participants valued the possibility of learning through developing their own work as well as the possibility to contextualize and connect ESD knowledge with their own field and subject matter.

gain recognition for their competences. In both pilots, there were some very motivated and experienced participants who earned the meta badge very fast. This demonstrated how prior experience, and motivation can accelerate the process.

In both countries the participants valued the possibility of learning through developing their own work as well as the possibility to contextualize and connect ESD knowledge with their own field and subject matter. They also valued conversations and teamwork with colleagues, including those from different subject areas. The main challenges included articulating abstract knowledge and previous competences, narrowing the focus, and ensuring

The badge constellation has succeeded in one of the major goals of the EduSTA project: operationalizing ESD competences.

that all evaluation criteria were met in the competence demonstration. According to one of the Finnish participants (Davis & Asikainen 2025):

It was fun but it was very challenging to figure out how to package it, how to make your competence visible and put it into words. And it was great to have it evaluated by an expert.

These pilots proved that the badge constellation lends itself very well for vocational, professional and academic professional teachers' continuous learning purposes. The various professional fields that the pilot participants represented provide rich context and material for sustainability competence demonstration. It can also be concluded that the constellation was successful in offering our participants the opportunity to leverage their zone of proximal development and approach the competence development from where they currently stand.

Lessons Learnt in Pilots

The structure of constellation and individual badges

The pilots' implications for the need to revise the badge constellation were discussed in three communal meetings of EduSTA consortium in November–December 2024. These meetings included sharing pilot experiences and discussing the necessary improvement to make the constellation easier to implement. Also, expert intervention on badge design provided help for the refining process.

The general result based on both pilot organizers' experiences and on participant feedback was that the badge constellation has succeeded in one of the major goals of the EduSTA project: operationalizing ESD competences.

From badge design perspective, the pilots proved that the constellation describes competence objectives, assessment criteria, and tasks for demonstrating the competence in a consisted manner. Still, some minor needs for alignment and development were identified relating to

- checking the alignment of competence objectives, assessment criteria and demonstration of competence
- checking some possible overlaps of competence areas
- using plain language

making some competence demonstrations more AI proof.

From the standpoint of applicability, the pilots demonstrated that the constellation can be successfully applied to various teacher educational contexts. Both organisers and badge applicants found the constellation is motivating, even though getting started with digital open badge driven learning caused some confusion for learners. From organiser perspective, it is critical to find a suitable course in the ITE curriculum for embedding the badges. In professional development, the most difficult issue is to find time for the teachers and get them started. Once engaged, they were motivated and found that the badges serve as a tool for developing both their competences and their work.

Applicability of badges in different contexts

The primary institutional challenge in applying the badges in ITE (Catalan, Czech and Swedish pilots) was integrating or embedding them into existing courses. Partners had to find suitable course(s) matching the competence criteria for a badge. Also, the traditions of course arrangements or evaluation practices needed to be negotiated. On the other hand, looking at a course through the competence criteria provided a lens for pedagogical development of the course to serve better the development of sustainability competences. Further, the course design canvas designed by the Dutch team in WP3 facilitated the pilot design.

The solutions of integrating badges differed as well. In Czechia, the badge was a compulsory assignment before attending the final examination. In Sweden and Catalonia, students had an opportunity to apply the badge after completing the course. These practices affected the number of badges gained, and the experiences can be used in course development.

The ITE pilots hint to the conclusion that courses related to teachers' sustainability competences using micro-credentials should be situated towards the final years of studies, as implemented by the Czech and the Catalan teams. At that point students should have some experience of different kinds of school environments and they are able to at least imagine how to apply the competences in practice.

The Finnish pilot for VET teacher students presents a bridging arrangement between the ITE pilots and professional development. In this optional pedagogical course, the students needed to complete the meta-badge to pass the course. This presents a solution applicable e.g. in Open University contexts.

The Dutch and Finnish professional development pilots were focused on vocational teachers and academic personnel. These pilots confirmed that with institutional support (Treda, worktime allocation) or personal commitment (Hanze) digital open badges can provide an effective tool to combine personal professional development and processes of developing ESD

in educational institutions. At the same time, the fact that the Czech team could not recruit in-service teachers and NGO personnel to pilot the badges describe challenges related to the lack of certification of teachers' sustainability competences and to the limited time that teachers can use for their professional development.

From organiser perspective, it is critical to find a suitable course in the ITE curriculum for embedding the badges.



Transformative and Competence-Based Learning Shake Hands Through Digital Open Badges

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Jaume Ametller Leal, University of Girona

One of the major challenges of any project is how to sustain the results and develop them further. In EduSTA, we tried to keep this in mind from the beginning. The two major routes are either to embed badges in Initial Teacher Education programmes or to create professional development opportunities based on the badges. Moreover, Securing the maintenance of the digital infrastructure for the badge constellation is essential for continuation.

Using Badges in Initial Teacher Education

The experiences of piloting the badges as part of initial teacher education show that the badges provide a useful tool to analyse an ITE curriculum from the perspective of teachers' sustainability competences. Thus, they can be used as a lens in curriculum development work to find the possibilities for integrating sustainability competences in courses. In Czechia and Catalonia, the pilots have resulted in embedding the piloted micro badges permanently in the curricula. Moreover, TAMK has embedded two micro badges in the Professional Teacher Education curriculum even if they were not piloted in the project.

The pilots demonstrated various methods of utilizing the badges. In the Czech pilot, the badge was a compulsory task of the course and had to be

completed before taking the final examination. The other approach is to have a course assignment which is in line with the chosen badge, but have the badge as a separate, extra-curricular activity. The first approach integrates the badges more tightly in the curriculum and serves to introduce the world of competence based digital open badges to the students. It also demonstrates the organisation's commitment to competence-based education. The second approach lets the students decide whether they see the value of badges. It can be suitable for situations where the students have a lot of freedom in their tasks.

The badges provide a useful tool to analyse an ITE curriculum from the perspective of teachers' sustainability competences. Thus, they can be used as a lens in curriculum development work to find the possibilities for integrating sustainability competences in courses.

Possibilities for Professional Development

The pilots organised by Hanze and TAMK provide a good view of the broad possibilities to use the badge constellation in Professional Development Programmes for teachers. Badges can be part of an intensive programme like the SDG Ateljer or provide the outline for a coaching scheme with different levels of on-site or on-line coaching as in the TAMK pilots. Also, various digital learning environments or platforms can be integrated into coaching. Moodle, MS-teams and Thing Link were used in the Finnish pilots,

but other could be useful as well. Badges provide also the possibility for individual paths. At least TAMK and the University of Girona are embedding the badges as part of the university personnel's continuous professional development offering.

In life-long learning, badges provide a good outline for planning online courses. The Finnish and Czech partners have developed this opportunity.

Measures for Securing Continuity After the Project

The products of the project are threefold

1. The community "Academy for Sustainable Future Educators"
2. The new and more practical understanding of teachers' sustainability competences that can be applied to any teacher education programme
3. The badge constellation that can be used as a vehicle for recognizing and demonstrating competences.

The community of "Academy for Sustainable Future Educators" exists way beyond the project consortium. The most obvious manifestation of it is the EduSTA LinkedIn profile with over 800 followers. After the project, this community will serve with posts on how the results have been applied and what kinds of outcomes have grown from the project. It will also provide a platform for informing about yearly webinars on the developments based on the project.

The development work on defining teachers' sustainability competences can benefit all institutions providing initial teacher education or professional development programs for teachers, even if they wouldn't be interested in applying digital open badges. To ensure an open access to the badge descriptions, they are published in the Finnish Library of Open Educational Materials aoe.fi. <https://aoe.fi/#/materiaali/4994>

The digital service infrastructure for the EduSTA Badges will be provided by TAMK after the project, and TAMK collects fees to cover the costs of the infrastructure. All the partners can use badges in the piloted form for a year,

and in the full content after they have purchased pro-license of OBF. Third parties can use the badges after attending training organized by TAMK for using the Open Badge Factory and for assessing the badges provided that they have a pro-license of the OBF. A Manual including the terms-of-use and providing guidance for using OBF and the badge constellation is published on the project web site.

The development work on defining teachers' sustainability competences can benefit all institutions providing initial teacher education or professional development programs for teachers.

Conclusion – EduSTA Badges Open New Avenues

EduSTA has shown that micro-credentials and digital open badges offer a useful tool to promote personalized pathways of professional development and accreditation. At the same time, we acknowledge that micro-credentials are designed as an individual accreditation tool, while transformative Education for Sustainable Development relies on collective decisions and actions. The tension between transformative learning and demonstrating competence as small "micro" badges was recognized already in the planning phase of the project. It resonates with concerns about whether the measurement of knowledge and skills can sufficiently capture the entity of professional and human growth (Fan et al., 2024). During the design process this concern was communicated more specifically through Sterling's (2014) levels of Education for Sustainable Development while Bloom's taxonomy assisted in negotiating the level of competence objectives and innovating ways of performing the competences.

During the badge design process, the members proceeded iteratively in creating a collective understanding of the competence-based approach, and of the subject knowledge. The phases of the badge design process show how challenging it was to adjust thinking to a “micro” level and to meet the requirements to clearly indicate the competence it represents (Asikainen et al. 2025). In the end, the design process succeeded in combining transformative and competence-based approaches, and piloting showed that the developed approach is applicable to many teacher-educational contexts.

In all, the EduSTA project has developed a new approach to empowering teachers as change agents in sustainability. The EduSTA badges recognize and underline the importance of pedagogical choices and other actions of teachers. Previously, strengthening the knowledge base of Sustainable Development has been seen as a key to addressing the lack of confidence experienced by teachers (for example Karvonen, et al., 2023). However, focusing on competences and competence demonstrations offers tools to move away from privileging content development over learning processes, local issues and values-based education (Wals et al. 2022). Further, the nine competences of EduSTA badges help to see teachers’ roles as a promoter of Learning for Sustainability with the students, in the school community and in society (Asikainen & Tapani, 2021; Sleurs, 2008; Timm & Barth, 2020). Some pilots have already shown possibilities for fostering collective empowerment and action in schools. Still, developing this dimension would be a natural next step for work.

At the same time, this process has opened up questions relating to the theoretical background of ESD and proposals for new avenues of research and development.

- The first notion has to do with reappraising the theoretical ideas on, and around, sustainability, that constituted the basis for ESD four decades ago. These ideas have changed and developed and though they have had an impact on the thinking behind policy, a deeper discussion within the ESD community about these changes should help us reframe the aims, processes and competences of ESD in fundamental ways.
- The second issue refers to better interconnecting the elements refer-

ring to values, knowledge, and action in ESD frameworks and in teachers’ sustainability competences. Research on how these elements relate to each other would foster a better understanding of how to develop these competences and, particularly, how to mobilise them by individuals and collectives. This knowledge would be, in turn, instrumental in informing decisions about ESD, within schools and in connection with societal initiatives.

- The third issue is more practical. The EduSTA digital badge constellation has proven to be flexible enough to be applied at different stages of professional development. At the same time, we have observed issues in applying some of the competences especially in initial teacher education.
- Finally, we are mindful of that we have developed our work within the EU, but the challenges of ESD are global. Hence, our last reflection on future work is this, the need to put the EduSTA results to the test outside the EU and to enrich it and transform it so that it could be useful for educators everywhere.

In conclusion, the developed competence based digital open badges present an avenue to make Education for Sustainable Development, bite size for the teacher needing an accessible road into developing sustainability competence. The Sustainable Future Educator Constellation serves also as starting point for more collective approaches based on whole-school-approach and offers a conceptual framework for reappraising conceptions of ESD to meet present and future challenges.

Final Reflection – The Transformative Power of EduSTA

EduSTA may be ending as a project, but we are starting something new. We have succeeded in verbalising what it takes to know and do – and to be – from a teacher to promote students’ sustainability competences. During doing so, we have transformed into teacher educators who can do this. We have seen the same transformation happening in the participating teachers. We have witnessed new networks being created and teachers joining together to change their educational organisations. We are proud of this, and we will continue to expand this community.

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Part 3

Partner Experiences and Reflections

The Finnish Experiences – Understanding That Teachers’ Sustainability Competences are Part of any Teachers’ Competences

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When the EduSTA project received funding in February 2022, the people who had written the plan were happy and excited – of course. Yet, the topic was quite specific and combined two tracks of expertise in the School of Professional Teacher Education: expertise in digital open badge driven education and micro-credentials, and expertise in education for sustainable development. Thus, in the early phases of the project also the TAMK team had to get to know each other’s perspectives and learn from one another.

The core of Education for Sustainable Development is to choose and develop pedagogies which enhance students’ sustainability competences or even demonstrate sustainable competences in action.

During the project, the TAMK team has been open about the differing understandings and discussed their views in the team meetings. This article is based on an analysis of the planning documents of the badges (Asikainen et al 2025) and on group interviews of the TAMK team, and it focuses on the learning process that occurred among the TAMK team during the project. A more detailed analysis of the interviews will be presented in Davis & Asikainen (2025). Additionally, the article discusses learning pathway concepts developed during the piloting phase as they demonstrate well the transformative process of those teacher educators who were not very familiar with Education for Sustainable Development before the project. The members of the TAMK team have read the manuscript and have agreed on its contents.

“How is Teaching for Sustainability Different from any Other Teaching? “

In some of the early discussions of the TAMK team, some team members presented the view that Education for Sustainable Development is nothing special or there is nothing such as pedagogies for sustainability. This led to vivid discussion and demanded careful thinking and wording of concepts. Finally, studying the GreenComps in more detail helped the team in arriving in a conclusion that what matters is the purpose of sustainability education. The Finnish bicycle model for climate education that emphasizes the importance of tying together hope, action and knowledge (Cantell et al 2019) was insightful for many teacher educators. Thus, the core of Education for Sustainable Development is to choose and develop pedagogies which enhance students’ sustainability competences or even demonstrate sustainable competences in action. This insight was critical for some later developments.

Experiences of the Badge Design Process

The process of operationalising the competences during the design of the EduSTA badge constellation was a major negotiation process as described in chapter Designing the badges – process and reflections (see also Asikainen et al 2025). Some of the Finnish team members had already expertise

in designing badges in other contexts, but they were the only members of the teams with that experience. Additionally, the context of our teachers' sustainability competences was more abstract compared to other badge design contexts in which these experts had previously participated. Finally, the transnational composition of the badge design teams brought extra challenges in comprehending each other and in arriving in shared conclusions. Thus, all team members experienced some moments of frustration during the process of defining the competences, coming up with assessment criteria and agreeing on the demonstration of competence. Yet, arriving in solutions was very rewarding.

The Finnish team had a feedback discussion in May 2023, when the design process was still under way and in some badge design teams the goal seemed to be far away. At that point, Eveliina Asikainen, the project coordinator, told the team that nobody has ever done anything like this. All other attempts to define the teachers' competences for education for Sustainable Development have failed to operationalise the competences. That's what we are going to do, she added. One of the team members responded: "This is good to hear. When you are giving birth to something, there is some pain. And we are giving birth to something new". Learning how special the project and its goals were helped in bearing the difficulties and the process was gratifying in the end.

The Finnish Pilots

The Finnish team piloted the entire badge constellation in three different contexts and teacher groups: VET teachers of a major vocational education provider, Tredu, VET student teachers studying in TAMK, and teaching personnel of TAMK. All the pilots had same approach: coaching participants in a digital platform. However, the guidance practices varied – as well as recruitment methods and rewards for participation.

The VET teachers were recruited by their employer and the participant were allocated with two working days for participating in the program, which was offered as part of their professional development. The student teachers were offered an opportunity to include the program in their curriculum as

optional study unit of 5 credits, which were awarded upon the completion of the meta-badge. The UAS teachers were participating as a part of the UAS pedagogical development program and were recruited by TAMK team members.

All cohorts were provided with a digital learning environment consisting of Moodle for learning management and a centralized access point to a Thinklinc interactive guide to the Digital Open Badges and Open Badge Factory for badge applications. Additionally, either in-person (VET and UAS teachers) or online (VET student teachers) coaching was available for all cohorts. The coaching sessions started with a kick-off session, introducing the idea of digital open badge driven learning, an introduction to the concept of teachers' sustainability competences, and an opportunity for self-assessment on current competence level. After the kick-off, voluntary coaching sessions for guidance and discussion were offered on a regular basis.

Table 6 presents how issued badges divided between the three pilot cohorts. At the end of the piloting, a total of 187 micro-badges had been awarded to the participants of the Finnish pilots, and 18 participants had received the meta badge "Sustainable Future Educator". The gained badges divided quite evenly between the three pilot cohorts.



Table 6. Digital Open Badges issued in pilots organised by the Finnish team according to the three pilot cohorts.

Micro badge	Badge applications approved	Teachers of TAMK	Teachers of Tredu	Teacher Students of TAMK
Knowledable Problem Articulator	35	7	12	16
Critical Developer	23	7	10	6
Complexity Embracer	12	5	3	4
SUM	70	19	25	26
Systems Thinking Promoter	21	6	5	10
Futures Thinking Catalyser	26	10	6	10
Value Awareness Supporter	18	4	6	8
SUM	65	20	17	28
Active Collaborator	13	2	5	6
Action Facilitator	14	4	3	7
SUM	27	6	8	13
Conscious Change Agent	25	8	9	8
TOTAL	187	53	59	63



Piloting Experiences

The following experiences provide a summary of participant feedback, reflective discussions of the TAMK team as part of pilot reflection and a group interview of teachers and another group interview of selected pilot participants. A more in-depth analysis is presented in Davis & Asikainen (2025).

Both pilot participants and teacher educators agreed that facilitation and guidance are needed to bring abstract knowledge into practice and in recognising and verbalising existing competences. Pilot participants in different phases of their careers benefitted from different kinds of guidance. Some valued help in connecting sustainability competences to their professional field and practice while others appreciated guidance in focusing and narrowing down. This relates quite straightforward to the competence of Knowledgeable Problem Articulator.

Both pilot participants and teacher educators agreed that facilitation and guidance are needed to bring abstract knowledge into practice and in recognising and verbalising existing competences.

The pilot participants found that cutting sustainability competence into smaller items like digital open badges supported learning. The badges helped to identify teachers' different roles in promoting sustainability. Thus, the design helped in focusing and interpreting sustainability competences.

The tasks for demonstrating competence guided to study one's own work, find and demonstrate the connections and to develop teacher practice. The participants greatly valued the possibility to use their own work as learning environment and to connect the recognition of competence with development of curriculum or teaching practice.

The pilot facilitators noticed as well that the participants were motivated rather by professional development than by earning badges. Collaborative learning was effective and rewarding for the participants. They received help and positive push both from the facilitators and their peers. The possibility to receive guidance both during the recognition process and as part of assessment encouraged students in the process even if getting participants to attend the workshops wasn't always easy.

Finally, the pilot facilitators assessed the time needed for planning, guidance and assessment. First, it is important to plan well ahead: create the digital learning environment, plan the meetings and allocate time for assessment. Second, assessment of badge assessment is quite demanding as the contents can deal with very diverse contents and contexts. Here the assessor's own understanding of the competence area is important. Third, collaboration with colleagues makes all this easier. All in all, this was a great learning journey also to the pilot facilitators. This is demonstrated by the fact that some of the facilitators accomplished the meta-badge during the pilot.

From Individual Badges to Learning Pathways

One important innovation during the pilot in TAMK was to combine individual badges into customised learning pathways. Each pathway option combined three or four badges, and the name of each pathway provided the scale or context for developing Learning for Sustainability. The pathways were called

- Innovative Pedagogical Design for Advancing Sustainability in Lessons
- Course Design for Strengthening Sustainability Competences
- Fostering Value Awareness and Reflexivity in Teaching and Guidance
- Cultivating Hope, Agency, and Future Orientation in Teaching and Counselling

The pathways helped teachers to identify concrete areas for improvement in their work and to gain perspective. From the facilitator's point of view, the pathways provided visual scaffolding and tools for advisory guidance. Through them it was easier to bring sustainability competences and pedagogy for Learning for Sustainability closer to UAS lecturer's daily work. In this way, the focus shifted from the completion of compulsory tasks to obtain a badge to the concrete study and development of one's own teaching practice or course design, which was a much more experiential, highly motivating and emotional form of completing the evidence of competence.

The badges had twofold function in assisting the concrete development work. Firstly, they provided framework and structure for starting to view existing practices from the sustainability perspective (or perspectives). Secondly, they served in making the development work visible for supervisors or in curriculum vitae. Pathways strengthened these functions as they showed how to move on using something you had started in one badge as a starting point for another. As a result, the participants did more badges than they had originally planned.

Sparking Local Communities of Practice

One important result of the pilots was sparking local communities of practice. The Finnish context offers two beautiful examples: the teacher educators and the teachers of Tredu Vocational College.

Some phases of the development of the sustainability competence promoting teacher educator community have been described in the beginning of this chapter. During the way it was important that the participating teacher educators could discuss, wonder ask, share and learn. They could test the commonly developed knowledge and practices quite straightforward in the pilots, and at the same time demonstrate their sustainability competences through the badges and get recognition. At the same time, they know that they don't need to know everything. They have developed and demonstrated competences of embracing complexity, collaborating actively and acting as a reflexive change agent in their community. Creating such a community of practice strengthens the possibilities to sustain the results and embed

them permanently in the structures of teacher education curricula and professional development programmes.

The second example comes from the Tredu Vocational College. EduSTA was not the first sustainability-related initiative of this vocational college. Yet, the feeling of empowerment was much stronger than in some previous projects. EduSTA was able to create spaces for peer learning and boost creating a community of teachers who are interested in integrating sustainability more holistically in their teaching practice. The 20 teachers who participated in the pilot have been meeting monthly since the end of the pilot (October 2024).

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Czechia – Open Badges as a Tool for Innovations in Pedagogy

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< At the Institute of Education and Communication of the Czech University of Life Sciences Prague (IEC), the preparatory phase of the project began with forming a national team responsible for the implementation of Open Badges. The team then proceeded to analyse the goals outlined in work packages 4 and 5. The Czech team comprised five members: the Deputy Director for Educational Activities, three academic experts specializing in Environmental Education, Social Pedagogy, and Educational Management, and one technical coordinator. To enhance collaboration, the EduSTA national team experimented with the team wheel model and explored key elements of online communities of inquiry, integrating these concepts into their meetings.

A series of five meetings was organized to establish a shared understanding of Open Badges and to introduce the ESD competence areas to two main target groups: students training to become teachers at Czech vocational schools and in-service teachers from 26 vocational schools affiliated with the IEC network. These discussions focused on defining the scope of each competence area, including its implications for teachers in terms of knowledge, actions, and professional identity. Additionally, the team explored the sub-skills encompassed within each competence and reviewed existing practices and publications in teacher education.

Initially, the project aimed to offer a meta-badge titled Educator for a Sustainable Future. However, due to practical constraints, this plan was revised. Instead, two milestone badges – Learning Ecosystem Design and Reflexive Praxis – were introduced to the target groups. One member of the EduSTA national team reflected on this decision by explaining that as a smaller institution with a limited number of students, conducting a pilot for multiple educational modules would have posed significant challenges. The team prioritized delivering a high-quality experience, ensuring that the pilot remained meaningful and impactful within the institution's capacity. The decision not to offer the Sustainability Literacy milestone badge stemmed from the existence of another Erasmus+ project at IEC focused on developing a new competence-based MOOC on Green Skills, to avoid potential duplication of funding. Table 7 summarises the Czech pilots.



Table 7. Piloting EduSTA badges at Czech University of Life Sciences Prague.

Milestone badge	Target group	Period	Scope
Learning Ecosystem Design	Life-long learning programme Future Teachers of Vocational Educational Subjects (Concurrent Pedagogical Study for CZU students)	Winter semester 24/25	Local
Enabling Action	In-service teachers at Czech vocational schools Personnel from local NGOs	Spring semester 2023/24	National
Reflexive Praxis	Students of BSc. programme Pedagogy for Practical Training Erasmus+ students of IEC	Spring semester 2023/24	Local International

Implementation Process

Learning Ecosystem Design

The Institute of Education and Communication conducted a pilot programme integrating the Value Awareness Supporter micro-badge into the course Environmental Education (table 8). This course is a key component of the Future Teachers of Vocational Educational Subjects (CVUOP2) programme, designed to equip student teachers with the skills necessary to incorporate sustainability values into their teaching. The pilot's primary goal was to foster reflection, empathy, and responsibility among future educators, enabling them to pass these values on to their students.



Table 8. Value Awareness Supporter micro-badge pilot and needed preparations.

Module	ENVIRONMENTAL EDUCATION
Learning Mode	HYBRID – Czech language
Context	Development of professional teachers' competences and social competences such as critical and system thinking, intercultural skills, sustainable thinking
Needs	Translations into Czech language Implement on CZU Moodle with a link to Open Badge Factory Involvement of 2 evaluators (academic personnel from IEC CZU + 1 coordinator)
Assessment Criteria	Lesson plan, presentation on personal values, project/activity to raise environmental awareness/future thinking, model/visualization/scheme for a sustainable future

A total of 27 second-year student teachers participated in the pilot as part of their coursework in the CVUOP2 programme. This two-year programme is part of a lifelong learning initiative aimed at preparing educators for vocational subjects at secondary vocational schools. The Learning Ecosystem Design milestone badge was integrated into the pilot, requiring students to complete the Value Awareness Supporter micro-badge along with at least one additional micro-badge from the same milestone badge category.

The Value Awareness Supporter micro-badge was closely aligned with the Environmental Education course, which introduced students to key principles, methods, and tools for integrating sustainability into education. Through the course, students gained both theoretical knowledge and practical experience in environmental education. They explored strategies for fostering critical thinking and encouraging students to reflect on their values in relation to sustainability. The course emphasized the importance of applying these concepts in real teaching situations, allowing participants to connect pedagogical theories with practical implementation.

By completing the Value Awareness Supporter micro-badge, students were expected to demonstrate their ability to integrate sustainability values into teaching by designing activities that promote empathy, reflection, and responsibility. They were also encouraged to reflect on how their personal values shape their teaching practices and interactions with students. Additionally, they developed innovative educational strategies aimed at helping learners explore their own values and take action on environmental issues. Community-focused projects were introduced as a means of fostering collective responsibility and raising awareness of sustainability among students.

To support the implementation of the pilot, an online meeting was held between the badge assessor and students enrolled in the Environmental Education course. During this session, students were introduced to the objectives of the EduSTA project and familiarized with the study materials and assessment criteria for three micro-badges within the Learning Ecosystem Design milestone badge. Special emphasis was placed on the Value Awareness Supporter micro-badge, which was presented as a priority option for students to practice.

As part of the pilot, students were tasked with preparing a presentation on one of ten predefined topics related to sustainability, such as waste sorting, alternative energy sources, national parks in the Czech Republic, and environmental disasters. The assignment aimed to encourage both personal reflection and practical application, guiding students through several key components.

They (students) developed innovative educational strategies aimed at helping learners explore their own values and take action on environmental issues.

First, students explored the chosen topic by identifying key facts and contextual information, explaining its relevance to sustainability education, and analysing its potential to shape students' environmental values and actions. This phase was followed by personal reflection, where students considered their own sustainability values – such as resource conservation, minimalism, or biodiversity preservation – and discussed how these values influenced their perception of the topic.

The next stage focused on integrating sustainability into teaching. Students proposed methods for incorporating their personal values into lesson plans and suggested activities to help learners reflect on their own values. They also developed strategies to foster empathy and raise awareness of the broader impact of human actions on sustainability. Community engagement played a significant role in the assignment, encouraging students to propose ways to connect sustainability education with real-world initiatives and projects. Finally, the assignment concluded with a reflection on how

the process deepened their understanding of sustainability values and their role as educators.

As a result, 12 out of 27 participants successfully earned the Value Awareness Supporter micro-badge. The remaining students cited external obligations and time constraints as barriers to completion. Submissions were evaluated based on the clarity and depth of personal reflection, the practicality of proposed teaching methods, and the effectiveness of strategies for fostering student engagement with sustainability issues.

Some of the most notable student submissions demonstrated creative and impactful approaches. One presentation on national parks in the Czech Republic provided a detailed exploration of biodiversity and conservation efforts, proposing interactive field trips to enhance experiential learning. Another focused on floating plastic islands, analysing the ecological consequences of oceanic plastic pollution and introducing a classroom activity designed to reduce single-use plastics. A project on waste sorting in schools presented a structured approach to implementing recycling initiatives, while another explored environmental themes in movies, using popular films to foster empathy and critical thinking. Additional submissions examined sustainable farming practices, highlighting the benefits of school gardens, and analysed the environmental and social consequences of ecological disasters.

Despite the successful completion of the Value Awareness Supporter micro-badge by 12 students, none of the participants applied for a second micro-badge to complete the Learning Ecosystem Design milestone badge. Many students expressed that they had too many competing obligations and would have required additional time to complete the process. However, this extension was not feasible due to the course schedule and institutional requirements.

Enabling Action

During the piloting of this milestone badge, the IEC team faced challenges in engaging in-service teachers from Czech vocational schools and personnel

from non-governmental organizations (NGOs). The target group for testing the Enabling Action milestone badge (see table 9) consisted of educators and professionals from these sectors, as IEC collaborates with vocational schools and NGOs to provide practical experience for students enrolled in two bachelor's degree programmes: **Career Counselling and Education and Pedagogy for Practical Training**.

Table 9. Enabling Action badge – description of the pilot.

Module	ACTIVE TEACHER
Learning Mode	ONLINE - Czech language
Context	Development of teachers + management competences and social competences such as team-work skills, communication skills, creativity and sustainable thinking
Needs	Translations into Czech language Implementing on CZU Moodle with a link to Open-Badge Factory Involvement of 2 evaluators (academic personnel from IEC CZU + 1 coordinator + 1 technical support personnel)
Assessment Criteria	Essay or video

To introduce the initiative, headmasters from 25 vocational schools and directors from six NGOs were invited to a Methodical-Didactic Seminar at the Institute of Education and Communication in Prague in September 2023. During this seminar, the EduSTA project was presented, and a two-hour session was dedicated to explaining the process of obtaining the Active Teacher milestone badge. The attendees were encouraged to share this opportunity with their colleagues and personnel, and the IEC team anticipated at least 15 applicants for the badge. However, no in-service teachers or NGO professionals ultimately applied.

In an effort to understand the barriers to participation, the IEC team organized a feedback session in September 2024. Participants explained that in-service teachers have access to a wide range of professional development opportunities, and due to time constraints, they must carefully prioritize their training choices. Since sustainability competence certificates are not officially recognized by the Czech School Inspection, teachers decided for courses directly related to their professional specializations. For example, accounting teachers attended seminars on recent changes in Czech accounting law, while gardening teachers participated in training on new trends in floral design.

Despite these challenges, both target groups acknowledged that interest in the badge would be significantly higher if it were linked to an accredited course recognized by the Czech Ministry of Education, Youth, and Sports. Recognizing this need, the IEC team has been actively developing course content, study materials, and working towards accreditation for a new life-long learning program that would align with these expectations.

Reflexive Praxis

The Reflexive Praxis milestone badge (table 10), along with the Conscious Change Agent micro-badge, was incorporated into the undergraduate Pedagogy for Practical Training (UPV1) programme. It was seamlessly integrated into the existing course School Pedagogy, providing students with an opportunity to develop their reflective and critical thinking skills – competences essential for both their studies and future teaching careers.

Table 10. Reflexive Praxis Badge – description of the pilot.

Module	SCHOOL PEDAGOGY
Learning Mode	HYBRID / Czech language – IEC students
	ONLINE / English language – Erasmus students
Context	Development of professional teacher competences and social competences such as self-direction
Needs	Translations into Czech language
	Revision of Czech literature sources
	Implementing on CZU Moodle with a link to Open-Badge Factory
	Involvement of 1 evaluator
Assessment Criteria	Project reflection based on ESD practice and policy, use of Future's triangle - video or written proof of maximum 2000 characters of reflection, a reflective logbook with description of own work experience with regard to ESD

The course was delivered in a hybrid format, combining face-to-face instruction with asynchronous online learning through the LMS Moodle platform. This blended approach allowed students to engage in interactive discussions while also having the flexibility to complete coursework independently. The preparation for badge defence was structured to ensure a balance between theoretical learning and practical application.

In face-to-face sessions, a variety of teaching methods were employed to facilitate deep engagement with the subject matter. Verbal methods, including structured discussions and heuristic interviews, encouraged students to articulate their thoughts and reflect on their pedagogical perspectives.

Collaborative teaching methods fostered peer learning, while project-based education provided hands-on experience in designing and implementing educational strategies.

Collaborative teaching methods fostered peer learning, while project-based education provided hands-on experience in designing and implementing educational strategies.

The Conscious Change Agent micro-badge was selected specifically to support the development of students' ability to think critically and reflectively, equipping them with the skills necessary for their professional growth. A total of 62 first-year student teachers participated in the course, representing a diverse group that included both younger students and more mature learners, some of whom were already working as teachers but lacked formal academic training.

Managing a large cohort of 62 first-year student teachers presented several challenges, particularly in supporting students who were hesitant to engage with new technological tools. Despite this initial unwillingness, 58 students successfully completed the Conscious Change Agent badge. The primary method for demonstrating their competencies was through written essays, with only three students opting for video-based submissions.

During the assessment process, two applications were rejected, and seven required minor revisions due to misunderstandings of the task or technical issues related to document sharing. In the end, only four students did not complete the course, which meant they were unable to earn an EduSTA badge.

The Reflexive Praxis milestone badge was also made available to international students participating in one-semester exchange programmes. Two foreign students applied, and both successfully earned the badge- one from the Primary Education programme at the University of Córdoba (Spain) and another from the Educational Science programme at the University of Wisconsin (USA).

Evaluation of the Pilots

The piloting phase involved 89 future vocational education and training (VET) teachers enrolled in two study programmes, as well as two foreign exchange students at the Institute of Education and Communication. Throughout the process, students received detailed feedback, highlighting both strengths and areas for improvement. Those whose submissions required revision were given specific guidance, ensuring that the process remained a learning experience rather than merely a certification exercise. This approach enabled students to refine their ideas and deepen their understanding of sustainability values.

A total of 70 micro-badges were awarded through the pilot courses at the Czech University of Life Sciences Prague. Students appreciated that the course content aligned with their personal experience and professional aspirations. They also recognized the value of digital badges in support-

ing teachers' professional identity. Key aspects of the course that students found particularly beneficial included its emphasis on reflection and feedback, subject-specific content and didactics, activation of student engagement, collaborative learning opportunities, and the use of coaching and mentoring techniques.

The pilots demonstrated the potential of digital badges to formally recognize ESD (Education for Sustainable Development) competences, enhance students' professional credentials and confidence, and encourage innovation in teaching methodologies.

Challenges and Lessons Learned

Several challenges emerged throughout the pilot phase, offering valuable insights for future improvements:

- **Time constraints:** Some students struggled to balance coursework with other commitments. A more flexible timeline could improve completion rates.
- **Administrative adjustments:** Institutional scheduling changes required adaptations, which were successfully managed by modifying course timelines.
- **Feedback and support:** Providing clear and actionable feedback played a crucial role in helping students meet badge requirements and succeed in the process.

Based on student feedback, there was a strong recommendation to expand badge offerings by introducing additional micro-badges that covers diverse interests and competencies. Students also expressed a preference for more flexible scheduling to better accommodate their various commitments.

Following the evaluation of both pilots, the Czech EduSTA team identified key takeaways for future implementations:

1. The tested competences proved valuable and could be further developed in later stages of study programmes as well as in students' future professional careers.

2. Implementing innovations and applying them in practice was easier for students who were already working in schools and had both the responsibility and motivation to improve their teaching practice.
3. While students initially expressed concerns about using the Open Badge Factory (OBF) system, they ultimately adapted well, and the evaluation process was straightforward.

At the conclusion of the course, participants were encouraged to reflect on contemporary educational topics and formulate their own perspectives. One of the reflective exercises, the future triangle, required students to collect feedback from colleagues. However, some students noted that they would have appreciated more opportunities for reflection and evaluation of the badge itself. One participant suggested that a small group reflection activity – where students could meet face-to-face, present their work, and exchange feedback – would have been beneficial, as individual work sometimes felt isolating.

Conclusion

The pilot projects at CZU successfully demonstrated the integration of the Value Awareness Supporter micro-badge within the Environmental Education course and the Reflexive Praxis milestone badge within the School Pedagogy course. By aligning course content with ESD competences, the initiative not only deepened student teachers' understanding of sustainability but also equipped them with practical tools to foster critical thinking and responsible action in their future classrooms. This represents a significant step toward embedding sustainability principles into vocational teacher training programmes.

Encouraged by these positive outcomes, the IEC team remains committed to continuing these efforts beyond the completion of the EduSTA project. As a continuation of this initiative, the course Sustainable Future Educator has now been developed and implemented on the CZU Moodle platform. This course will be offered as a new lifelong learning opportunity, further supporting educators in integrating sustainability into their teaching practice.

The University of Girona (UdG) Experience: Integrating Sustainability Competences into Teacher Education

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Context of the UdG Pilots

This pilot project was implemented at the University of Girona by adapting two elective modules from the second year of the Primary and Early Childhood Teacher Education Degrees. These modules, titled “Scientific and Environmental School Experiences” and “Geography in a Changing World”, are part of an elective itinerary focused on science and environmental education within the undergraduate programmes. Each module was a 3 ECTS course and was delivered over the course of 12 weekly sessions of 80 minutes during the second semester of the 2023–2024 academic year. The same 33 students were enrolled in both modules.

The intervention was designed to pilot the re-designed modules and two micro-credentials (one for each module) from the EduSTA framework: Systems Thinking Promoter (STP) and Conscious Change Agent (CCA). Applying for these micro badges was entirely voluntary and took place only after students completed their formal course assessments. The intention was to avoid additional workload and ensure ethical separation between course grading and applying for the credential.

The modules were restructured by two faculty members, assisted by a third colleague familiar with the original module content. Each faculty member delivered one module and assessed students’ work in relation to both course objectives and the micro badge demonstration tasks. Two additional team members oversaw the micro badge evaluation process, reviewing submissions and providing feedback through the Badgecraft platform in the badge factory.

In this chapter, we briefly present each module we have piloted and its results and, finally, provide some reflections on the pilot process in Girona.

Description of the First Pilot – Systems Thinking Promoter

The primary objective of the first pilot was to embed ESD (Education for Sustainable Development) competencies within formal teacher training, focusing particularly on systems thinking as both a conceptual and practical framework. The Scientific and Environmental School Experiences module was selected for the implementation of the Systems Thinking Promoter (STP) badge. The course was redesigned to align both with the existing academic structure and with the learning objectives and assessment criteria of the EduSTA badge.

The STP badge required students to demonstrate competencies in recognizing, applying, and justifying systems thinking as a tool for sustainability education. To achieve this, both content and methodology were adapted accordingly.

The core content of the piloting module focused on:

Understanding the characteristics of systems thinking (ST)

- Exploring school-based sustainability projects
- Acquiring and applying systems thinking tools
- Designing an educational proposal with a ST perspective
- Evaluating the use of ST in educational contexts

Four key systems thinking tools were introduced and explored in class:

1. Enumerating and grouping system elements
2. Identifying connections within a system, including activities like the web game and connection mapping
3. Causal loop diagrams
4. Feedback loops

Each of these tools served as building blocks for analysing complex systems and understanding the interdependencies between elements within a school environment.

The course design was informed by key ESD educational principles, including learning as dialogic and participatory, contextualized and complex learning environments, focus on transformation and ethical action and

The course design was informed by key ESD educational principles, including learning as dialogic and participatory, contextualized and complex learning environments, focus on transformation and ethical action and critical engagement with social and institutional structures.

critical engagement with social and institutional structures. The primary methodological approach used in the module was a role play in which students simulated the dynamics of a school community engaged in redesigning its playground to promote sustainability. Role playing was chosen deliberately for its potential to promote dialogic learning, critical awareness of power relations, ethical reflection and values clarification and action-oriented decision-making. A range of learning resources were made available, including national and international resources regarding knowledge about systems thinking tools, or the school playground as a place to promote sustainability inside the school.

This scenario allowed students to experience systems thinking by embodying the roles of various stakeholders (teachers, pupils, families, school management, cleaning personnel, leisure monitors, etc.). They had to identify needs and contextual factors; reach consensus on a shared sustainability objective; and design and justify a feasible project proposal. It also enabled students to work within a realistic and familiar context (the school setting) while maintaining the flexibility of hypothetical exploration. Importantly, the design emphasized learning by doing, therefore, students were not passive recipients but co-creators of knowledge.

The expected outcomes aligned with both badge and course goals. Future teachers were expected not only to understand systems thinking theoretically but also to apply it in educational planning, justify their decisions in relation to SDGs, and develop transferable pedagogical strategies for sustainability.

The demonstration task for the badge was integrated with a course assignment. Students were asked to design a sustainability-oriented school project incorporating systems thinking tools. Having an activity that can be used as part of the evaluation of the module and to apply for the micro-credential reinforced the coherence of our proposal and did not require students to perform extra work beyond the course requirements.

Students were assessed on:

- The adequacy of the tools selected
- Their ability to justify methodological and design choices
- The clarity and feasibility of the proposal
- Their ability to relate systems thinking to broader sustainability goals
- To support equity and feedback, students received formative comments, and those whose badge applications were returned for revision were given the opportunity to improve and resubmit.

First Pilot Results – Systems Thinking Promoter

The pilot revealed both achievements and limitations in integrating sustainability competencies through micro-credentials in initial teacher training. Students demonstrated varying degrees of mastery across the targeted learning outcomes. They found the sustainability domains more accessible and comprehensible than the systems thinking tools, especially those requiring diagrammatic representation (e.g., feedback loops, causal diagrams).

In structured reflections and feedback surveys, students reported:

- High engagement with sustainability concepts, noting that they developed a broader and more complex understanding of the topic beyond recycling or environmental protection.
- Improved ability to identify and analyse systems, including their components and interrelations, particularly in the context of school settings.
- Challenges in applying systems thinking tools such as causal loop diagrams, and in justifying their instructional decisions in terms of sustainability outcomes.
- Strong appreciation for the course's practical and participatory approach, especially the support provided by instructors and the collaborative nature of activities.

However, not all students' experiences were uniformly positive. Some students expressed uncertainty about their ability to apply the competencies in real classroom settings, which can be attributed to their limited teaching experience and the hypothetical nature of the pilot. Time management was another frequently cited difficulty, as the badge demonstration tasks coincided with the examination period.

From an implementation standpoint, students successfully used the learning resources provided, including national materials. The design also maintained workload balance, as the badge tasks were aligned with core course assessments.

Description of the Second Pilot – Conscious Change Agent

The second pilot focused on the conscious change agent competency (reflective practice) was integrated in the module "Geography in a Changing World." Conscious change agents strive for continuous personal and institutional learning in education for sustainability using reflective tools. They can articulate their position as a change agent, foresee possibilities for sustainable change, and explore and debate multiple solutions and possibilities for action in the educational context. They can review their actions and decisions as educators to understand how policies, structures, assumptions, and values affect the implementation of education for sustainability in their educational context.

The course was completely redesigned to embed the competence in conscious change agent. Doing so meant connecting the competence with geographical thinking and to change the course learning processes to a more applied one: the development of a service-learning project. This ESD competence and micro badge was suitable for the contents and the purposes of the course. The university teacher who delivered the course was also familiar with this competence and how to work it with students.

The objectives of the pilot related to the EduSTA ESD competence framework were:

- To use tools of reflection to reveal various perspectives, assumptions and values related to ESD by actors and structures in their educational context.
- To have an open mind in relation to the multiple solutions that might emerge while maintaining the principles of sustainability and is ready to take action.
- To understand the importance of being hopeful and engaging with emotions when anticipating and influencing changes for ESD.
- To revisit actions and decisions with informed understanding of shifting perspectives related to ESD and of the effects of policies and institutional structures.

The main teaching and learning approaches of the course included service-learning, cooperative work and self-reflection. Students, in groups, were able to create a full proposal of a simulated educational project with the perspective and/or methodology of service-learning and then, individually, they wrote a piece of self-reflection on how the development of this project helped them to develop the competence of conscious change agent. It was necessary to guide students closely. Learning resources were created specifically to enable students to understand the whole project-based learning process, and to help them complete the learning activities associated to the project. They worked well and students appreciated them very much. After submitting their piece of self-reflection, precise feedback was also provided by the teacher, and students had the opportunity to improve the task and resubmit it.

The main constrain during the course was time: the workload was not adequate for a 3 credits course. The development of this kind of projects requests much more time. This is why we are thinking into moving this pilot to another course in the same field of knowledge with more credits.

The conscious change agent competence badge asked students to demonstrate they achieved it by reflecting in three main elements:

- A change agent knows how to imagine possibilities to improve the sustainability of the environment.
- Explores and designs actions for sustainability in the educational context and the immediate environment.
- It reflects on the actions planned and carried out, and proposes improvements, as well as discussing new initiatives for the future.

Pilot Results – Conscious Change Agent

Most of the students of the course completed the task and passed the course with good marks. Their reflections were good, and we were surprised about their familiarity in doing such type of metacognitive tasks. It seems they have been exposed to some previous training on reflection in other courses, what helped them in completing the task in an appropriate way. 14 students applied, completed and gained the badge.

The learning outcomes worked because we did a systematization of the tasks and made clear explanations (with visual maps) on how to do the task. For example, we provided a clear rubric that guided students on how to complete the reflective activity.

The module focused on the development of a service-learning (SL) project linked to solving a community problem. The projects have helped students specify actions and proposals for solving problems and they knew how to explain and to systematize a SL project (elements, phases, and so on). At the end of the course, students were able to contextualize and delimit the problem well and provided relevant documentation. However, they failed to fully relate the aspects addressed to the elements of geographical thinking. They also provided a good curricular justification for the project. Although students discussed how they would take into account the degree of student participation in their learning, there was no sense of certainty about this, as they proposed many areas of total control by teachers and few opportunities for consultation and real student participation. The social agents chosen were usually teachers and families. In a few cases, they have added others, which indicates that they did not fully understand the key social agents in the area or what role they could play in the project and society; nor fully specified is the degree of participation they would have given to them. Students usually did not justify the type of service they were carrying out.

Regarding self-reflection, students were accustomed to reflecting and knew how to provide clear evidence for each of the three elements of the competency. The positive aspects of their reflections showed a certain degree of excitement and satisfaction with what they have learned: "I want to learn more during the specialization." "The subject has had an impact on my learning." They acknowledge that they now feel they know what sustainability is about in reality, beyond theory (rhetoric). Some other interesting statements about their learning were: "I have learned how to do things." "I have learned a new geography." "I have introduced changes in the way I think."

On the other hand, there are aspects that have not been as satisfactory or that require change: some students have focused their reflection more on

the learning of the class group than on their own learning as future teachers. The connection with the school and the rest of the teaching personnel has also been lacking, so there was not a development of the sense of being part of a team.

Final Reflections from the UdG Pilots

The piloting of these modules and micro-credentials was a rich and transformative learning experience for both students and faculty at the University of Girona. Embedding micro-credentials in existing modules made it possible to explore how digital badges can formalize and recognize ESD competencies in pre-service teacher education.

For instructors, working with the EduSTA badge framework was an opportunity to increase alignment with sustainability competences and encouraged innovation in pedagogical design. The experience underscored the value of active and contextual methodologies—such as service learning, role play, and project-based learning—in fostering engagement and deeper understanding.

From the students' perspective, the pilot facilitated critical and reflective learning. Most participants gained a deeper appreciation for sustainability, enjoyed the hands-on and collaborative methods, and benefited from consistent support. However, several students also questioned the utility and value of digital micro-credentials, indicating that institutional and professional recognition of such credentials is still emerging and unclear.

The pilot also led to strategic decisions for course redesign:

- The module Geography in a Changing World and the Conscious Change Agent badge will be integrated into a compulsory course, ensuring wider participation and institutional support.
- The module Scientific and Environmental School Experiences, along with the Systems Thinking Promoter badge, will be offered in the fourth year, when students have more classroom experience and can better contextualize their learning.

These changes aim to improve the timing, depth, and authenticity of the learning experience. Moreover, the experience revealed potential to scale the EduSTA approach beyond students: there is interest in offering ESD competence certification to teaching personnel, and in recognizing sustainability efforts through existing school networks. The EduSTA project may serve as a starting point for institutionalizing ESD credentials as part of the university's sustainability strategy.

In conclusion, this pilot demonstrated that micro-credentialing can be an effective and motivating strategy to embed ESD competencies in teacher education. With thoughtful integration, institutional support, and continued development, this approach holds promise for both initial training and life-long learning in the field of sustainability education.

The experience underscored the value of active and contextual methodologies—such as service learning, role play, and project-based learning—in fostering engagement and deeper understanding.



Partner Experiences Hanze UAS Netherlands

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< The Dutch partner, Hanze UAS, executed three different pilots on ESD and as such developed experiences on working with the open badges in different ways: ESD Atelier (pilot 1), Catalysing Futures Thinking (pilot 2), Independent Badge Applications (pilot 3). The main learning path was created as a guided learning module (ESD Atelier) for teachers and other educational personnel at the Hanze UAS. Alongside this, EduSTA open badges were offered to colleagues interested, as a supplementary way of demonstrating the learning in an accredited way. The third pilot has been executed in a kind of international in-company track, focusing on achieving the Futures Thinking badge in an intensive three-days training.

In this chapter we first present a short overview of the three Hanze pilots, followed by a reflective evaluation of the Education for Sustainable Development (ESD) Atelier using the Evaluate-2-Redesign model (Smit & van Aken, 2023). The chapter concludes with a view to the future.

Pilot Descriptions

Education for Sustainable Development Atelier

At Hanze the EduSTA badges were integrated with a professional learning program: the Education for Sustainable Development (ESD) Atelier – a track for teacher/educational professional development in which a group of professionals committed themselves to attend seven monthly sessions and in between the monthly sessions work on their role and contributions to sustainable development, as suitable to their work. Picture 1 describes a session of ESD Atelier.

The meetings were designed to help colleagues ‘walk the talk’ in hands-on training aimed at implementing ESD in their own educational setting. Creative and critical dialogue was stimulated, with the aim to trigger transformative learning. Intrinsic motivation was enhanced by giving participants autonomy and purpose by having participants set their own learning quest. This learning quest was structured in the form of a “How can we...” question. Support on the badge constellation was offered through hybrid -in person and online -, flexible support and coaching on demand.

The full constellation of EduSTA digital open badges was offered as part of the pilot in the in-service learning module ESD Atelier at Hanze UAS. The ESD Atelier saw 14 participants (8 teacher-researchers, 2 teacher-trainers, 1 team manager, 1 living lab coordinator, 1 psychologist, 1 junior researcher) and four applicants (HE and VET) who obtained the badges independently. In total 25 people applied for one or more badges from the EduSTA badge constellation





Picture 1. Participants revisiting their learning throughout the Atelier in relation to the competencies during the 6th Atelier session at Hanze UAS.

Independent Badge Applications

Alongside the learning module, the Hanze team promoted the possibility of applying EduSTA badges to a variety of educational stakeholder groups in education in Groningen. These include Vocational educational trainers (Noordepoort, Alfa, and Drenthe College); teachers in the Basic Didactical Qualification programme (Hanze UAS); teachers at the Pedagogical Academy (Hanze UAS); promotion through the online professionalization platform at Hanze UAS ('PL Academy').

Two people applied for the meta-badge using prior developed knowledge and experience. One participant is a front runner in UAS-wide implementation of SDGs, and the other a frontrunner educator in innovative learning, badge learning and an in-service Futures Literacy Intensive Programme.

Catalysing Futures Thinking

Catalysing Futures Thinking was a one-week intensive pilot training focusing on the badge Futures Thinking Catalyser, customised to the demographic of educators at the University of Girona (UdG). The training aimed to explore some of the key concepts of Futures Literacy and the underpinning discipline of anticipation and to put these into practice by communally designing and trying out Futures Thinking micro-interventions for the workplace. The training kicked off with a learning-by-doing experience in the form of a Futures Literacy Lab (FLLab) on the Future of Learning.

In the FLLab the participants were challenged to reveal their anticipatory assumptions on the future of Learning and to reframe and rethink them to make better informed decisions in the present. With this experience as a base, the 11 faculty members that wished to develop their Futures Thinking Catalysing skills joined forces in the subsequent two and half days to design and refine their own contextualised Futures Thinking micro-interventions.

This process paved the way for the participants to start designing their own Futures Thinking micro-interventions by connecting the underlying process and design principles of the FLLab with the Future of Universities as theme. When designing, the participants made use of a template that contextualized the demonstration of the competence objectives and assessment criteria to obtain a Futures Thinking Catalyzer badge. The pilot is described more in detail by Ametller Lleal & Kazemier (2024).

Evaluate-2-Redesign: the ESD Atelier

To support the design of the ESD Atelier, the educational designers used an Evaluate-2-Redesign (E2R) Canvas to structure intended outcomes of the learning paths and connect these to the (learning) activities in the program. By placing expected and actual (learning) outcomes next to the context and activities, this canvas provided an opportunity to design and evaluate the ESD Atelier in a structured way. Preliminary findings from additional research (based on surveys and interviews with participants and conducted by the Professorship Learning in Professional Learning Communities) pro-

vided input from the ESD Atelier participants and were used in the program evaluation. The E2R canvas is explained and elaborated below, after a short summary of the preliminary research results.

Preliminary Research Results

The participants of the ESD Atelier have been contributing to research by filling in surveys and participating in group interviews. The target group turned out to be very diverse in their opinions and experiences, which posed difficulty for drawing straight conclusions. Nevertheless, some conclusions can be drawn.

(Participants) valued meeting with colleagues from different disciplines and discussions on integrating sustainability in their work. This fostered a sense of connection and reinforced their commitment to sustainability.

In general, the participants of the ESD Atelier found the experience of learning in a community very precious. They valued meeting with colleagues from different disciplines and discussions on integrating sustainability in their work. This fostered a sense of connection and reinforced their commitment to sustainability. Some used the ESD Atelier to reflect on their teaching practices, supported by various theories and methods.

Discussions on the complexity of sustainability issues and the application of concepts like Ikigai and Futures Literacy were appreciated, though not

all participants saw a direct relevance to sustainability education. Collaboration and idea exchange were highly valued, with positive group dynamics. Working in pairs was recommended, provided it doesn't lead to isolation.

As an example of application into their daily work, participants mentioned organizing sustainable lunches and linking projects to the SDGs. Reflection exercises and a focus on personal development helped clarify their roles in sustainability education. Practical methods directly applicable to their work were particularly appreciated.

Less positive opinions reflected the diversity of the group and the differences in prior knowledge and experience. There were mixed feelings about the depth and relevance of the content, with a need for more common denominators or differentiated content to address varying capacities and desires.

Recommendations included improving session structure and coherence, making sessions longer and more interactive, and clarifying the badge structure. Overall, the ESD Atelier was seen as valuable, highlighting the components that led to reflection, collaboration, and application.

The E2R canvas used to evaluate the ESD Atelier

To clarify the model in question, this section is dedicated to the main principles of the model Evaluate to Redesign (E2R) that underpins Canvas.



A testing canvas for learning modules

Instructions <i>This canvas is intended for evaluating and optimizing your learning module</i> Step 1: Fill in the blue blocks by answering the questions in each block Step 2: Describe the learning processes, activities, and enhancing/hindering context factors [pink blocks] Step 3: - Fill in realized outcomes [yellow block] Step 4: - Evaluators fill in: green blocks	Name of the Module What is the name of the intervention?	The learning module is based on these educational design principles: What are the educational design principles the intervention is based on?	Our "why" What is the overarching goal of the intervention?
	Intervention = module as executed What are the important building blocks of the module?	The expected learning processes Activity What learning process needs to be triggered by which activity?	Expected outcome = Our "what" What are the competence objectives or learning outcomes, as direct goals of the intervention?
	Context of intervention What is the setting of the intervention? [space, time, participants, guidance]	Context Factors What were enhancing (context) factors? What were hindering (context) factors?	
	Recommendations How can the intervention be improved? Can ineffective elements of the intervention and the context be removed, improved, or replaced?	Recommendations for redesigning and optimising the intervention Which recommendations are there for concrete changes in the design which will enhance the learning processes and trigger the desired outcome?	
			Learning outcomes achieved by participants? Which learning outcomes were actually achieved by participants?

Figure 5. E2R Evaluation Canvas, Hanze UAS (2025). (Based on E2R-model by Smit & van Aken, 2023.)

The E2R model, as described by Smit & van Aken (2023), forms an approach designed to optimize the effectiveness of interventions and can be applied to various types of designed interventions, such as an educational program.

The starting point of the model is the analysis of the intervention itself. In the case of an educational module, this entails examining the different components of the module, such as the desired (learning) outcomes, the setup of the sessions, the participants and trainers involved, and the educational strategies used. The aim is to understand which elements of the module positively contribute to the desired outcome (enhancing factors) and which elements may have a negative effect (hindering factors) to strategically redesign.

Next, focus is placed on the context in which the intervention takes place. This includes factors such as the physical environment of the sessions, the availability of supporting resources, and the social and organizational context. These contextual elements can either enhance or hinder the effectiveness of the module. For example, an inspiring location can increase participant engagement, while logistical challenges such as time constraints can be a hindrance.

An important part of using the E2R approach is understanding the mechanisms that make the intervention work. This means trying to determine why certain elements of the educational module are (assumed to be) effective in the given context. For example, why should a natural environment promote reflection and collaboration? This insight helps identify the strengths and weaknesses of the intervention.

In the case of the educational module, the E2R model can be used to systematically evaluate and improve the module. Following the logic outlined above, this begins with describing the key components of the module (in blue, see figure 5). Then, the learning processes and linked activities plus moderator variables (in pink). This helps identify the elements that can increase or decrease the effectiveness of the module.

After these analyses, the type of test is determined, such as whether the evaluation is ex ante (before) or ex post (after). This helps plan the evaluation and gather the necessary data. The mechanisms and expected outcomes are analyzed, looking at how intervention elements work in the given context to achieve the desired results.

Finally, the green blocks on the canvas are addressed, describing concrete recommendations for the module design. This includes adjusting hindering (contextual) factors and optimizing the intervention elements to improve the learning processes and desired outcomes. The end goal of the module and the intended learning outcomes are also described, as well as the possible results that can be achieved with the recommendations.

By following these steps, the E2R model helps systematically evaluate and improve the module. It ensures that both the intervention elements and the contextual factors are carefully analyzed, making the module as effective as possible. By thoroughly evaluating the intervention and the context, designers and policymakers can make improvements that increase the effectiveness of the module. This might involve adjusting the session times to better fit the participants' availability or increasing publicity about the benefits of the module. The process also includes identifying potential dilemmas and risks. For example, if the planned program isn't working out as intended.

The E2R approach provides a structured tool for designing and optimizing interventions. It can help bridge the gap between scientific knowledge and practical application, ensuring that interventions are as effective as possible in the specific context in which they are implemented.

ESD Atelier Evaluation

As indicated earlier, the canvas can be used ex ante (to design) or ex post (to evaluate). In order to evaluate the ESD Atelier learning module, the canvas has been used ex post, in a work-session guided by an expert in E2R. The different elements of the module were analyzed and discussed which resulted in the canvas as depicted in figure 6.

A testing canvas for learning modules

Instructions Step 1: Fill in the blue blocks by answering the questions in each block Step 2: Describe the learning processes, activities, and enhancing/ hampering context factors [pink blocks] Step 3: - Fill in realized outcomes [orange block] Step 4: - Test panel fills in: green blocks	Name of the Module What is the name of the module? ESD Atelier	The learning module is based on these educational design principles: What are all educational strategies or pedagogical principles that trigger or enhance the learning processes? • dialogue and social interaction; • critical reflection and ownership; • practice-oriented: practiced as preached / learning by doing; • education for and as sustainable development: laying the foundation for transformative learning • atmosphere of trust and empathy	Our "why" What is the final goal of the module? Supporting lecturers in their competence development and recognition in the field of education for sustainability.
Instructions if ex-post / after By participating in the ESD Atelier, participants have sharpened their role in the field of sustainability education and show ownership.	Context of intervention What is the setting of the module? [space, time, students, teacher] • Start with 24 Hours in nature, followed by 6 sessions at different locations, • period March – Nov 2024, • 14 participants, • 4 trainers	Recommendations from the test panel: Which concrete changes in the module design will help trigger the learning processes and desired outcome? • align naming with 'language' (core themes) learning concept of the university of applied sciences (e.g. transition skills); • well align the moment of offering with planning/dynamics of school departments (e.g. deployment); • adjust the offer with the institution-wide teacher development team; • use of participants in previous programmes (who can give examples from their own educational setting); • integrate content, badges and competency demonstration into learning path with options; • completion of the learning process with Edubadge via national portal in NL (let go of Badge Factory as long as there is no national recognition / registration of microcredentials); • use systems thinking as a central theoretical concept and link Futures Literacy, learning in complexity, etc. to it	Potential outcomes Potential outcomes achieved by the recommendations • broader reach, increased participation and greater impact of the learning journey • strengthening practical orientation; • recognizable certification; • increased sense of autonomy through flexibility; • systems thinking as the key to transition-skilled learning communities.
Intervention = module as executed What are the important building blocks of the module? • ESD-Atelier sessions 1 - 7 • CoP-meetings (without coaching) • EduSTA badge-constellation	The expected learning processes What learning process needs to be triggered by which activity? • reflecting on the approach to sustainability education and making an inventory of potential improvements in one's own (educational) setting; • making connections with one's own educational context, designing an educational intervention; • articulating one's own role in the field of sustainability (education).	Expected outcome = Our "what" What are the competence objectives or learning outcomes, as direct goals of the module? • Articulates his/her own position as a change agent, foresees opportunities for sustainable change, and explores and discusses multiple solutions and action possibilities in his/her own educational context; • Revises actions and decisions as a teacher based on an informed understanding of the influence of policies, structures, assumptions and values on the relationship of ESD in one's own context; • Remains hopeful and takes emotions into account when anticipating and influencing changes for ESD	
Context Factors Enhancing: • (guided) meetings and social interaction with like-minded people in ESD sessions was stimulating, gave inspiration and support and contributed to personal development; • For some, being able to obtain badges helped with reflection and articulation on their own role as a change agent and recognition and the freedom to choose or not to choose this gave participants a sense of autonomy Hampering: • the provision of theoretical models was not always experienced as enriching and sometimes lacked the desired depth and practical orientation; • the parallel provision of badges via Badge Factory was sometimes experienced as confusing and fragmented, with unclear meaning/status of badges and for some difficult steps to go through in Badge Factory.	Learning outcomes achieved by participants By participating in the ESD Atelier, participants have sharpened their role in the field of sustainability education and show ownership.		

Figure 6. Canvas for ESD Atelier Evaluation as completed by Hanze UAS (2025).

To share these findings in a more legible way, the content of the canvas has been summarized and briefly described below.

Introduction

The ESD Atelier program is designed to support educators in developing and recognizing competencies in sustainability education. This canvas outlines the key components, pedagogical principles, learning processes, outcomes, and recommendations for the module, which ran from March to November 2024. The analysis includes the preliminary results of research into the modules as planned, as performed, and perceived by including the reflections of the trainers/designers and the experiences of the participants.

Module Overview

The ESD Atelier began with a 24-hour session in nature, followed by six sessions at different locations. The module was attended by fourteen participants and was facilitated by four trainers. The initial session in nature aimed to create a strong foundation and social cohesion for the participants, fostering a sense of community and connection with the environment.

Key Components

The ESD Atelier consists of several key components that contribute to the overall learning experience:

- 1. ESD-Atelier Sessions 1-7:** These sessions provide the core content of the module, focusing on various aspects of sustainability education. Content and form (of activities) are determined using ESD level III (Sterling, 2014), such as transformative learning and dialogue. These are outlined in more detail below under pedagogical principles.
- 2. Community of Practice (CoP) Sessions:** These sessions were supposed to be conducted without guidance to encourage independent learning and peer support. Participants could share their experiences and learn from each other in a collaborative environment.
- 3. EduSTA Badge Constellation:** This system recognizes participants' achievements and competencies. The badges serve as a form of certification, acknowledging the skills and knowledge gained during the modules.

Pedagogical Principles

The ESD Atelier is built on several key pedagogical principles that aim to enhance the learning experience:

- 1. Dialogue and Social Interaction:** The module encourages communication and collaboration among participants. This principle is essential for building a supportive learning community where participants can share experiences and learn from each other.
- 2. Critical Reflection and Ownership:** Participants are encouraged to engage in self-assessment and take responsibility for their learning. This principle helps participants develop a deeper understanding of their roles as educators and change agents.
- 3. Practice-Oriented Learning:** The module emphasizes learning by doing, ensuring that participants can apply theoretical knowledge in practical settings. This approach helps participants develop practical skills that are essential for sustainability education.
- 4. Education for Sustainable Development (ESD):** The module aims to foster transformative learning experiences that promote sustainable development. Participants are encouraged to explore and implement sustainable practices in their educational contexts.
- 5. Trust and Empathy:** Creating a supportive learning environment is crucial for the success of the module. Participants are encouraged to build relationships based on trust and empathy, which enhances their learning experience.

Expected Learning Processes and Activities

The ESD Atelier incorporates various learning processes and activities designed to facilitate participants' development:

1. Enhancing Factors:

Guided interactions and social engagement in ESD sessions provide inspiration and support, contributing to personal development.

The achievement of badges helps participants to reflect upon and to articulate their roles as change agents, providing a sense of autonomy.

2. Hindering Factors:

Theoretical models sometimes lack depth and practical relevance, which can hinder participants' understanding and application of concepts.

The parallel offering of badges can be confusing and fragmented, with unclear significance and challenging steps in the Badge Factory.

Expected Learning Outcomes

The primary goal of the ESD Atelier is to support teachers in developing and recognizing competencies related to sustainability education. Several direct learning outcomes were formulated for the module, supplemented by the learning outcomes of the EduSTA badges.

1. **Articulate Role as Change Agents:** Participants should be able to articulate their roles as change agents and explore multiple solutions and actions in their educational contexts.
2. **Understand Influence of Policies and Structures:** Participants should reassess their actions and decisions based on an informed understanding of the influence of policies, structures, assumptions, and values on ESD.
3. **Remain Hopeful and Consider Emotions:** Participants should remain hopeful and consider emotions when anticipating and influencing changes for ESD

Achieved Outcomes and Recommendations

The ESD Atelier has achieved several positive outcomes when it comes to learning design, and there are recommendations for further improvement:

Achieved Outcomes: Participants have a clearer understanding of their roles in sustainability education and demonstrate ownership of their learning. They are better equipped to act as agents in their educational contexts.

Recommendations:

- Align badge content with the learning trajectory and integrate badge and competency demonstration to provide a more cohesive learning experience.
- Use previous participants as examples to provide practical insights and enhance the relevance of the module.
- Improve the practical relevance of theoretical models to ensure that participants can apply concepts in real-world settings.

Potential Outcomes

If the recommendations are implemented these are the potential results:

1. **Broader Reach:** Increasing participation and impact of the learning trajectory can enhance the overall effectiveness of the module.
2. **Enhanced Practicality:** Strengthening practice-oriented learning can ensure that participants develop practical skills that are essential for sustainability education.
3. **Recognizable Certification:** Improving certification recognition can enhance the value of the badges and provide participants with a sense of achievement.
4. **Increased Autonomy:** Providing flexible learning options can enhance participants' sense of autonomy and ownership of their learning.

Analyzing these results, combined with the research input of the participants, led to valuable insights for the future. Before finalizing these insights, the intermediate research findings are summarized to get a clear overview.

Intentions for the future

Prompted by the process of completing the canvas, the intensive critical reflection on the ESD Atelier yielded several valuable insights. In combination with the preliminary research input, some conclusions can be drawn and provide advice for future practices. These adjustments concern both organizational changes as well as didactical and content changes.

The first adjustment could be to specifically motivate participants to enroll into the ESD Atelier with a colleague as a duo, to be able to work together and create more impact within their own context.

In addition, the positioning of the ESD Atelier within the Hanze institute could be more sensitive to the culture and practices of the organisation. In addition, the positioning of the ESD Atelier within the Hanze institute could be more connected to the strategic priorities of the organisation. For instance, strategic priorities of the University (impact in regional transition) need to find their way into curricula (transit skills). This need can serve as a leverage to promote sustainability competencies and badge driven learning by teachers. And finally, regular teaching development programs within Hanze could offer opportunities for the usage of the ESD Atelier modules.

As indicated before, the elements that the program intentionally consisted of should have been guarded more. Next time, it might be more effective to form groups ourselves (based on participants' wishes) and schedule meetings in advance, allowing participants to incorporate these sessions into their agendas and steer a bit more upon organizing and attending.

A factor with dual aspects is the acquisition of badges. We discovered that this element is valued differently by various participants. Additionally, the fact that in the Dutch context badge learning is not yet common and in-

stitutionalised adds complexity to drawing conclusions and planning for the future. As a compromise, we suggested jointly working on the badge of change agent and assessing it at the end of the program, in the future. This would culminate in a presentation where participants demonstrate the competencies associated with the change agent badge.

By identifying the enhancing and hindering factors of the module, recommendations could be developed. The hindering factor of multiple confusing theoretical models can be diminished by a greater focus on one key theoretical model. Systems thinking, which includes holistic thinking, embracing complexity, and transformative skills, could be the central theory to work with. However, other skills should also be addressed, but in a more practical manner, rather than the theoretical approach we previously took. Sometimes, addressing fewer topics can lead to greater understanding.

Including previous participants in parts of the module and sharing experiences might be stimulating and can provide useful practical examples for participants who seek more connection with their practice.

In conclusion, working with the canvas model as described illuminates the dual function of the model as ex post and ex ante method; being an iterative process that never ends, providing input for future designs.

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Swedish Partner Experience Reflections - Sustainable Education for ALL

Liisa Uusimaki & Monica Reichenberg, University of Gothenburg
University of Gothenburg, Sweden & Vocational Education & Training (VET)

University of Gothenburg (2023) is internationally recognized for its work on sustainability in education and research that is a crucial aspect of the university's mission. To ensure courses and programs educate for sustainability the university has a system for labelling courses and programs since 2006 as sustainable. (Uusimaki, 2025)

The labelling of courses is based on criteria reflecting the multidimensional concept of sustainable development. Today 20% of courses and 25% of programs are labelled sustainable, and the goal is to further develop and strengthen sustainability efforts while increasing the university's relevance as a societal actor and collaborative partner, thereby contributing to Agenda 2030 and the global goals for sustainable development, encompassing economic, social, and ecological dimensions (Uusimaki, 2025).

Selecting the course Development Work and Action Research for Vocational Teachers for the EduSTA pilots was a logical choice, as its content and structure perfectly matched the criteria for the micro-credential and badge Knowledgeable Problem Articulator. This micro-credential was also which the Swedish team had contributed to developing. As previously mentioned, the course is sustainably certified by the University of Gothenburg, making it an ideal fit for the EduSTA pilots.

The course content covers various aspects of school development, with a strong emphasis on sustainable development, both as a concept and as a

didactic element within vocational education. Alongside mandatory readings, the VET student teachers conducted interviews with school Principals about systematic quality work, which serves as the foundation for their reflections on quality in vocational education.

We decided to offer only one competence-based digital open badge integrated into one course, instead of allowing VET student teachers to apply for several digital open badges – even if it caused low number (20) of badge applications. This decision made the project somewhat vulnerable, with the risk of it being seen as a short-term initiative, quickly checked off and not given lasting value. It was recognized that providing real opportunities to earn digital open badges throughout the university vocational teacher program could greatly benefit future Swedish VET student teachers.

Further reflection on our experiences in the Swedish EduSTA project highlights the critical importance of role models – particularly teachers who possess a deep understanding of how to include all students in sustainability education. Their inclusive practices not only ensure broader participation but also model the very values of equity and engagement that underpin sustainable development.

Students Need Role Models in Sustainable Education

Swedish activist Greta Thunberg has become a global symbol of the environmental movement, inspiring people of all ages to believe in the possibility of a sustainable future. Scholars have even referred to this phenomenon as “the Greta effect,” highlighting how her activism empowers both the young and the old. But who, in turn, inspired Greta?

As a student, Greta faced challenges related to her autism spectrum diagnosis and at times even stopped attending school. Yet, the turning point in her story came from a classroom experience. During a lesson on the impact of climate change on polar bears, something shifted. This moment – what could be called a critical event – sparked a powerful emotional response in Greta. It became a catalyst, awakening a deep sense of urgency and commitment to act.

From that moment forward, Greta never wavered in her belief in herself or in her capacity to make a difference. She began protesting every Friday outside the Swedish parliament – an act that soon grew into the now-famous "Fridays for Future" movement. Fridays For Future is an international climate movement active in most countries and our website offers information on who we are and what you can do.

What We Can Learn from the Greta Case: Empowering Sustainable and Inclusive Education

The case of Greta Thunberg offers valuable lessons. Despite facing challenges related to her autism spectrum diagnosis, she never doubted her ability to act. This confidence was sparked by a teacher who integrated sustainability into classroom learning – highlighting the profound role educators play in shaping environmental awareness. This underscores a vital message for all teachers, including those in vocational education and training (VET): to encourage all students to develop an “environmental eye” and adopt environmentally responsible behaviours.

But what does it mean to foster an “environmental eye”? Teachers have a responsibility to equip students with the ability to critically read and interpret texts about pollution, toxicity, and unsustainable production. This includes guiding and encouraging students to question environmental narratives and to listen critically to news and public discourse.

Social Sustainability: A Missing Piece in VET?

In higher VET education, sustainability discussions tend to focus primarily on ecological concerns. While this is essential, sustainability rests on three interdependent pillars: ecological, social, and economic. In the Swedish context, we particularly emphasize the intersection between ecological and social sustainability. So, how can both dimensions be promoted within VET?

Social sustainability in VET implies that education should be inclusive and accessible to all students – regardless of their background or ability. Greta's story serves as a powerful example of this inclusive approach. Her

teacher didn't just provide knowledge about climate change; she created a space where students with disabilities were empowered to see themselves as contributors to sustainability. VET education, with its focus on practical skills, holds unique potential to integrate ecological awareness with occupational competence – effectively blending the practical with the ethical.

Empowering Students Through Inclusive Sustainability

Including students with disabilities in sustainability education is critical. For this to succeed, teacher attitudes play a key role (Uusimäki et al. 2018). Teachers must be persuaded of the value of inclusion and must believe in their own ability to teach sustainability to students with diverse needs. Greta's teacher exemplified this confidence and commitment. She believed in her capacity to reach all her students – a belief that empowered Greta and, in turn, inspired millions.

VET education, with its focus on practical skills, holds unique potential to integrate ecological awareness with occupational competence – effectively blending the practical with the ethical.

Confidence in one's teaching capability, or self-efficacy, is not innate. According to Bandura (2008) and Seligman et al. (2009), self-efficacy is developed through social learning – via inspiration, persuasion, and successful experience. However, some teachers may lose confidence due to discouraging social or institutional circumstances. That is why it is crucial to cultivate environments that foster optimism, trust, and empowerment – so that teachers feel supported in their mission to include all students in sustainability education (Uusimäki, 2025).

When teachers believe in their own capabilities, they are more likely to encourage similar beliefs in their students (Uusimaki, et al, 2018). This aligns with Giddens (2015)¹, who emphasized the central role of educators in advancing sustainability. Fostering capability involves two key practices: (a) encouraging students' beliefs in their capability to contribute to a sustainable society and (b) promote the development of these capabilities in creating a sustainable society.

Ultimately, students must not only acquire skills—they must also believe in their capacity to make a difference. This belief, their self-efficacy, is the foundation for meaningful participation in climate action and sustainable development (Bandura, 2008).

Concluding Reflections

The importance of the EduSTA project has shown how international collaboration, digital innovation, and competence-based learning can reshape education. By empowering educators as leaders in sustainability and making their learning visible, portable, and transferable, EduSTA supports a shift toward a more sustainable, equitable, and interconnected future for education across Europe.

Thing is, here in Sweden, we are not there yet! The use of micro-credentials in Swedish higher education is in its infancy, and important questions remain: How can we ensure quality and consistency in assessment? What infrastructure is required? How do we avoid overwhelming educator while ensuring meaningful recognition for all learners?

Going forward, we suggest two concrete steps:

1. Pilot badge-aligned assessments within existing courses to explore alignment between curriculum goals and badge criteria.
2. Develop professional learning opportunities for educators, focused on assessment literacy and digital credentialing tools.

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How to Achieve High Impact of Project Activities and Outputs

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Introduction

In this chapter, we would like to show good practices and lessons learned in terms of effective publicity of an international project and the core activities run through the project Academy for Sustainable Future Educators (EduSTA).

In EduSTA, a variety of tangible outputs were developed:

- Context and Concept Analysis
- Sustainable Competence Frameworks
- Open Badges and Learning Driven Pathways
- Pilot courses
- National seminars and international webinars

These products would not be useful or remain sustainable if thorough dissemination and publicity among stakeholders had not been wisely planned. The dissemination and publicity actions followed the international FAIR-principles. The strategy, and Dissemination and Exploitation Plan were continually monitored, updated and reported during the whole project period.

The impact of the EduSTA activities and products was exceptionally high in both quantity and quality. Quality declares at least two facts:

1. In EENEE's (European Expert Network on Economics of Education) report, micro-credentials and open badges have been identified as one of the catalytic points and actions that can provide some of the core pathways for changing the provision and mainstreaming of education for sustainable development in teacher education. The EduSTA project has been chosen as a case study to illustrate this leverage point.

2. Academy for Sustainable Future Educators (EduSTA) project has been selected for the global list of 100 excellent environmental and climate education solutions. The list has been compiled by Teachers for the Planet organization. The solution repository was published on 8 December 2024 at the RewirED Summit in conjunction with the COP28 UN Climate Summit.

The dissemination materials produced were intended to establish a network of policymakers, professionals, associations, citizens, and other relevant stakeholders. The objective was to maximise the project's impact on these audiences through targeted information and formats, including policy reports, publications, leaflets, newsletters, papers in scientific journals, press releases, blog posts, podcast interviews, and video spots.

EduSTA dissemination activities ensured wide reaching impact and use of project deliverables among three categories of the targeted audience:

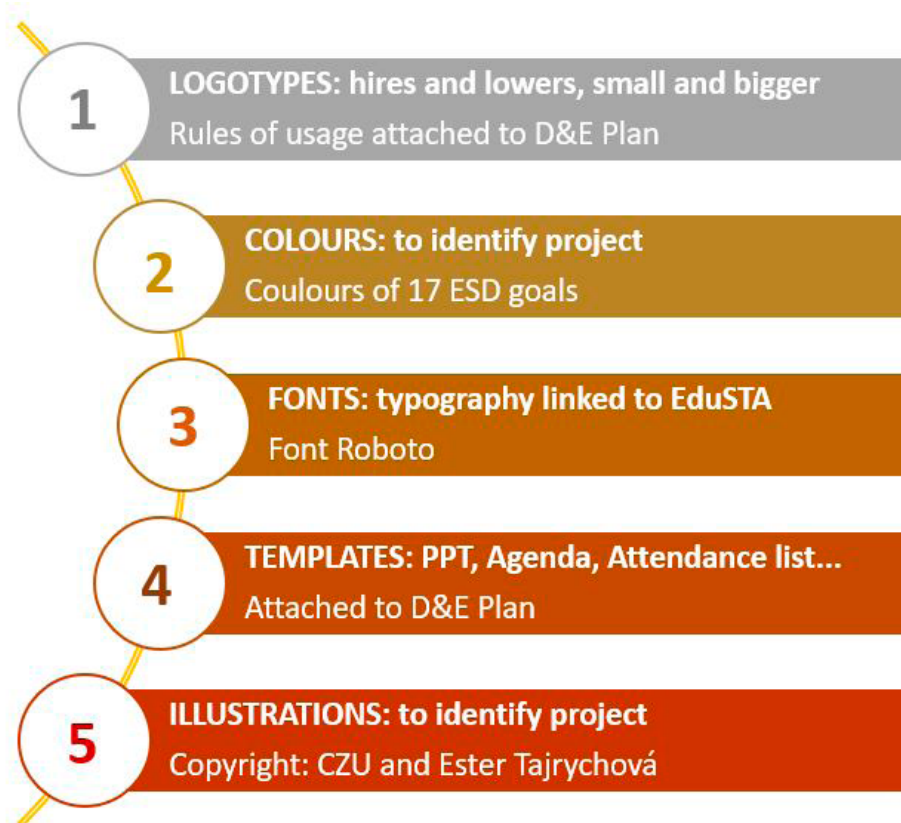
- **General Public and Local Communities**
 - For example, TAMK UAS community and Tredu Vocational College community or community of the Decin municipality in Czech Republic
- **Specialised Audience – Universities and VET schools**
 - Academic personnel – teacher trainers, teaching personnel, university students and future VET teachers, in-service teachers, research community at large, and other experts, such as personnel of other educational institutions.
- **Decision Makers**
 - National and regional education ministries and federal and local administrative bodies.

Project Identity

The impact of the project would not be such high without Dissemination and Exploitation Plan and Project Identity. The main purpose of Dissemination and Exploitation Plan was to demonstrate the approach of dissemination, communication, visibility, and exploitation strategy of the project results. It provided all steps needed to be taken during and after the project to achieve

maximum effect of the dissemination process and reach the relevant target groups. The strategy and plan of dissemination and exploitation was continually monitored, updated and reported during the project.

EduSTA identity (picture 2) was defined at the early stages of the project, and it contains elements such as logo, illustration, colours, fonts and templates for official project materials. Its purpose is to ensure visual consistency across all content created for the project. The templates are important for giving a united impression of the project, and to establish a common visual language that will, at a glance, indicate that the information concerning the EduSTA project.



Picture 2. EduSTA project identity.

The dissemination and publicity actions followed the international FAIR-principles.

The project identity of the EduSTA corresponded with the colours used for icons of 17 European Sustainable Development (hereafter named as ESD) goals. The EduSTA logo (picture 3) communicates all 17 colours of ESD goals, hexagons as a symbol of honeycomb (bee is a metaphor for sustainable practices – collaboration, biodiversity and environment protection) and collection of badges.

Czech EduSTA team also asked known artist Ester Tajrychová for drawing an illustration for the publicity purpose (see the book cover). This picture describes the process of teaching and learning for sustainable development and defending and awarding badges (micro-credentials). This picture was used as a corporate image in online communication and for tangible materials such as project notebook or book covers.



Picture 3. EduSTA logo.

Project Stakeholders

Efforts of the dissemination strategy focused on tailor-made content based on the need of different stakeholder groups.

The primary target group consisted of pre- and in-service teachers, and teacher educators in the participating HEIs. Dissemination activities at the partner institutions made the project known inside the institutions and have impact on colleagues (academic personnel) and students of BSc, MSc or lifelong learning study programmes of pedagogy, vocational teacher training, and special pedagogy.

The primary target group consisted of pre- and in-service teachers, and teacher educators in the participating HEIs.

Project partners shared EduSTA good practices (pilot courses), and results of concept, and context analysis with principals and educators (teachers) in home countries and regions (Catalonia, Czechia, Finland, the Netherlands and Sweden). For that purpose, meetings and workshops for professional organisations or national networks of VET school were organised.

International stakeholders are represented by the European and non-European universities (managerial, academic and research personnel) and European local authorities. The EduSTA team reached international stakeholders at several international conferences, for example ATEE 2023, ICOLLE 2024, Multiclass 2024, ICERI 2024, EAPRIL2024. EduSTA personnel also shared project results within international networks, who the EduSTA partners are members of.

The following presents a list of networks where collaboration with EduSTA has been particularly intensive:

Association for Teacher Education in Europe (ATEE)

The ATEE are constituted by about 120 individual members and 48 institutional members span over 40 countries around the world. They work both within and outside higher education. Personnel from institutions who are members of this association took part in EduSTA webinar. The EduSTA personnel took had a paper on EduSTA badges at the ATEE conference in Braga (Portugal, October 2023). Moreover, the Head of Office - M. Tagliabue was a key speaker at the EduSTA final webinar „Digital Open Badges Enabling Sustainable Future Educators to Becom Change Makers“.

Tampere Vocational College (TREDU)

Tredu is a regional upper secondary level college in Tampere. Around 500 students take part in preparatory training and yearly over 2000 persons are participating in other types of training arranged by Tredu with its 1200 personnel members. Tredu has altogether 15 campus areas in Tampere region. The intensive cooperation included testing new EduSTA open badges and taking part in two EduSTA webinars.

ENTER: European Network of Learning and Teaching in Agriculture and Rural Development

ENTER is a European association of educational institutions in the field of teacher training for secondary and higher vocational schools of agriculture, forestry, horticulture and related subjects. Members are 19 teacher training institutes of universities of applied sciences in 13 European countries.

The president of this network was responsible for the external project evaluation. On ENTER website, Facebook group and LinkedIn were frequently shared posts on project progress. Personnel from member institutions of the network took part in the EduSTA webinars. Czech EduSTA team conducted a workshop on EduSTA open badges at the ENTER Study days (ENSFEA Toulouse, March 2024).

UNESCO Global Futures Literacy Network

The Global Futures Literacy Network is a diverse community of futures researchers, practitioners, and supporters, ranging from the 20 UNESCO Chairs in Futures Studies and Futures Literacy to the High-Level Committee on Programs (HLCP) Foresight Network. EduSTA lead and HANZE personnel (Dutch EduSTA partner) effectively communicated the project results internationally through this network.

Moreover, thanks to the EduSTA activities, a variety of new partnerships was built up, (other networks communities or professional organisations):

Learning Planet Alliance

This alliance is worldwide community of passionate individuals and organisations committed to reshaping the world through innovative learning and collaborative approaches. Eveliina Asikainen, the project lead, participated as a key speaker in the episode “How Can Technology be at the Service of Environmental Education?” (LP Vision).

Erasmus+ Teacher Academy SciLMi Hub

This Hub comprising entities involved in both initial and continuing teacher education, schools, teacher associations, education authorities, foundations, NGOs, libraries, science centres, and other pertinent stakeholders. The EduSTA team participated SciLMi online fairs and seminars and also created project booth on SciLMi platform (Picture 4).



Picture 4. EduSTA booth on SciLMi platform.

The EduSTA project shared experiences with the consortiums of other Teacher Academy projects and programmes, including:

1. CLIMAtE change teacher's acaDEMY (CLIMADEMY), Erasmus+ TA
2. Teaching Sustainability: Content, Competences & Approaches for Europe's Pre- and In-service Teachers (TAP-TS), Erasmus+ TA
3. Teacher's Upskilling Aiming at Holistic Inclusivity in Learning (TUTOR), Erasmus+ TA
4. Meta-Scientific Literacies in the (Mis-)Information Age (SciLMi), Erasmus+ TA
5. Challenging the Climate Crisis: Children's Agency to Tackle Policy Underpinned by Learning for Transformation (CATAPULT), SOLSTICE, Youth in Action
6. Multicultural Classrooms: Inclusive Learning and Teaching in Higher Education (MULTICLASS), Erasmus+ KA2
7. Holistic Decision-Making for Climate and Environment (DECIPHER), programme Horizon Europe
8. Personal Green Skills in Higher Education, Erasmus+ KA2.
9. Sustainability Roadmap (Finnish Vocational Colleges and Finnish National Agency of Education).

How to Reach Stakeholders

EduSTA consortium has organised or participated in a variety of dissemination activities, including congresses, webinars and meetings. All participants of seminars and workshops developed their understanding of the urgency of adoption of operational sustainability competences in curricular and daily practices of educational institutions. This will produce changes in the practices of the schools, curricula and pedagogies, and will create greater need of in-service training or tailored projects with schools, which can be answered with the modules and learning pathways developed in the project.

During the whole project period, there were a dozen of meetings between EduSTA academic personnel, researchers and project managers organised at local, national, and international level.

Local meetings: personnel meetings at EduSTA partner universities, meetings within rector's boards, discussions with students, interviews for local authorities

Meetings with national scope: meetings with academic personnel from universities in home countries of partner institutions, reports to national education agencies, researchers from science centres, career counsellors from education enterprises, headmasters and VET teachers from vocational schools in home country, interviews with decision makers (e.g. personnel from ministries of education or EACEA).

Meetings with representatives from foreign universities: sharing EduSTA results, outputs and products was during international project meetings, international personnel events, hosting foreign academics or visits of foreign research. Academics from universities outside the partnership also participated in online EduSTA workshops. After analysing records of the meetings with aim to speak about EduSTA, the stronger impact flew to countries included in schema (see figure 7).

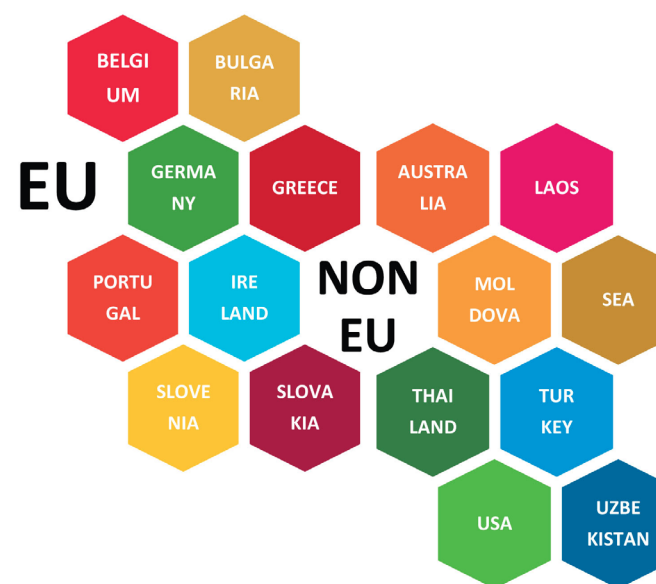


Figure 7. Impact in EU and non-countries.

The EduSTA consortium ensured an effective and synergistic internal and external communication framework to inform, promote and engage relevant bodies on how to leverage the results of the EduSTA. The creation and maintenance of the website together with social networks was a core part of the dissemination strategy.

Project Communication Channels

Website and blog

The EduSTA website was established at the very beginning of the project (July 2022) to disseminate essential messages to capture the importance of EduSTA-related issues, stimulate dialogue and promote knowledge transfer among stakeholders, partners, authorities, and the general public. The EduSTA web pages are nested on the website of TAMK.

The site stands as a baseline for understanding what Academy for Sustainable Future Educator is, its vision, its main objectives, and anticipated outcomes. It covers different sections that provide a holistic view of the Teacher Academy and highlights the work of the different WPs. Important section of the website was a blog – central repository and news broadcast channel for all public information. There were informal articles about project news, events, achievements, pilot courses, and specific EduSTA topics (competence-based education, open badges, sustainable principles, etc.) posted monthly. The website was continually updated throughout the project, so that it will constantly present update source of information for the interested stakeholders.

<https://projects.tuni.fi/edusta/>

Webinars

EduSTA consortium has organised or participated more than twenty dissemination events, including congresses, webinars and meetings. Table 11 presents webinars organised by EduSTA along with their topics, scope, objectives, and impact:



Table 11. Webinars organised by EduSTA project.

Online event	Date	Goals	Stakeholders
EduSTA webinar 1: Bringing Sustainability Education to Life – the Potential for EduSTA Badges in Teacher Training	23/11/2023	Introducing a badge constellation, exploring the relevance of educational badges in today's sustainability education landscape. Sharing current designs for learning modules that support the achievement of various EduSTA badges for educational professionals.	40 Academicals, researchers and VET teachers International
EduSTA webinar 2: Novel Ways to Support Teachers' Sustainability Competences with Digital Open Badges (webinar on sustainability and teacher education)	03/09/2024	Digitalisation and learning for sustainability. Defining teacher's sustainability competences in EduSTA. Presentations of pilots in Sweden, Czech, Catalonia, the Netherlands and Finland	90 VET teachers, TREDU personnel, Academics and VET teachers International
EduSTA webinar 3: Experiments of Enhancing Sustainability Competences and Future Literacy in Teacher Education	10/12/2024	Sharing the results and achievements after the piloting.	72 Academics and VET teachers
Final webinar: Digital Open Badges Enabling Sustainable Future Educators to Become Change Makers	01/04/2025	Presenting overview of all the EduSTA deliverables and results.	136 persons, including academic personnel and researchers. VET teachers EduSTA consortium, target groups, European HEIs and VET schools International

Podcasts

Two interviews were released on the podcast channel *Sånt är livet i Sverige* [That's life in Sweden!] <https://luusimaki.podbean.com/>. The moderator is Liisa Uusimäki from University of Gothenburg, Sweden.

In the first episode she invited a Finnish expert on micro-credentials Sanna Ruhalhti, a Finnish Teacher Educator and senior designer of EduSTA Open Digital Badges. Sanna shares there her thoughts about future teacher skills, international collaboration, and the importance of digitalization. She also shares her thoughts about the war in Ukraine and its impact on students.

In the second episode, Principal Lecturer, Dr. Hanna Teräs from Tampere University of Applied Science speaks to broad international educator community. Hanna Teräs had an important role in the European EduSTA project as an expert on development of micro-credentials. With the moderator she discussed about the good practices in distance teaching and learning, online collaboration and micro-credentials.

"If we talk about learning, it is not only acquisition of knowledge but also growing as a human being. You can cumulate knowledge by yourself, but you need collaboration and interaction to grow in a community."

These podcasts were powerful medium for dissemination of the project results, in reaching specific targeted audience such as associations of Swedish vocational schools at the secondary level, but also universities or wider research community from all the Europe.

Video-clips

To provide an audio-visual support to the whole project achievements and objectives, video-clips about developing the EduSTA badge constellation were released. This channel is the most suitable to reach a wide range of public and especially educators in European countries and in the third countries.

The videos are about lessons learnt of sustainable development in education by project team members, and the challenges of bringing sustainability

education into life. Four video clips based on interviews with Finnish, Dutch and Spanish EduSTA personnel were created during the consortium meeting in Groningen in the middle of the project life cycle. Each video is aimed at the experience in working in team on the milestone badge, concretely:

Video 1 on Sustainability Literacy: In her introduction of the macro badge Sustainability Literacy, Jenni Majuri explains the need for balance between sustainability knowledge and the teaching practice.

Video 2 on Ecosystems Design: Marta Gual Oliva and Corine Seelen reflect on the Learning Ecosystems Design badge and their personal learning processes.

Video 3 on Reflexive Practice: Joost Haverkort and Hanna Teräs discuss the need for actual action to achieve change and what this means for the teachers' roles, captured in the macro-badge Enabling Action.

Video 4 on Enabling Action: Lauren Verheijen, Jaume Ametller and Eveliina Asikainen illustrate the final badge Reflexive practice by walking the talk in reflecting on their own work in the design process.

For the purpose of the final webinar, each partner created own video-clip, presenting **goals, achievements, challenges of pilot courses** and future goals for using open badges. There are five videoclips developed all together. The EduSTA portfolio is also complemented by recordings from international webinars.

Social media

The fast track keeps information posted on social media. The most sustainable channel for EduSTA purpose was LinkedIn. <https://www.linkedin.com/showcase/academy-for-sustainable-future-educators-edusta>

Its purpose was to build community of educators and also point to post-project activities. The LinkedIn profile is kept lively, each month there are at least two posts on project news, such as invitations to project webinars, face-to-face seminars, results from the project research, description

of impact of project events, lesson learn from implementing pilots or announcement of new project products such as publication based on context and competence analysis Teacher Training for Education for Sustainable Development: Developing a Shared Competence Framework, EduSTA open badges and brochures.

The LinkedIn brought up a big community of academic personnel and researchers, project coordinator, career counsellors VET teachers and university students.

The EduSTA consortium achieved great success – the LinkedIn profile Academy for Sustainable Future Educators reached 847 followers! This channel will remain active, with new posts being added even after the end of the project.

The project partners also used own social channels to promote the project findings and foster the creation of a bi-directional collaborative community of interested stakeholders.

The good thing about using the social web is that it does not require sharing only full formed ideas or complete pieces of research – EduSTA consortium can share work in progress and get feedback that will improve results.

Articles

A very useful media to reach broad academia and scientific public were the university magazines and scientific journals. They are also appropriate channels for popularization of the science topics. For that purpose, the EduSTA partners published more than 50 articles with results of WP2 (Context and Competence Analysis) but also with case studies of using Open Badge Factory or piloting courses to develop ESD competences of VET teachers etc.

Articles in professional journals are media for members of professional community or personnel from vocational and tertiary educational institutions, career centres, or networks, e.g. Finish OAJ Areena – Finnish Teacher Trade Union's magazine (<https://www.oaj.fi/en/>), ENEE report (link), Article on EduSTA results in printed version or the Journal of the Spanish Service for the

Internationalization of Education (SEPI) or website of ENTER network.

Articles in scientific journals, e. g. article Enhancing Teacher Competences for Sustainable Development in Journal from the ICERI conference 24, article “Strengthening Teachers’ Sustainability Competences through Digital Open Badges”, in Proceedings of Society for Information Technology & Teacher Education International Conference, etc. The badge design process was described in a scientific article published in Acta Didactica Norden “Collaborative meaning-making: Teacher educators’ experiences in developing sustainability competence badges”.

A very high impact also brought articles, which were published on the websites of the European Commission or national agencies for Erasmus+ or scientific activities in partner countries, concretely articles: EduSTA presented in European Commission's report on teacher education for sustainability (pages 53–57), Erasmus+ Teacher Academies building the future of teacher education in Europe on the Finish National Agency for Education or EduSTA – Academy for Sustainable Future Educators on the websites of in the CZELO (Czech Agency for Science and Projects in Brussels).

Several articles about EduSTA outputs appeared in university magazines and on websites of the EduSTA partner universities.

Conclusion

This chapter provided an overview of the publication outputs and dissemination efforts undertaken within the framework of a project implemented in the framework of Teacher Academies. It brings some ideas for future project coordinators how to effectively communicate the project achievements and products. The professional outcomes included peer-reviewed journal articles, book chapters, and conference proceedings, many of which are indexed in international databases such as Web of Science and Scopus. These academic contributions reflect interdisciplinary collaboration and focus on topics relevant to the project's core objectives.

In addition to formal publications, significant emphasis was placed on dissemination to broader audiences. This included participation in public lec-

tures, media appearances (e.g., interviews, podcasts), fairs, and cooperation with vocational schools, national and international networks and academic institutions.

The chapter also highlighted the project's success in fostering international collaboration and visibility. Citations, media responses, and partnerships are evidence of the impact the project has achieved both within and beyond academic circles.

The breadth and depth of publications and dissemination activities presented here illustrated not only the academic rigor of the project but also a strong commitment to sharing knowledge beyond traditional boundaries. By engaging both professional and public audiences, the project had successfully bridged the gap between research and real-world impact. Let this serve as a reminder that a meaningful project does not conclude with its final publication. Instead, it begins a conversation that can inspire change, foster growth, and generate new ideas for the future.

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Evaluators' Comment

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The Academy for Sustainable Future Educators (EduSTA) project has made significant strides in the development of educational modules, piloting new methodologies, exploring open online badges (conducting thorough evaluations), and ensuring effective dissemination. After reviewing project documents and conducting interviews, several important insights have emerged that highlight both successes and areas for further development.

Development of Modules and Piloting: Achievements and Challenges

All project partners have actively contributed to the development and piloting of educational modules, achieving the set indicators. However, the scale and number of modules created have largely depended on the resources each partner had available.

One of the initial intentions was to develop modules collaboratively across multiple countries. However, due to differences in educational contexts, pedagogical approaches, and practical circumstances (e.g., offline, blended, and online learning), most development work was conducted independently within each country. This independent approach, though understandable, resulted in less co-creation than originally envisioned.

A significant effort was made in the early phase of the project to align understandings across the consortium. The creation of a shared glossary of concepts and jargon proved invaluable.

Additionally, Hanze University of Applied Sciences Groningen introduced Canvasses as a tool to moderate and compare module development. While this was beneficial within Hanze and potentially other institutions, the broader goal of comparison and co-creation across all partners was not fully realized. The final phase of the project, including the meeting in Prague, presented an opportunity to showcase the best practices, align modules more closely, and strengthen their connection to digital open badges.

The Role of Digital Open Badges in the Project

The Finnish partners brought prior experience with micro-credentials and digital open badges due to their unique educational landscape, which necessitates distance learning solutions. Their education and professional development systems encourage teachers and educators to enhance their skills through smaller, more flexible credit units. For many other partner countries, this approach represents a forward-looking innovation rather than an established practice.

There is growing recognition of the benefits of digital open badges. The underlying philosophy of online badges – offering development-oriented, formative, and flexible learning assessments – has encouraged consortium members to rethink traditional evaluation and certification methods. The challenge remains to what extent this system can be fully adopted and implemented in each partner country.

It would be advantageous to not only address the adoption of online badges but also to offer a practical demonstration of their implementation. Many educators and trainers still regard them as an abstract concept; therefore, a hands-on explanation could effectively bridge this understanding gap.

Evaluating the EduSTA Project: A Tool for Improvement

The project's internal processes, content development, and collaboration efforts have been thoroughly evaluated, with Czech University of Life Sciences Prague taking the lead in carefully documenting all evaluations, surveys,

and improvement plans. These materials are available in MS Teams for tracking and review.

One of the key considerations in such projects is whether evaluation serves merely as a checkpoint or plays a more integral role in shaping project direction. Balancing effective, substantive evaluation with the realization that it requires time and energy from partners is an ongoing challenge. Ensuring that evaluation remains a tool for improvement rather than an administrative burden is crucial for maintaining engagement and momentum.

Effective Dissemination Strategies

The dissemination efforts within EduSTA have been both extensive and effective. A variety of smart strategies have been employed, including leveraging the project website, a LinkedIn group, and other digital media tools used by various partners. The consortium also strategically connected with existing conferences, platforms, study days, summer schools and professional networks. These efforts have resulted in high-quality outputs such as applied scientific articles, conference proceedings, podcasts, and seminars at both national and international levels. An essential takeaway is the importance of national activities within international projects.

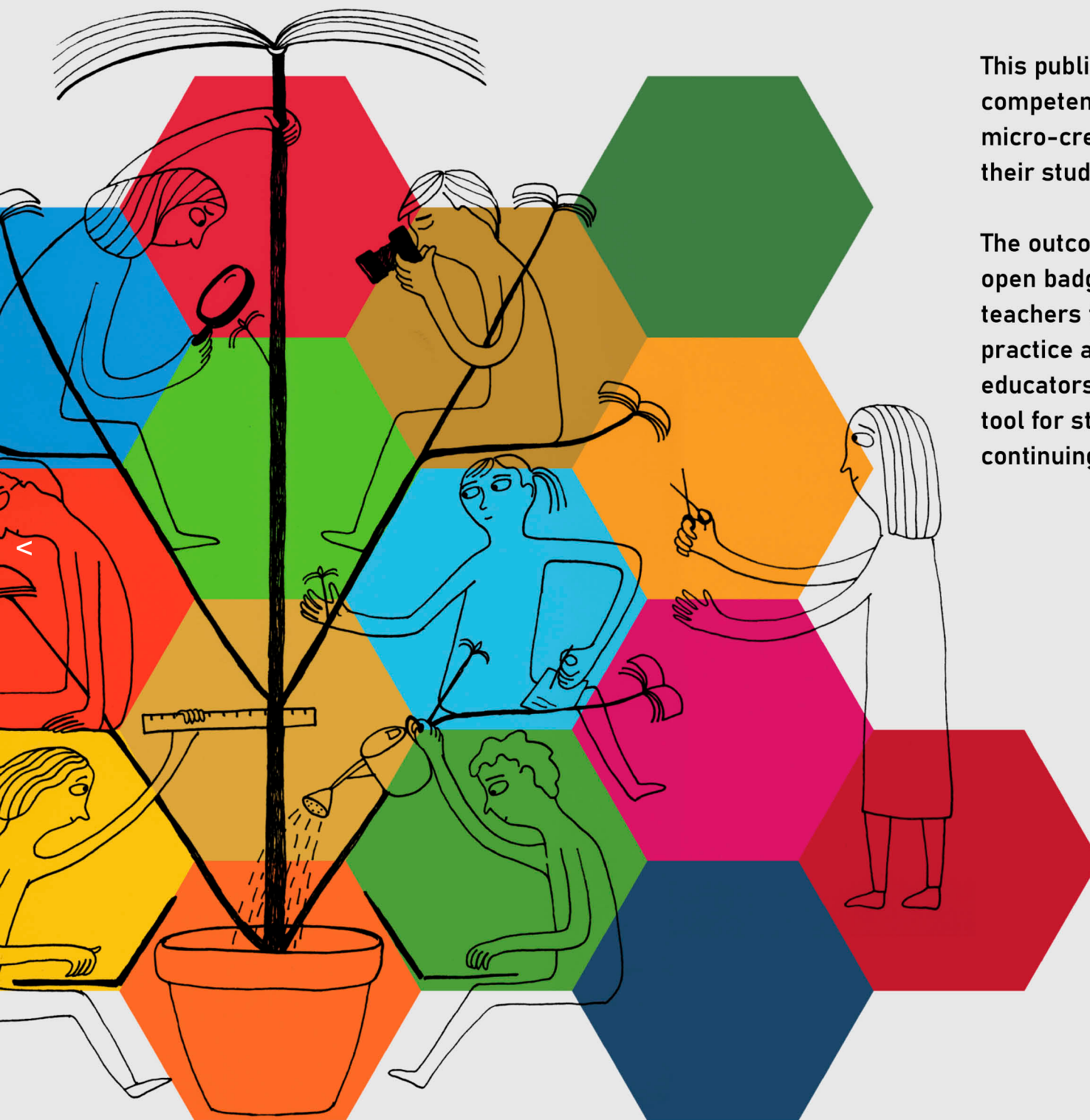
Addressing language barriers through localized dissemination ensures broader impact and engagement. For the final event in Prague, it was recommended that good practices from the developed modules will be shared, along with reflections on open online badges and their potential for integration into regular teaching and training practices. Demonstrating how digital open badges function in practice would be particularly valuable in making the concept more tangible for educators.

Lessons Learned and Future Steps

Overall, the EduSTA project has successfully navigated the complexities of international collaboration, module development, and innovative credentialing. While some initial aspirations for multi-national co-creation were not fully realized, the project has yielded valuable insights and practical

outputs. The final meeting provided an opportunity to consolidate lessons learned, showcase successful practices, and discuss the sustainability of online badges within partner institutions. By addressing these elements, EduSTA can ensure a lasting impact beyond the project's formal conclusion.





This publication explains how general sustainability competences were translated into practical micro-credentials that support teachers in guiding their students through transformative learning.

The outcome—the Sustainable Future Educator digital open badge constellation—provides a framework for teachers to simultaneously develop their professional practice and competences. In addition, it offers teacher educators and teacher education institutions a valuable tool for strengthening both initial teacher education and continuing professional development programs.

