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A collection of colorful geometric shapes, including pentagons and hexagons in shades of red, yellow, green, blue, and orange, arranged around the central text.

TEACHER TRAINING FOR EDUCATION FOR SUSTAINABLE DEVELOPMENT: DEVELOPING A SHARED COMPETENCE FRAMEWORK

Academy for Sustainable Future
Educators (EduSTA)

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TEACHER TRAINING FOR EDUCATION FOR SUSTAINABLE DEVELOPMENT (Developing a shared competence framework)

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Jaume Ametller, Eveliina Asikainen, Marta Gual
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LIST OF ACRONYMS AND ABBREVIATIONS:

CESD:	Competences for Education for Sustainable Development
ESD:	Education for Sustainable Development
(E)SD:	a mixture of ESD and SD characteristics
FL:	Futures Literacy
KSD:	Knowledge on Sustainable Development
SCESD:	Students’ Competences for Education for Sustainable Development
SD:	Sustainable Development
SDC:	Sustainable Development Competences
TCESD:	Teachers' Competences for Education for Sustainable Development
TTCESD:	Teacher training for Education for Sustainable Development

FOREWORD

Karel Němejc

Confronted by unprecedented global challenges, Education for Sustainable Development (ESD) stands as a pillar of hope, leading towards a future where education is founded upon knowledge, responsibility, and interconnectedness. At the forefront of this transformative journey there are educators and various stakeholders in education, serving as catalysts for change, shaping the minds of future generations.

The book “Teacher Training for Education for Sustainable Development: Developing a Shared Competence Framework” is tangible evidence of the collaborative efforts of committed researchers, educators and policy makers who are striving to improve the quality of teacher education for sustainable development. This work crystallizes valuable insights gained from in-depth research, workshops and interviews conducted in five collaborating countries, and lays the foundation for a unified competency framework that crosses borders and strengthens the global dialogue on education.

Within the following pages, the authors undertake a comprehensive exploration of ESD teacher competences, integrating scholarly precision with pragmatic relevance. The analysis, rooted in a thorough literature review, extends its scope to the educational contexts of Finland, Sweden, the Netherlands, the Czech Republic and Catalonia. Through this multi-dimensional lens, the book identifies common threads, providing a roadmap for educators, policymakers, and practitioners worldwide to navigate the complex landscape of ESD teacher training.

This innovative publication is characterized by a remarkable ability to easily link academic knowledge with practical frameworks. With a strong emphasis on collaboration and mutual understanding, the authors offer a well-defined pathway to a coherent approach to teacher education in Education for Sustainable Development. The collaborative competency framework presented in this publication acts as a dynamic tool for educators, offering a practical guide for both enhancing and assessing their skills in fostering sustainability education.

In the challenges and possibilities presented by the 21st century, the significance of ESD teacher training becomes increasingly pronounced. With its emphasis on empowering educators to foster critical thinking and action skills of their students, this publication emerges as a key element in building a more sustainable, justice and equitable world.

In conclusion, the book invites readers into a sphere guiding the educators shaping the future and calling to action for a more sustainable tomorrow.

1. INTRODUCTION - THE EDUSTA PROJECT: OPERATIONALISING TEACHER COMPETENCES ON EDUCATION FOR SUSTAINABLE DEVELOPMENT

Eveliina Asikainen & Jaume Ametller

Teachers' capabilities to act as active change makers in the ecological transition and to educate citizens and workforce to meet the future challenges is key to a profound transformation in green transition. Teachers' sustainability competences have been researched widely but a gap remains between research and the actual work of teachers. The starting point of the Erasmus+ Teacher Academies project EduSTA – Academy for Sustainable Future Educators (2022-2025) is to cross the gap between the conceptual models of teacher's sustainability competences and their realisation in teacher's work. In other words, there is a need to operationalise teacher's sustainability competences by describing the direct links with the everyday tasks such as curriculum development, pedagogical design and assessment. EduSTA does this through building a community, "Academy of Sustainable Future Educators" and by creating digital open badge-driven learning pathways on teachers' sustainability competences supported with multimodal learning modules. The project proceeds from mapping the contextual possibilities and restrictions for transformative learning on sustainability to operationalising competences as digital open badges and developing and piloting competence-based learning modules and open digital badge-driven pathways.

In this publication we present how the work on "Context and Competence Analysis" (EduSTA project Workpackage2) has led to the proposal of a set of teacher's sustainability competences. In chapter 2, we will present the literature review and analysis we have conducted to identify the core elements of existing and widely used competence frameworks that touch upon teacher's sustainability competences.

Chapter 3 contains the first results of the analysis of the context for Education for Sustainable Development in each of the participant countries (Czech Republic, Finland, the Netherlands, Catalonia-Spain and Sweden). The results are presented as case studies, which give an insight to the situation of each country. By presenting the five case studies based on the analyses carried out by the national teams we want to respect the multiplicity of voices and the work of all partners.

The data has been collected by:

- surveying the politico-legislative frameworks
- conducting workshops in co-operation with training schools
- interviewing key stakeholders connected to education and teacher training programmes.

The last chapter discusses a cross analysis of data from all participant countries and how the insights from this analysis, together with the results of the analysis of the

literature have been used to bring forward the EduSTA proposal for a framework of teacher's sustainable competences.

The proposed competences and all the contextual information provide a framework to address the main aims of the EduSTA project: the creation of a constellation of digital open badges, and the development of educational proposals. This framework articulates the information from theory, empirical research results, policy literature and professional knowledge necessary to underpin the formulation of the pedagogical principles, learning content and assessment strategy to be developed into specific proposals. We also intend to use this framework to acknowledge and tackle criticism about Eurocentric biases of Education for Sustainable Development competence frameworks and make them more relevant to both internal diversity and global outreach.

METHODOLOGY AND DESIGN

The politico-legislative and curricular frameworks provide and define the context in which teachers and teacher educators enhance sustainability in their work. In EduSTA, the national teams have surveyed these through literature searches and interviews of key actors as they form important background conditions for the development of the proposals in this project. Each project partner has interviewed key stakeholders of Education for Sustainable Development (from now on, ESD) policy development and implementation using a jointly developed thematic interview template. Interviews took place during January-February 2023. The stakeholders have been chosen independently in each country to provide information on the situation regarding Knowledge on Sustainable Development (KSD) and Futures Literacy (FL) in the partners' educational systems and in higher education institutions, particularly on relation to teacher training institutions and programmes.

The design of data collection started by defining the topics on which we wanted to collect data. These topics are areas of inquiry rather than specific questions and were selected considering two main criteria. On the one hand, we have selected aspects that are significant in the ESD literature. On the other hand, we have collected information that we deem relevant for the contextualisation of the design of open badges and educational proposals. Once we had agreed on the topics, we decided which types of informants would be better placed to provide information in each of the topics (see Table 1).

The University of Girona team has developed the structure of thematic interview and reporting templates for interviews (included in Appendix 1) to provide a template for all teams. The wording of exact questions has been decided by each national team according to the specific characteristics of the interviews and of the interviewees. Topics were presented with a certain degree of context considering that this work had the aim of informing the development of open badges and educational proposal later on in the project, however, more general questions had been posed when considered

appropriate. Each team has gathered information in relation to the educational level that is more relevant to its context and expertise. Therefore, we have used “academic institution” instead of school, college or university in the rest of the document in order to cover the variety of educational levels and institutions covered in the data.

The following is a list of the selected topics. The order in which topics are presented in the list is not necessarily the order in which they had been covered during interviews or workshops.

1. Characteristics of an academic institution that is working on ESD.

We would like to know how informants see ESD in practice in terms of how the institutions taking this perspective/approach work (or will work). This information will help us imagine how are the institutions teachers for Sustainable Development (SD) should be ready to work in and, hence, will help us to define the competences they would require working in that way, and to design the badge driven training pathways to achieve those competences.

2. ESD teachers: competences, knowledge and praxis

This is one of the key topics. On top of what the literature review, and the expertise of the EduSTA consortium, will tell us, we will use this data collection to gather data on what ESD teachers should know/be able to do to make ESD possible at all education levels.

3. Teacher education for ESD

Our badge driven pathway and training proposals must address relevant competences for ESD and they must do so in a way that fit teachers’ expectations, policy makers’ proposals and experts’ knowledge. We need to know what is being already offered and the empty spaces we might want to address. We also need to consider if our proposals should be part of pre-service or in-service training.

4. Situation of ESD in each country (and internationally, in Europe and the World)

To correctly pitch our open badges and training proposals we need information about how ESD is addressed in policy and implemented in practice. Here we will gather information about ESD in general terms, in terms of policy, organisation, aims, etc.

5. ESD taking place in academic institutions

Closely connected to topic 4, we are interested in how ESD is taking place, in concrete terms, at different academic institutions.

6. Connecting academic institutions to their surroundings/communities

This topic is closely related to topic 5. In this case we focus on how ESD is connecting academic institutions to their social contexts. ESD implies changes in the classrooms, but it requires going outside of the classroom and the school to ground itself in real

problems, real solutions and real networks. Knowing what is already taking place will help us design feasible proposals.

7. ESD in the context of educational change

ESD does not happen in an educational vacuum. For better or worse, ESD is part of a milieu of elements connected to how education should evolve to meet the needs of society in the future. These elements pull teachers in different directions through policy, training, and public and professional discussion. To what extent these elements fit with ESD, fostering, hindering, or just helping to define it in practice, is an important issue when designing open badges and training proposals.

8. ESD policy

Policy concerning ESD is a key element to consider when making our proposals. Interviews to policymakers and experts can throw light on how to interpret existing policy and on how policy might evolve in the future.

Table 1: Questions coverage in each data collection exercise. In the case of experts and policy makers items to be covered will depend on the profile of the interviewee

Question	Expert	Teacher	Policy maker	Lit Review
1	X	X	X	X
2	X		X	X
3	X	X	X	
4	X		X	
5	X	X	X	X
6	X	X	X	X
7	X	X	X	
8	X		X	X

On top of interviewing some experienced teachers, the practitioner’s opinions have been gathered by organising workshops. Each project partner has organised at least one workshop in cooperation with teachers or teacher students in November 2022 – March 2023. In addition to providing important information, the workshops have served both as a consultation mechanism and as a first step to engage schools in this project and as a capacity building platform for teachers.

During the workshops teachers have discussed what they should know to identify themselves as professionals who are actively constructing a more sustainable world and to be able to educate students to be change makers. Different ESD competence models for educators (UNECE competence framework and the Rounder Sense of

Purpose competence framework), knowledge on sustainable development competences (SDC), Futures Literacy (FL) and the GreenComp (Bianchi et al., 2022) have been used to inform the organisation of the workshops. The project team of the University of Girona has provided templates for the workshops and for reporting and organising the analysis of the results. Insights to the national data gathering and results are presented in the chapter “Context analysis. Five national cases”.

2. COMPETENCES ANALYSIS: A LITERATURE REVIEW

Jaume Ametller

To address our aim of defining a framework of operationalizable competences for teachers working on Education for Sustainable Development, rather than developing a completely new framework, we decided to make a proposal based on existing frameworks. To do so, firstly, we have gathered up-to-date information about proposals of competences teachers require to be involved in Education for Sustainable Development that are influential in research and innovation in ESD. Secondly, we have analysed the selected frameworks to look for core common elements and, thirdly, we have selected the elements that would be directly relevant for teachers' practice, that would foster a transformative perspective on ESD, and that could be operationalized.

We have not conducted a systematic review, but we have aimed to cover the most relevant literature on frameworks of competences for teachers of ESD (we will call these frameworks TCESD). Several reviews of this topic, and related ones, have been published in the past ten years, including a systematic review published in 2020 (Corres et al., 2020). We have taken them into account and used them according to our specific aim.

It is common in the literature that discussions about TCESD include elements of either how the teacher training takes place or about the teachers' effectiveness at promoting the development of competences for sustainable development in their students (from now on CESD). Though we will not review here these two aspects, we will refer to them when they are instrumental to the definition of the TCESDs.

LITERATURE REVIEW

During the last three decades, Education for Sustainable Development (ESD) has become an important topic of discussion both in terms of its presence in policy documents and on the number of academic publications around it. This interest is a consequence of the widely accepted need for systemic changes to shift towards a sustainable development for the Anthropocene and the central role that education must play in this paradigm change.

As with education in general, one of the key elements to foster an effective ESD is the improvement of the teachers' education. While there is a wide consensus around this point, proposals on what this teacher training for ESD (TTCESD) should be aimed at are rather scarce. Most of these proposals take the form of "competence frameworks" which often include a heterogenous set of components: areas, topics and goals of SD or ESD, aside from competences. This diversity might be connected to the complex nature of ESD and, hence, might be necessary to fully grasp what TTCESD must tackle. Despite this heterogeneity, the different proposals found in the literature have many points in common, albeit with different accents on the importance of individual

elements, differences in terminology to refer to the same, or almost the same, concepts, and with fluctuating status of some of the elements which might be a competence area or a teacher's competence depending on the proposal.

Our proposal had two aims. On the one hand to contribute to the confluence of existing proposals. To this end we have adopted the idea of a framework of teachers' competences for education for sustainable development (TCESD) and we have constructed it on the basis on existing framework proposals. On the other hand, our goal was to operationalise this framework into elements that can be effectively used to design open badge (and micro-credential) accreditation driven teacher professional development pathways. To address these goals, we have reviewed the literature on TCESD as well as the policy documents regarding ESD of five European countries, and we have conducted individual interviews and workshops with policy makers, experts in ESD, and students and teachers of professional development programmes. We will present these results in the next chapter.

As we have already mentioned, there are few proposals of TCESD in the literature (Vare et al. 2022). For the purpose of this summary, we will focus on six frameworks: UNECE (UNECE, 2012), CSCT (Sleurs, 2018), A Rounder Sense of Purpose (RSP, 2019), KOMBiNE (Rauch and Steiner, 2013), Bertshcy et al. (2013), and Cebrián and Junyent (2015). UNECE is the most influential in terms of other frameworks referencing to it. If we look at papers on ESD that refer to Teacher Education we can see that, even though the majority do not refer to a TCESD framework - other than their own framework proposal-, UNECE is the most widely cited. Our proposal is also based on UNECE and offers a comparison of the frameworks that are most used and quoted.

Two assumptions have guided our analysis. First, a definition of competence as a combination of knowing, doing and being. Secondly, the choice of the GreenComp framework (Bianchi et al., 2022) as the definition of the aims of ESD we will consider. Our choice of the GreenComp is eminently practical: this is the mostly likely framework of reference for policies in EU countries in the immediate future. Furthermore, we think that the GreenComp are located in a wide consensus on ESD which means that, while making explicit reference to it, our proposal should be useful for other ESD competence frameworks.

The UNECE framework, as the GreenComp, uses a matrix to define the competences. This matrix has two axes. The first one contains three ESD characteristics: *Holistic approach, envisioning change, achieving transformation*. The second axis contains four elements that UNECE refers to as learning experiences: *learning to know, learning to do, learning to be and learning to live together*. These seven elements appear, in one way or another, in all the selected TCESD frameworks.

In the case of the GreenComp the two axes are: *embodying values, embracing complexity, envisioning futures, acting for sustainability; and knowledge, skills and attitudes*.

If we compare that axis of both frameworks, we can establish some connections (see Table 2).

Table 2: Analysis and comparison of the GreenComp and the UNECE frameworks on relation to Sustainable Development/Education for Sustainable Development characteristics and Competence dimensions

Elements	GreenComp	UNECE
(E)SD characteristics	Embracing complexity	Holistic approach
	Envisioning futures	Envisioning change
	Acting for sustainability	Achieving transformation
	Embodying values	
Competence dimensions		Learning to live together
	Attitudes	Learning to be
	Knowledge	Learning to know
	Skills	Learning to do

Even before considering how each framework deals with each element, we can see two broad areas of agreement and one area that fluctuates. There are three characteristics of ESD that make them distinctive in relation to other education perspectives that we find in every proposal of TCESD (connected to ESD goals in terms of the competence goals for students):

ESD1. To consider the complexity of our world/context

ESD2. To envision different solutions/situations for the future of the world/context

ESD3. To plan and carry out action to bring about the envisioned futures

It is important to note that the action characteristic of ESD is not just an added competence, it changes the nature of all the competences included in the ESD frameworks; to develop a competence in ESD is not just to be able to apply knowledge and skills to concrete contexts/problems/situations, it is to do so. This is explicitly seen in the inclusion of the idea of urgency in some of the TCESD proposals.

To make this action-oriented perspective possible, ESD requires bringing together attitudes aligned with change (and with a specific change in particular) and the building up of agency. Together, they modify the idea of interest (in nature) from the earlier ESD proposals to the idea of (personal) investment in the (complex) problems and the bringing about of change. All of these are connected to identity.

Identity elements can be seen as part of the action-oriented characteristic of ESD or as a dimension to be included in the competences to be developed by students (SCESD) and they fluctuate in their conceptualisation across framework proposals.

Identity does not have to be seen as a purely individual issue. Identity is often seen as arising from the interaction with, centrally, other people. Hence, identity can be connected, not just with the idea of learning "to be", but also with the idea of "learning to live together". The latter is very important for ESD because of the connection between complexity outlook and action orientation - as well as being part of the poetical-ideological milieu of SD (see Table 3). We suggest splitting this "learning to live together" into two areas: one connected with values and attitudes to be included in identity and one related to how we cooperate with others to be included in the area of bringing about change.

Table 3: Modifications to the identity and values dimensions in the analysis and comparison of the GreenComp and UNECE frameworks on relation to Sustainable Development/Education for Sustainable Development characteristics and Competence dimensions

Elements	GreenComp	UNECE
(E)SD characteristics	Embracing complexity	Holistic approach
	Envisioning futures	Envisioning change
	Acting for sustainability	Achieving transformation/learning to live together - cooperation-
Competence dimensions	Embodying value/ Attitudes	Learning to be/ Learning to live together - empathy
	Knowledge	Learning to know
	Skills	Learning to do

All these elements together constitute what we call the core elements to define the TCESD. This level defines the playfield within which we will operate. This playfield gives us the core ideas of SD and ESD that will underpin our framework. The competence dimensions are defining the orientation of the learning situations/goals in ESD and the ESD characteristics provide goals for ESD in a very general form.

If we take now RSP framework we find two axes as well: *thinking holistically, envisioning change, achieving transformation; and integration, involvement, practice, and reflexivity* (see Table 4). The first axis is easily connected with the ESD characteristics. The second axis is connected to a model of education (action-oriented, transformative pedagogy). The way Vare et al (2019) define these pedagogy elements allows us to connect them with competence dimensions.

In RSP the identity core elements are more focused and restrictive, but, as we will see, other elements appear when crossing the two axes to produce the competences in this proposal.

The main contribution from RSP to our definition of core elements is the articulation of pedagogical foundations for ESD that orientate the work on competences.

We will now add to the comparison the CSCT proposal. Instead of two axes, this model uses a core of 5 areas seen as core elements of competences in ESD (knowledge, Systems thinking, emotions, ethics and values, and action), and general dimensions of the work of a teacher (teacher as individual, teacher in the educational institution, teacher in society) and “general competences” teachers must have (teaching, reflecting/visioning, networking).

Table 4: Analysis and comparison of the RSP and UNECE frameworks on relation to Sustainable Development/Education for Sustainable Development characteristics and Competence dimensions

Elements	RSP	UNECE
(E)SD characteristics	Holistic approach	Holistic approach
	Envisioning change	Envisioning change
	Achieving transformation	Achieving transformation/Learning to live together - cooperation-
Competence dimensions	Reflexivity/Involvement	Learning to be/Learning to live together - empathy
	Integration	Learning to know
	Practice	Learning to do

These three tiers are not just connected but, to some degree (according to the authors of the proposal) they overlap. The proposal makes an explicit effort to focus on the teacher and, in places, it blurs the distinction between the teachers as a professional or as an individual citizen. This duality appears also in UNECE, but that proposal focusses more on the teacher as professional – and indeed most of the transformation element of the ESD characteristics focuses on the teacher's transforming education.

The five core elements of the competences in CSCT can be connected to the pedagogical/competence dimensions. Emotions, ethics and values would fit into learning to be/learning to be together-respect-, Action would fit with learning to do, and Knowledge would fit with learning to know. This latter dimension would be associated with the fifth core competence chosen by CSCT: systems thinking. Something similar happens in RSP where knowledge is referred to by integration. In both cases the proposals are singling out a way of dealing with knowledge which, as we have already discussed, connects with the characteristics of ESD. In some cases, we have found

a mixture of ESD and SD characteristics connected in the frameworks, we will refer to this as (E)SD.

In the case of CSCT the proposed element is not just a characteristic of how one should deal with knowledge in (E)SD - integration, complexity... - but refers to something more specific and elaborated: systems thinking. This is not a competence dimension (learning to know), it does not talk about the characteristics to be underlined in the knowledge of the world/context from the SD perspective – complexity, integration –. Systems thinking has epistemological as well as ontological characteristics that are precise enough to consider it a methodology/tool to be used in SD and, hence, to be learnt in ESD. This is an example of the development of the core elements into a competence's framework: elements that we can see as goals or competences of ESD – competences that are build-up of more general competences. More general competences might deal with one or more than one of the dimensions and, in practice, they are used in conjunction with other general competences. These sets of coordinated general competences can constitute a big competence that functions as a whole.

The rest of the CSCT elements can be connected with learning to live together - cooperation- (networking, teacher in the educational institution, teacher in society), learning to be (reflecting, teacher as individual), envisioning change (visioning, and achieving transformation (teacher in the educational institution, teacher in society). Something that is very present in this proposal (as in Cebrián and Junyent, 2019) is the importance of embedding the local-global and the past-present-future dimensions in the conceptualisation of the world/context students construct in ESD.

The elements we have discussed so far, based on the literature review we have conducted and on our analysis, can be used to compare the four main frameworks we have considered (see Table 5).

Table 5: 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

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

Taking all of the above into consideration we have put forward a proposal for the elements that would underpin an ESD teacher competence framework (see Table 6).

We have added agency and uncertainty as two elements (one in identity and one in general orientations) because of their presence in the literature.

Table 6: 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

Existing proposals in the literature usually move from a set of “foundations”, as the ones we have already discussed, to define a, usually large, number of “competences”. They tend to be very heterogeneous and, even though they often present specific examples, in many instances the “competences” are far from being something that can be directly translated into an educational activity (either for students or for teachers as part of their Continuous Professional Development - CPD). UNECE, for instance, proposes in the same “competence” to generate dialogue for interdisciplinarity (an element of content), complex reasoning (an epistemological element) and to situate students in a g-local context (a contextual perspective). RSP, lists as “competences” elements as diverse in nature as futures thinking (a well-defined methodology), values (a dimension of our identity) and creativity (something difficult to even define).

These “competences” are useful but probably too many and too varied to serve as a guide to a concrete, open-badge-driven professional development plan, which is our aim. We need to do two things in order to achieve our goal. First, select a small number of competences for teachers to work within the coordinates defined in the core elements. This will be the competence framework of the proposal. Secondly, we should provide specific, well-defined, context applicable examples of learning situations where each of these competences can be developed; this will be a further development of our proposal that will take place in the EduSTA project work on the definition of the open badges. We could refer to this as a third level of development.

As a rule, all competences in our framework must be recognisable “action-cognitive tools” which can be applied to different contents and contexts. These competences could be seen as a combination of more general competences, but not all of them might be able to be developed independently. And even when that is possible it might not always be advisable. It is also important to keep in mind that many general competences are not specific to (E)SD nor are they, in themselves, conducive to develop SCESD.

Some competence frameworks have been the focus of a lot of research and designed proposals. They are mostly the ones connected with knowledge – unsurprisingly - and, to a lesser extent, with action. Much less so in relation to identity elements. This means that in some cases examples of the third level of development are well defined and easy to find while other will require more work. In all cases, these elements should be easy to turn into learning situations which would fit more easily with the idea that SCESD cannot be taught directly but they must be developed.

The final chapter briefly describes our work to move from the core elements to the competence framework, considering the insights from the national data collection that will be introduced in the next chapter.



3. CONTEXT ANALYSIS: FIVE NATIONAL CASES

FINNISH VET – EMPOWERING OF TEACHERS NEEDED TO FULFIL THE GREAT OPPORTUNITIES OF EDUCATING SUSTAINABLE WORKFORCE

Eveliina Asikainen, Jenni Majuri, Liisa Marttila, Outi Rantanen & Hanna Teräs

INTRODUCTION

On policy level, the highest document guiding ESD is the Strategy of the National Commission on Sustainable Development 2022–2030 by the Prime Minister’s Office. The strategy states the importance of institutional culture and learning environments in ESD. (FNCSD 2023.)

In its Sustainable Development Policy, the Finnish Ministry of Education and Culture stresses the importance of addressing the sustainable development perspectives in teacher education and supports the strengthening of sustainable development in in-service training of teachers. Furthermore, the ministry guidelines emphasis the importance of increasing opportunities for continuous learning and personal guidance (MofEC 2020 p. 9)

The Ministry of Education and Culture states the will of strengthening ESD in teacher education. Still, there are no legal competence requirements on ESD competences, which would cover all teachers. On the other hand, ESD is part of all National Curricula and National Qualifications of VET. Thus, it is somehow part of all teacher education programmes in Finland. But, based on our discussions with teacher educators working in different Finnish teacher education universities, the ways to implement ESD do vary greatly.

In Finland, the most straightforward and transparent means of recognizing and funding ESD is the funding for further education of teachers by the Finnish National Agency for Education. The Agency funds further education activities organized by teacher education institutions and by NGOs that work closely with teachers (including WWF Finland and Finnish United Nation’s Association). Green Comps (Bianchi et al., 2022) is one of the nine main themes stated in the guidelines for applying funding (OPH 2023). The definition of sustainability competence states specifically climate, loss of diversity of nature, planetary health, and circular economy. According to the call for applications “teacher training on sustainability competences can have elements of knowledge, skills and attitudes in leadership, teaching and counselling and as a part of practices and culture of the educational institution. There can be also education on applying the Green Comps or on how sustainability values and sustainable lifestyles are strengthened through teaching specific subjects or in specific vocations in VET” (OPH 2023, translated by the team).

The Finnish case of EduSTA presents findings mainly in the context of Vocational Education and Training (VET). The results are based on two workshops with VET teachers and one with VET teacher students. Secondly, we use knowledge drawn from expert interviews and analysis of Finnish ESD policy documents.

MATERIALS AND METHODS

The Finnish context of ESD is described through a document analysis of policy documents describing the context and principles of ESD (FNCSO 2022, MoEC2020), documents guiding the implementation of ESD in Finnish schools, VET and HEIs (EduFi 2023, Arene 2022, UniFi 2020) and documents that provide examples of how the policy is implemented (e.g. a call for grant applications by the National Board of Education, eRequirements and Opintopolku describing the qualifications of vocational education). Also, GreenComp (Bianchi et al 2022) was used as a European framework for the document analysis. The analysis was performed and reported for further analysis using the guiding questions and template provided by UdG.

Expert views were brought to the analysis by interviewing six experts in February – March 2023. These experts represented national educational governance, leadership and expertise in higher education, ESD expertise in VET, and ESD research. The interviews were based and reported using a shared structure provided by UdG and reported ac.

Practitioners' voices were constructed through three workshops with altogether 43 participants. One of the workshops was arranged on-site at a vocational school. The student workshop and workshop arranged for participants of a development project were organized online. The two in-service VET teacher groups differed in background knowledge in ESD or SD. The other group included VET teachers from different fields, and they had less background knowledge about ESD even though this group was formed by the VET institution itself. The other group included VET teachers who had a strong background in ESD and SD, and they were also enthusiastic and passionate about including ESD in their teaching. The workshops were organized according to the guidelines provided by UdG and reported using the reporting templates provided by UdG.

ESD IN THE FINNISH VET

Specific responsibilities of different educational institutions are described in MoEC (2020 p. 9. POLICIES box). General aim is to promote sustainable development activities, which with their links to continuous learning comprehensively extend to different areas of life and enhance the transfer of knowledge to the activities and from plans to practice. The Government Programme also requires that sustainable development and climate and gender equality education will be taken into account as cross-cutting themes at different levels of education.

In the Finnish VET, an approach of holistic institutional development of SD is quite strong. This is supported by a certification system created and run by an educational foundation and supported by the Ministry of Education and Culture (OKKA-foundation, n.d.). Furthermore, the National Board of Education is financing a project developing a road map for sustainable development in VET (VASKI project, 2023). This project has also an institutional approach. This holistic approach was also emphasized by our interviewees.

The VET is based on national qualification requirements and competence-based curricula based on these requirements. ESD is also embedded in the qualification requirements of VET. A course of one competence credit on sustainable development is nationally compulsory for all students. Themes are applied in vocational studies depending on the field of education and on the teachers' interests. The national qualification requirements also include an optional qualification unit on "Working with Climate responsibility (15 competence points). The providers of education have the power to decide whether they offer this unit and to apply it to a specific qualification. The example in the list of references demonstrates an example of turning the qualification requirements into assessment criteria in Natural and Environmental Protection (eRequirements, 2021).

EXPERTS' AND TEACHERS' OPINIONS ON POSSIBILITIES AND CHALLENGES OF PROMOTING ESD IN VET

The Finnish VET teachers and the interviewed experts express the need for professional and vocational emphasis also in ESD. The focus should be on the student's future profession and professional identity. On the other hand, this can be a source of discomfort or hesitation for teachers, if they don't feel professionally competent enough to discuss sustainability in a professional context with their students.

Our interviewees emphasized that teachers need some understanding of the broad framework of sustainable development, but not all need to be professionals on all specific topics. According to their understanding it is fine to focus on one or two topics and promote them in one's work. Teachers need knowledge of the key concepts of SD. The understanding of key concepts and a positive attitude towards sustainable development were mentioned as the most important factors for a teacher to be able to develop knowledge-based specialisation on ESD and find concrete pedagogical solutions. Harnessing students' skills and enthusiasm for the theme requires that a teacher has an open attitude and is humble, especially in situations where students know more about the subject.

In the workshops, teachers stressed that it is important to harness students with an example of positive attitude towards SD and demonstrating it through actions is important as teaching ecologically sustainable skills has a big role in the work of VET teachers. Positivity, faith in (better future), thinking openly about own possibilities to

choose, critical thinking and assessments of sources of information, experiential learning, demonstration, active learning, discussions presenting new perspectives, teasing out ideas were mentioned as practices that describe ESD teacher's attitude and practices to teaching and learning and her/his pedagogical tools. The VET teachers emphasized co-operation with working life as an important part of successful ESD. Site visits, guest teachers from working life, internships and different kinds of projects were mentioned as examples, and also the possibility to use these more, and in more innovative ways was acknowledged.



Picture 1: VET teachers at pondering about their needs for sustainability competences at Tredu Vocational College, Finland

Concerning their needs, the VET teachers mentioned the importance of knowledge - access to checked, reliable knowledge (databases), knowledge of new innovations – staying updated in the SD developments of one's own profession. Regarding to knowledge, teachers expressed an understanding that knowledge is changing and the need to somehow know that they are using reliable knowledge. This reflects a feeling of inadequacy with different sources and formats of information.

In the workshops, Finnish VET teachers and teacher students expressed that they were lacking the following skills or competences: using digital tools in the sustainability context, specifically using carbon footprint calculus (and to teach it to their students), searching information, and courage to learn together with and even from their

students. The teachers also said they need more ideas for active learning methods, and competence of presenting different perspectives of sustainability in their teaching, referring to ecological, economic, social and cultural dimensions of sustainable development. They also expressed a need for guidance or instructions to make abstract topics and concepts more concrete.

As we had in our workshops teachers with different experience of working with ESD we could also observe some differences, which describe professional growth or development of expertise in ESD. The more experienced teachers were able to name more sources of information and pedagogical ideas or tools to make sustainable practices visible: videos, games, visits, tests, documentaries, recycling diaries, and using companies as examples. All teachers mentioned that resources to actual development of ESD tend to be scarce and teacher's space for action in the educational institution is often limited. Yet, the more experienced teachers had a more systemic idea of the educational institution and stronger capacity to influence practices of the institution. The less experienced teachers were concentrating on how to add ESD to their teaching and didn't discuss their role in influencing the educational community. Also, connecting with nature felt quite difficult and distant for the beginners while the more experienced teachers could describe ways to bring nature and ecological sustainability into teaching holistically and to go beyond recycling, which tended to be the first interpretation of ESD.

SUMMARY

In Finland, ESD is already a quite coherent part of the educational policy in all levels of education. It is embedded into national curricula and qualification requirements of VET. Also, it is one of the main focuses of further education of teachers. Still, commitment, practices, and resources (as time, money, support) vary greatly in individual educational institutions.

One of the main findings is that vocational teachers' understanding of their role in promoting sustainable development varies greatly. Some see that the role is limited to what happens with the students. As such they feel that they can influence the future through this role, but they don't necessarily see how to influence the practices of the educational institution. On the other hand, teachers who are more experienced with ESD do have systemic understanding of institutions and of the educational system. Thus, they are able to use also these opportunities of change making.

The Finnish VET teachers express the need for professional and vocational emphasis in ESD. This should support students' future profession and professional identity. Yet, this can be a source of discomfort or hesitation for teachers, if they don't feel professionally competent enough to discuss sustainability in a professional context with their students.

Possible solutions to this can be found in strengthening co-operation with working life through internships, authentic learning, visits and projects, and through developing teacher's competences of dealing with uncertainty and change. Parallel to this VET teachers need help in finding trustworthy learning resources and examples of successful pedagogical approaches in the context of VET.

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VET EDUCATION FOR SUSTAINABLE DEVELOPMENT IN SWEDEN

Liisa Uusimäki & Susanne Gustavsson

INTRODUCTION

The responsibility for Swedish higher education, research, and funding rests with the Swedish Parliament (Riksdag) and the Government. Laws that apply to the sector are set out in the Swedish Higher Education Act (Swedish Council for Higher Education, 1992:1434), the Swedish Higher Education Ordinance (Swedish Council for Higher Education, 1993:100), and Swedish Higher Education Authority (UKÄ) (Kahlroth, 2020).

Sweden has a long history of sustainable development (SD) considering Sweden was the first country in the world to pass an environmental protection act in 1967, and in 1972 hosted the first UN conference on the global environment. SD has formally been on the Swedish Higher Education Institutions' agenda since 2006 (Scott & Gough, 2007). SD was first introduced by the Brundtland Commission (1987) and is defined as "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (UN, n.d; Lövin 2022). This definition is aligned and reflected in the following statement by Swedish Council for Higher Education, (2015).

... Higher education institutions shall promote sustainable development to assure present and future generations of a sound and healthy environment, economic and social welfare, and justice.

In Sweden, sustainability is built into all teacher education courses including vocational teacher education (Carr & West, 2014). It is mandatory for teachers to incorporate ESD into all subjects in Swedish compulsory schooling, as knowledge about the concept of sustainable development is examined in courses. The objectives include being able to link to scientific foundations, society, and ethical aspects that concern social, ecological, and economic perspectives. Teachers are to:

demonstrate the ability to make assessments in educational work based on relevant scientific, social, and ethical aspects with consideration for human rights, especially the rights of the child according to the Convention on the Rights of the Child, as well as sustainable development. Higher Education Ordinance (1993:100) Swedish Code of Statutes 1993:1993:100 up to SFS 2022:1609 - Parliament Annex 2.

SWEDISH HEIS AND SUSTAINABLE DEVELOPMENT

In their study, Finnveden et al. (2020) note that most of the 47 HEIs investigated offer courses or degree programs in which SD has been integrated, but that the quality of

work varies. The study found that about half of the HEIs do not have overall targets for SD in place and that even fewer followed-up these targets or offered professional development for teachers (Finnveden et al. 2020, p.687). Further, only about a quarter of the HEIs were considered to have established “a well-developed process for their work on SD in education”. This suggests that the Swedish HEIs’ efforts to promote SD need to be developed further to become more apparent to ensure SD is in line with Agenda 2030 and the Paris Agreement on climate change. A way forward is suggested by Argento et al. (2020) who argue that there is a need to focus on individual teacher’s competences through HEIs in Sweden to offer courses in Pedagogy with a specific focus on teaching for sustainable development. This way teachers with knowledge of sustainability issues can relate and teach sustainability in their specific subjects while recognizing the interconnection of sustainability to other topics and disciplines (Bianchi, 2020).

VOCATIONAL TEACHER EDUCATION

National VET curricula in compulsory education and training (up to upper secondary level) are developed by the Swedish National Agency for Education (SNAE). The National Agency for Higher Vocational Education (Myndigheten för yrkeshögskolans, NAHVE) is responsible for deciding the content for CVET. IVET for adults is run by municipalities, with a more flexible approach to programmes. Community high schools are run by non-profit organisations and offer a few VET programmes, for example for journalists. (Cedefop, 2023)

Swedish Higher vocational education is embedded within the framework of vocational education and interpreter programs. The role of vocational education is to meet the needs of the labour market which is achieved through the provision of combining theoretical studies with workplace training. The length of higher vocational programs varies between one and three years and is equal to just over 10 percent of tertiary education. (UKÄ, 2020)

The Swedish *vocational teacher program* leads to a teacher degree, that is teachers are eligible to work in the vocational programs of upper secondary school, upper secondary school's vocational special education programs, vocational introduction, and vocational education within municipal adult education.

There are over 250 vocational subjects offered in upper secondary vocational education. Prior to admission, the student's vocational skills are assessed through validation in one or more vocational subjects. The studies consist of 90 credits, of which 30 credits are work-based training. The courses cover pedagogical and didactic areas, as well as other areas such as school development.

The objective of the vocational teacher degree is "to demonstrate the ability to make assessments in the pedagogy based on relevant scientific, societal, and ethical aspects, with particular consideration for human rights, especially children's rights

according to the Convention on the Rights of the Child, as well as sustainable development." Higher Education Ordinance (1993:100) Swedish Code of Statutes 1993:1993:100 up to and including SFS 2022:1609 – Parliament

For a vocational teacher degree, the student should:

- demonstrate self-awareness and empathic ability,
- demonstrate the ability to maintain a professional attitude towards students and their guardians.
- demonstrate the ability to make assessments in pedagogical work based on relevant scientific, societal, and ethical aspects with consideration given to human rights, especially the child's rights according to the Convention on the Rights of the Child, as well as sustainable development, and
- demonstrate the ability to identify their need for further knowledge and to develop their competence in both the professional subject and pedagogical work.

UNIVERSITY OF GOTHENBURG – VOCATIONAL TEACHER EDUCATION PROGRAM

The University of Gothenburg (2023) is internationally recognized for its work on sustainability issues in education and research. The goal is to further develop and strengthen sustainability efforts and increase 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.

Education for a sustainable future is a crucial aspect of the university's mission and courses and programs on sustainability can be found across the university's faculties. To ensure courses and programs educate for sustainability the university has had a system for sustainable labelling courses and programs since 2014. The labelling is based on criteria reflecting the multidimensional concept of sustainable development. Today 20% of course and 25% of programs are sustainably labelled. Even so, there is still much work to be done to promote the concepts to lecturers and students.

The purpose of the Vocational unit at the University of Gothenburg, partnering in the EduSTA project is because there is a need to provide and support vocational teachers in their understanding of the interrelationship between SDs and ESD to their specific areas of expertise. To get a sense of Swedish Vocational Teacher education a brief introduction is necessary.

The current Vocational Teacher Education Program at the University of Gothenburg is carried out remotely with one or two campus meetings per semester. The studies are conducted individually and in groups through the institution's learning platform. During the work-based part of the education, the education takes place at a school near the student's place of residence.

Learning for sustainable development is characterized by:

- democratic working methods
- critical perspectives
- interdisciplinary collaborations
- a diversity of pedagogical methods
- student participation and influence

Several courses in the vocational teacher education program contain elements that are directly related to ESD. For example, in one course, the learning objectives are:

- Investigate and reflect on the concept of sustainable development and its use in schools and society.
- plan an educational/teaching activity on the theme of sustainable development related to vocational education.

As an example of the above course, the examination consists of two parts and is graded on a three-point scale (Fail-Pass-High Pass).

1. A group project - the group is to plan to teach about ESD (Education for Sustainable Development).
2. An individual reflection on how ESD can be expressed in vocational education.

The individual reflections are categorized into three challenges:

Challenge 1. Preconditions for a sustainable society:

This involves a critical consideration of what is possible regarding a sustainable lifestyle and working life. There is a focus on the global situation, people's conditions, and opportunities. For example, what economic conditions are required for both businesses and individuals to act sustainably? Students reason about reciprocity, credibility, trust, resource preservation, creating equality, and gender equality.

Challenge 2. Preconditions for students:

Young students (16-19 years old) may resist or show disinterest in sustainability requirements and ESD. The challenge for vocational teachers is to activate motivation for learning among these disengaged students. Students who are provided with real-life learning opportunities such as, for example, comparing working conditions in other countries to Sweden where ESD form a central part of courses and may help students re-evaluate their values. This relates especially to students in so-called "vulnerable" areas in Sweden whom no fault of their own cannot prioritize sustainability in their private lives. The conflict they experience often arises between normative education and everyday life. The main purpose of vocational education is to support the development or updating of the student's skills, in their area of work.

The benefits of quality workplace learning can more concretely show the consequences of sustainability perspectives. This is demonstrated by workplaces having more developed strategies, tools, and routines. In contrast, there are

workplaces that may not meet sustainability requirements and can create confusion for a student.

In adult education, vocational teachers need to manage linguistic and cultural differences in their teaching since they encounter a diversity of nationalities. This provides an opportunity for vocational teachers to learn about the diverse experiences of their students while having opportunities to disrupt habits and routines that may differ from their previous workplaces in their countries and to learn about the Swedish workplace culture, democratic values, laws, equality, and so on.

Challenge 3. Conditions for sustainable education:

There is a call for vocational education and vocational teachers to become more attentive to ESDs. Unfortunately, one of the problems that have been identified relates to workplaces that are not always the role models that schools/vocational education have hoped for and that require further work to develop active dialogue both with students and with workplaces.

Creating projects or teaching about, for example, to students who are interested in the work of a florist requires specific skills in sorting, choice of materials, and sustainable processes. Processes, that may be perceived and experienced by students as too simplistic or narrow.

Questions, such as, what effect do sustainable processes have on the environment? For example, to a florist the challenge here is to link to ESD explaining the importance of making bouquets with locally produced plants and understanding the use of ecologically degradable material and integrating this with a global perspective, to develop a deep understanding and an awareness of sustainable processes. Teaching is not about transmitting knowledge, rather it is about personal change, the development of new understanding, and awareness.

Individual interests, needs, and opinions of students exist that should not always be influenced or are not possible to influence. The question of right or wrong when it comes to sustainability is not always simple and it is important to consider, ethical dilemmas, engagement, and action. For example, there is a risk that the conversation in education can lead to political discussions and lead to conflicts between students. Here, the school's policy documents, and research cannot be seen as neutral, since the policy documents are fundamentally a political stance where students differ in their interpretation.

Subject integration is an excellent way to create a context where teachers with different competences can contribute to courses and programs. Vocational subjects can be integrated with mathematics, social studies, and natural science. For example, students in building and construction programs are taught by engineers using mathematics to calculate heat losses through different materials. Students give presentations in English and Swedish, and examiners are from the building and construction field to ensure that students can demonstrate their understanding, skills,

and the purpose of how the task relates to their future profession and their personal position.

COMPETENCES

The challenge in Sweden is a lack of national initiatives supporting the development of vocational teachers' competences. The development of professional competences in ESD lies with each educational institution/school/authority responsible for the professional development of its teachers.

Below are examples of competences that need to be strengthened:

- 1) Knowledge of the ESD goals, and the competence to illustrate and use these goals in their work. The reference to the ESDs is in the curriculum and is the responsibility of every teacher, regardless of the subject(s) they teach.
- 2) Current professional competence and subject didactic competence. Teaching should support students to develop the necessary knowledge applicable to their place of employment.
- 3) The ability to stay up to date with research, and proven experience.
- 4) Social competences including the ability to handle conflicts.
- 5) Ethical and norm-critical competence.
- 6) Economic competence in connection with the selection and purchase of teaching materials.

Sweden is consistently ranked as one of the most sustainable countries in the world and the reason is not surprising considering the sustainability initiatives for renewable energy and recycling took place many years ago (Green Flag n.d.) and that learning about sustainability begins at the age of 3.

Nonetheless, sustainable development and challenges can never be ignored.

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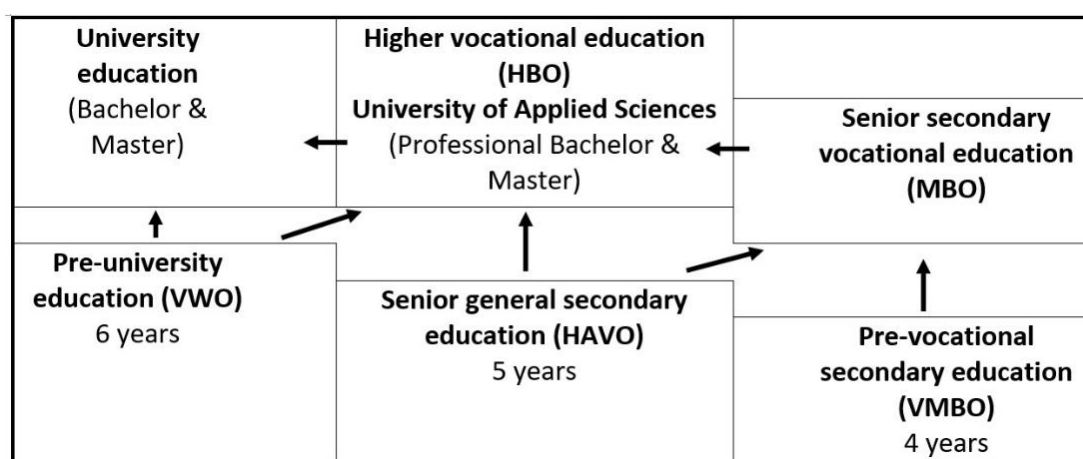
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EDUCATION FOR SUSTAINABLE DEVELOPMENT AND THE DUTCH EDUCATIONAL SYSTEM

Petra Cremers, Corine Seelen, Elles Kazemier, Lauren Verheijen & Jitske Gulmans

In the Netherlands, in general there are two kinds of educational institutions that prepare students for specific professions: institutions for senior secondary vocational education (called 'MBO' in Dutch) and Universities of Applied Sciences (UAS; 'HBO' in Dutch). Students can enter the MBO programme after four or five years of secondary education. They have access to universities of applied sciences after five or six years of secondary education or after having completed an MBO-programme. Research universities require completion of six years of secondary education (see Picture 2).



Picture 2: The Dutch educational system (Cremers, 2016)

Within the EduSTA project, Hanze UAS targets mainly (student)teachers of UAS (HBO) and senior secondary vocational education (MBO). The analysis is based on three workshops, one interview and the results of nine cases interviews.

Interview and workshop participants were predominantly UAS teachers (some of whom are working on or have completed (PhD-) research into ESD-related subjects), some MBO-teachers and one teacher at a research university. While MBO clearly focuses on vocational training, the distinction between UAS and research universities is smaller. The difference lies in the balance between education and research: at UAS education has been the primary goal for a long time, research groups at UAS have only been established in 1993 and government funding for research is relatively modest. UAS also have an obligation to make an impactful contribution to society. Research universities' primary commitment is to research, as they are mainly funded and rewarded for research, and less for education. Both UAS and research universities perform practice-based research that aims to have an impact on society; research universities also perform more fundamental research.

NATIONAL POLICY ON ESD

ESD in the Netherlands has been addressed by the Dutch government in a national plan 'DuurzaamDoor' (Education for Sustainable Development in the Netherlands, 2023), applicable to both research universities and UAS, and supports formal, nonformal, and informal learning. Its underlying concepts are based on multi-stakeholder participation, cocreation, social innovation, and transformative learning.

INSTITUTIONAL POLICIES ON ESD AND TC FOR ESD

Most, if not all, of the research universities have some strategic plans or guidelines to promote ESD (Rijksoverheid, 2022). As UAS strive to make a positive impact on society, ESD almost inevitably forms a vehicle through which this impact can be made. Research and education are increasingly interwoven in regional collaborations with government, small and medium enterprises (SME) and other educational institutes to create impact for societal challenges. Many examples can be found on the specific educational programmes focusing on sustainability and the SDGs (most notably in minors, electives, and master programmes) and institutional focus in e.g. mission statements and visions (Professionals voor Morgen, 2019; Rijksoverheid, 2022; Vereniging Hogescholen, 2019, 2023). Explicit examples of active promotion of Teacher Competency for ESD however are still scarce, as well as the integration of ESD into core curricula.

Regarding teacher-training on ESD, some training programmes are available and have been executed, but incidentally and fragmented, addressing the intrinsically motivated teachers/frontrunners. They have not been integrated as a formal part of teacher training yet. The importance of ESD is being recognized in theory; action in practice still proceeds slowly and fragmented, mainly by the frontrunners, evolving through experimentation as they go.

TEACHER COMPETENCE PROFILES IN THE NETHERLANDS

In general, primary education, secondary education and vocational education have a shared teacher competence profile in which no explicit reference to ESD is made. The pedagogical competence however always addresses the support of moral development in students and the reflection and development competence concerning norms and values. ESD is not (yet) explicitly mentioned in national formal role descriptions, but descriptions are suggested in various documents.

REFLECTIONS OF TEACHERS ON ESD

When asked which competences or skills are required for ESD, the teachers seem to focus on soft skills such as: communication skills in leading discussions within a diverse group in a normative context; asking the right questions, evoking reflective thinking, creating a safe, equally experienced atmosphere. Another requirement which

is stressed is an attitude of empathy, open mind, vulnerability, equality and awareness of one's own values, assumptions and perspective. Reported required knowledge for ESD teachers in Dutch UAS steers towards knowledge that is needed to foster transformative learning, systems thinking, Futures Literacy, collaborative caring and transformative design.

When asked if Dutch UAS teachers are prepared to perform ESD, one of the teachers answered that "not everyone is ready for this" and that training, commitment and passion is required. The rich case interviews reveal that teachers emphasize the need for didactic competence:

- Pedagogies highlighted from the cases of educational practice are along the lines of design-based, challenge-based and case-based learning. Emphasis lies on students working towards a 'solution' of a specifically formulated problem.
- The relationship between the student(s) and educator was emphasized as: 'everyone is a learner', relationship built on trust, emphasis on coaching (minimal lecturing) or community/group-based learning.
- Format embraces uncertainty, chaos and friction in the learning process.

CONDITIONS FOR IMPLEMENTING ESD

Two kinds of conditions are mentioned by the teachers: systemic and educational.

In interviews and workshops criteria and necessities mentioned for better implementation of ESD focus on institutional or systemic conditions such as:

- Providing a space for experimenting freely together with students so teachers can follow and strengthen the contribution they want to make to ESD.
- The possibility to leave existing structures behind, e.g. by collaboration among all study programmes, and to connect new initiatives and collaborations to their own.
- Additionally, a whole school approach of ESD within the whole educational system would be essential. Buildings, classrooms, facilities should all live and breathe sustainability, to set examples and bring inspiration.
- Often the linear and concrete nature of the 'professional profiles' (and corresponding regulations for (final) assessment for each education programme) guiding the Dutch UAS were seen as especially limiting. The assessment system should allow for holistic assessment, for varying learning outcomes (each student and each SD-project is different), and for graduating in interdisciplinary groups, while working and learning in transition or innovation communities.

Regarding the ways teachers would like to learn and practice ESD, several options are mentioned:

- Time and space for teachers to collaborate on evolving ESD ("we should always teach as a team or a couple instead of alone");

- Time and space to learn from initiatives and role models in other programmes or institutions (this is also systemic: it is still unclear who is doing what with respect to ESD, it is very fragmented);
- Learn together in teacher learning communities or teacher development teams.
- Embedding TCESD to the trajectory of didactic teacher professionalisation;
- Flexible learning (smaller chunks rather than entire curriculum, masterclasses, lunch meetings) and hybrid/online learning.

Some recommendations for the EduSTA badges are:

- Use the badges as support for educators to engage in transitions;
- Work in small teams to stimulate innovation;
- Microcredentials can only be acquired in a team and/or given as a bigger piece of the puzzle;
- Tap into experiments that are already being done;
- Stimulate a community of practice / professional learning community;
- Focus on how do I (teacher) do this transition? Not just using the microcredential to show 'what could be'.

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TEACHER TRAINING FOR EDUCATION FOR SUSTAINABLE DEVELOPMENT IN THE CZECH REPUBLIC

Jiřina Sněhotová & Jeanette Kovaříková

INTRODUCTION

The strategies on education for sustainable development (ESD) are part of a larger concept: the Strategy 2020 - 2030+. This is a key document for the development of the education system in the Czech Republic in the decade 2020–2030+. The two main strategic objectives are:

- to focus education more on the acquisition of competences needed for an active civic, professional, and personal life, and
- to reduce inequalities in access to quality education and pave the way for the maximum development of the potential of children, pupils, and students (Czech Ministry of Education, Youth and Sports, 2020).

As in other European countries, education in the Czech Republic is based on equal access to learning for all Czech citizens and citizens of other EU member states, without discrimination based on race, colour, sex, language, religion, nationality, ethnic or social origin, property, health, or other factors. It considers the educational needs of individuals. It aims at mutual respect, tolerance of opinions, solidarity, and dignity of all participants. In the Czech Republic, ESD is described in six areas or so-called cross-curricular themes for basic education: Personal and social education, Education of a democratic citizen, Education to think in European and global contexts, Multicultural education, Environmental education, and Media Education, and in four themes for secondary education: Environment and Sustainability, Labour Market, Inclusive Education & Equal Opportunities, and Global Development Education. The cross-curricular themes are part of the Framework Educational Programs which form a generally binding framework for the creation of School Educational Programs of all fields of education in preschool, elementary, elementary art, language, and secondary education. They were introduced into education in the Czech Republic by Act No. 561/2004 Coll., on pre-school, primary, secondary, higher vocational and other education (Education Act).

SITUATION OF ESD AND ITS EFFECT ON TEACHER TRAINING FOR ESD

The position of ESD teachers does not exist by itself in Czech schools. They are not mandatory and are not anchored by law. It's just a voluntary activity of the school to have an ESD, Environmental Education and Awareness (EVVO) or ICT coordinator. EVVO coordinator is needed to receive the title of the Sustainable Development School, but most of the school principals do not see the additional value in this position. Each

school must have a counselling centre with an educational counsellor and a prevention methodologist. Schools focus on primary prevention and current topics are cyberspace, fake news, hoax, or frugality. Recently, some Czech secondary vocational schools have employed a school psychologist or special educator, except for the apprenticeship for pupils with special needs, where the school principal replaces the role of special educator.

Teachers and school principals see the main pitfalls in teacher training in general pedagogical education because pedagogical faculties produce theorists without practical experience. According to one interviewed school principal, new teachers are missing practice of model crisis situations which is important both concerning pupils and parents. Thus, they are demotivated quickly, they gain experience and leave the educational sector after 2 years. Furthermore, teaching professionals are at risk of the burnout syndrome.

The basic training is teacher education, however specifically for ESD most of the teachers do not have any systematic education. There are a lot of webinars or seminars for free, unfortunately, the quality is low. The trainings are rather just an introduction to what is done, rather than what should be explained in secondary schools regarding ESD. The teachers often must pay for quality training themselves. There are a lot of high-quality paid training however the school principal understandably supports teachers in professional seminars related to their field of teaching. Thus, ESD training would rather concern teachers of ecology and similar subjects. It's more on the subject team leaders and how they influence their members to include ESD, when, for example, they create school education programmes to incorporate it there or to create a whole new subject.

The education of ESD teachers usually takes place in the form of certified training offered by universities and higher education institutions, the Ministry of Education, Youth and Sports, the Ministry of Agriculture, or the National Institute of Education (many offers come from the Institute). There are also profit or non-profit organizations such as People in Need with its program Active Citizen or the FORUM publishing house that offer training and quality documents on ESD. One secondary school has organized ESD training for mayors and representatives in the region and organizes a so-called Rural development school. However, the situation has changed after COVID-19, and the training focus is less on ESD according to one interviewed school principal. In general, the school management must support ESD activities and training of teachers. The lack of professional staff in schools makes school principals do some of the ESD activities.

In Czech education, ESD training and activities are about volunteering, the motivation of teachers and their desire to further their education. According to one interviewed school principal: "There is no point in forcing teachers who don't want to. It misses the point and makes everyone uncomfortable." And another school principal said: "The way to develop a teacher is through self-awareness. Any development must be

promoted non-violently.” Widely, training is voluntary and is usually chosen by the teachers themselves (mostly within their expertise). School head teachers emphasize pedagogical skills such as education in teaching methods, formative assessment etc., and professional training for specific fields. All teachers and school principals see very little time to actively search for new training and courses as there are no comprehensive documents available on the professional development of ESD teachers. School principals should be passionate about ESD and make training and activities a priority overall.

Teacher training for ESD is included in the Regional Action Plan and each region offers many workshops and courses for teachers to be able to deal with the pupils. Technology courses or craft activities require the teacher’s participation in the project, otherwise, they must search on their own and such training is usually expensive. The Regional Centre of Further Education also offers courses, mainly for general education subjects or ICT. Vocational courses are limited, especially in agriculture because secondary and higher agricultural schools were financed by the Ministry of Agriculture in the past. School principals and teachers praised these times for a higher professional level of vocational training than when the founder is the region. Thus, they mostly attend vocational training organized by professional associations, for example, the Associations of Florists, Gardeners, Chefs and Confectioners, the Establishment and Maintenance of Greenery, or the Fishing Association.

The competences of ESD teachers are partially mentioned in the laws on pedagogical workers. A short paragraph is also provided in the educational strategies. Sometimes the teachers themselves do not know what is realistically expected of them, and what also belongs to education. ESD teachers should be educated in the area so that they know what is expected of them, what are the goals of sustainable education, and they should have some internship where they have seen how it works elsewhere. They are open to other areas of teaching and are so-called multifunctional. They must be able to process documents and should be at a very good level of rhetoric. They should have an overview, familiar colleagues, and gain experience in a variety of ways. Because they must promote ESD, they should be considered as experts among colleagues and pupils.

Teachers should be leaders with an interest in pupils and should behave decently, especially to students. They should be role models and should spring the interest in pupils, i.e., to lead them to recycle papers, to clean the working place, to consider materials like plastic, or recyclable materials, as well money and energy that goes into production. The teachers who support and include ESD generally lead the children in a slightly different way, they don't use very often frontal teaching, but they are more open to a discussion with the pupils and are much more willing to listen to their arguments. According to all educators in the survey sample, great teachers are from practice, they are experts who can engage pupils although they are often missing pedagogical competences, they also value the job at the school. For ESD teachers,

respectively for teachers of the cross-curricular themes is the best practice using the teachers' lounge for sharing information on students, teaching methods and results. Therefore, there must be open and friendly relations among educators to promote ESD.

ANALYSIS AND RESULTS

Some conclusions emerged from the analysis of the interview content. School principals and teachers at secondary vocational schools are aware of the importance of ESD and are actively implementing the information and principles into the curriculum. However, these activities are voluntary unless they are part of vocational subjects (e.g., in agricultural and forestry schools) or the so-called cross-cutting themes defined in the Framework Education Programmes. Cross-cutting themes can usually be implemented by integrating them into subjects, by introducing a separate subject or by project-based learning. The areas of ESD are mentioned in the short- and long-term strategic objectives and in a school's concept or action plan, are part of School education programmes. However, there is no model concept to lean on. Schools apply different areas of ESD in general subjects such as Health Education, World of Work, Civic Education, Global World and Natural Science etc., and education for sustainable development should have more consistency.

One of the main obstacles is the lack of comprehensive documents and methodology available on ESD (in one place). One school principal calls for a coordinator from the region or the ministry to make recommendations. The sustainable development includes environmental protection, safety, care for pupils, and employees, fair communication, inclusion, equal opportunities, and career development. In this context, schools must set up a counselling centre with a prevention methodologist. In addition, depending on their capacities, schools shall select an educational and/or career counsellor from among the teachers. Headteachers have over the years tried to recruit and retain school psychologists or special educators, but the labour market situation for these positions is critical, as there is a long-standing shortage and systematic work on a solution to educate more experts has not even begun.

ESD training is part of postgraduate and lifelong learning. Certified training is offered by universities, the Ministry of Education, Youth and Sports or the National Institute of Education which is most active in promoting training. ESD teachers must have a pedagogical master's degree or so-called pedagogic minimum. However, new teachers generally lack either expertise or pedagogical competences (when they come from practice) and are not prepared for the demanding school environment, where they must master not only pedagogical activities but also communication with pupils and their parents. Schools and teachers of vocational subjects emphasize connections with companies and vocational training centres because they have new technologies, and it is usually not sustainable for schools to buy and maintain new technology every 2 years.

There is no specific regulation on how to report ESD activities, but they appear in the annual report and the evaluation of the school principals once every two years. Teachers report ESD activities within the registration of subject committees. All those activities are rewarded, some by personal reward or reducing teaching hours or other ways. The coordinators have a direct specialization bonus. Then they have a personal reward, and in addition, they also receive higher rewards for activity. Rewards are paid either on an ongoing basis or on a one-off basis. The number of teaching hours has been reduced for the ICT coordinator and the educational counsellor (one teaching hour per week), but not for the prevention methodologist and the EVVO coordinator – there is just an additional bonus. However, education for counsellors is limited and the universities should pay more attention to their education.



Picture 3: Reflection on the EduSTA qualitative research results during workshop with teachers from Czech vocational schools

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DEFINING AND DEVELOPING TEACHER TRAINING FOR EDUCATION FOR SUSTAINABLE DEVELOPMENT: THE CATALAN CASE

Marta Gual Oliva

The Catalan case presents mainly findings in the context of undergraduate programmes and in-service courses regarding primary school and compulsory secondary school education. The results are based on the analysis of national policy documents (O. ECI/3857/2007; O. ECI/3858/2007; RD 1834/2008; RD 48/2010; RD 822/2021), interviews with ESD experts and in-service teachers, and the analysis of interviews with policy makers. Secondly, we use knowledge drawn from two workshops conducted with environmental educator VET students and in-service primary teachers.

ESD POLICY IN CATALONIA

ESD is considered a transversal element of public policies in Catalonia and that therefore Government technicians explain that they try to work from a global point of view, not only as another subject or issue to cover. This transversality is reflected in different areas in the policy agenda, such as: water waste, energy saving, curriculum (curriculum greening), building management (materials, resources, etc.), participation and involvement of the entire educational community and relationship with the school environment (social, cultural, natural, non-formal organisations, other stakeholders). In the region of Girona, for example, the Provincial Council of Girona encourages contact with non-formal institutions (nature schools, natural parks) and promotes sense of belonging through granted activities, and also provides support to the schools with lots of programmes and resources (Generalitat de Catalunya, 2022).

ESD is also conceived as a transversal element of the curriculum (D 175/2022), so there aren't much specific guidelines for educators on how to develop ESD principles in the educational context. Although the new curriculum is an opportunity to integrate ESD in school curricula, the new policy related to teacher education study plans is lacking a scientific foundation which would provide rigour to ESD. Experts emphasise that as a result of this situation, sustainability might be now in curricular frameworks (in a superficial way), but it might not be practiced genuinely at school levels: ESD is not embedded in education structures, and it relies on school champions. Even in schools that actually develop ESD oriented programs (*Green Schools*) (XESC, n.d.), the projects currently taking place are mostly about recycling and do not have an impact in teaching and learning.

Despite low impacting cases, data collection has provided good examples of ESD practices currently taking place in Catalan schools: ESD actions are developed through

projects rather than through everyday teaching and learning, mostly connected to science. Most of the projects which are currently being implemented promote a student-centred approach and promote experiential and inquiry-based learning, so that children and youth can do research about the environmental conditions in their communities, carry out school sustainability audits, support climate assemblies to propose concrete actions, etc.

Continuing with the idea of illustrating good practices, policy makers and experts have provided several examples of governmental support for ESD actions, but all the participants agree that the Green Schools Program (*Programa Escoles Verdes*, in Catalan) (Generalitat de Catalunya, 2012) is key to ensure in-service teacher education in this area: Green Schools Program is identified as a benchmark for good school practices, and as a good example of governmental support. Teachers also highlight the role of its trainers, which is key for them as they seem to be the closest figure that a teacher has as a reference in education for sustainability in the school context.

Despite government support, the need for more resources and time to implement ESD policies and/or actions is evident, teachers and experts agree (CNEA, 2021). The results draw attention to this mismatch between policy guidelines and teachers' day-to-day reality: while the policy puts the ESD on the spot, there isn't a clear path on how to implement those policies neither in pre-service nor ongoing training. In the next section we present a brief description of the state of the art about teacher ESD competences followed by the characteristics that the training should consider to be able to respond that mismatch in the Catalan context.

TEACHER COMPETENCES IN ESD

The following are the most common responses from our informants to what would be the competences required from teachers in ESD:

1) Teamwork

Teachers who are willing to work towards ESD in the school need to be able to work in interdisciplinary teams and in collaboration with others. This means that teachers are willing to create synergies between other teachers, work in a team, and know how to establish relationships with other entities and/or people, and participate in dissemination (talks, conferences, workshops) activities.

2) Disciplinary and curricular knowledge

Teachers need specific sustainability knowledge in order to be empowered to lead change in this area. Due to the nature of environmental issues, this specific knowledge has usually been related to scientific knowledge, but experts say that a key professional development challenge is how to work in a transdisciplinary approach without losing the need for disciplinary knowledge. On the other hand, as ESD has traditionally been related to environmental aspects, it is considered by teachers an

important skill to get to know the immediate environment of the school and be able to see the opportunities that the environment offers you to work on curricular knowledge (imagination, creativity). Finally, a competent ESD teacher must also know the curriculum and be able to bring SDGs into different aspects of the curriculum.

3) Pose actions with an impact on the community

In-service teachers consider that being able to organise projects that enhance sustainability conscience and allow students to affect real changes is key for the professional development towards ESD. Two examples of this approach, pointed out by the teachers could be: a) service-learning or cooperative-learning projects that support the active engagement of learners, promoting relationships with the community, creating networks of schools and projects with social actors; b) real projects in collaboration with students, teachers, families and community stakeholders.

4) Transformative education

Both experts and teachers agree on the need for a change in the vision of education in order to become an ESD-oriented teacher. For this change to happen, teachers would know the available resources and would be opened to on-going training. This change means, among others, embracing inclusive education, having strong values, being a critical thinker committed to social change or practicing what they teach. In relation to this skill, policy makers state that teaching with examples or transformations in the school would allow the school community to realise that changes are possible and the school being a model or a part of this change.



Picture 4: In-service primary teachers participate in the workshop held at Universitat de Girona, November 2022

CHARACTERISTICS OF ACTUAL TEACHER TRAINING IN ESD

The present context in Catalunya brings to light the fact that there aren't specific courses related to ESD competences during pre-service teacher training. This means that the only certified training that teachers will receive related to ESD teaching competences will be once they start developing as professionals, and it will be voluntary: there isn't a specific policy that provide specific courses for teacher development but support schools from the non-formal education arena, with environmental educators and a wide range of programmes, games, publications, and other resources to encourage ESD at schools. To address the situation, the easiest strategy has been, so far, adding an optional module on sustainability in some teacher education programmes, although this is not ideal in an imaginary world where sustainability is embedded everywhere, experts say.

Experts have identified that at university level, implementation of ESD across Catalonia is unequal: those universities with a stronger commitment at higher levels and which have identified sustainability as cross-cutting competences, seem to be doing more work in this area. So, there is a need to work more closely between faculties to move this agenda forward together as well as the need to address a key challenge involving the training of teacher educators and university educators.

If we move into the specifics of teacher training, informants in the project pointed out that this training should consider emotional management and well-being aspects. For example, teachers say that it should bring elements of surprise, while experts express the need to address eco-anxiety, which is a big issue, so training is needed for teachers to be able to manage new type of emotions (anxiety, stress...) and transform them into more positive and hopeful ones.

Teachers, experts and policy makers note that there is a need for more networking opportunities during the training, with the aim to fulfil the need to develop the capacity of teamworking but also networking. Policy makers also identify technologies as a booster with the networking and the interchange of resources and initiatives.

As experts point out the importance of transdisciplinary knowledge, teachers claim that the training must enable them to work more transdisciplinary through using project-based learning and must be connected to good and authentic teaching examples and/or materials rooted in the reality of each school. This is important because it should help understand the big concepts, how they appear in the curriculum and how they connect to real praxis, starting with what is already happening in schools.



Picture 5: Environmental educators VET students share their thoughts on the challenges they will have to face as future ESD professionals

CHALLENGES

To summarize the highlights of the study we want to point out two challenges that have been identified by all the informants. Firstly, there is the need for recognition and reward of ESD knowledge. Teachers are willing to access a certification process in order to continue their role as ESD leaders in schools. At this moment there are not incentives for teacher educators to innovate in this area, so without incentives or recognition, academics and teachers lose interest in working towards these issues. And secondly, the need for exchange spaces on ESD practices and reflections. For teachers this would be the evidence that other teachers are currently working in ESD and point out that they would feel less alone in this journey. On the other hand, experts point out the need to establish relationship spaces between professionals dedicated to ESD, at all levels (school, university, administration, associations, etc.) to encourage school networks and increase the student's engagement in ESD activities. We would like to pose a final question: how do these challenges meet the actual structure of the teacher education study plans, where ESD training is not clearly founded, is voluntary, and is not recognised nor rewarded? Could ESD training be mandatory? Wouldn't that contradict ESD principles? Those for sure are some important ideas we will have to address sooner or later.

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4. TOWARDS OPERATIONALISING TEACHERS' SUSTAINABILITY COMPETENCES

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So far, we have presented our analysis of the TCESD competences through a literature review and snapshots of the data we have gathered on the context in which ESD is taking place in the five EduSTA project participant countries. In this chapter we will summarise the results of our literature review, we will develop a cross analysis of the contextual data we have collected across the five participant countries, and, finally, based on these two types of insights, we will present the EduSTA proposal to operationalize the competences teachers need to practice ESD successfully. The EduSTA framework is not intended to be an alternative to existing frameworks of ESD teacher competences but rather an operational development of what is widely understood to be the teacher's core competences for ESD.

. This framework has been developed to be the basis for the design of a constellation of open digital badges aiming at providing a system of recognition and accreditation of such competences whether they have been developed through formal or informal education or in the workplace. The developed framework will also inform the design of training proposals to help teachers develop these competences. In both cases, open digital badges and training proposals, our main aim is to present competences in a way that connects with everyday praxis in real contexts.

In describing and selecting teacher's competences for ESD we used three main criteria. The competences should be part of the core ideas of influential and widely used existing competence frameworks, they should be important for teachers, and we should be able to operationalise the competence. With the latter we mean that there is a way to demonstrate and assess the competence as part of teaching practice, development work at educational institutions or other processes that are part of the school practices.

In this chapter, we will present first the results of the literature review we conducted to identify core competences present in existing influential competence framework proposals (first criteria). After that, we will summarise our findings about the views of teachers, ESD experts and policymakers on the competences teachers need for ESD and on how they should be fostered, developed and implemented (second criteria). Finally, we present our proposal of teachers' competences for ESD that considered the insights from the previous sections and the work of the EduSTA team to operationalise these competences (third criteria).

IDENTIFYING COMMON CORE ESD TEACHER COMPETENCES IN THE LITERATURE

We have conducted a review of the literature connected to ESD teacher competences since 1990. While this is not a systematic literature review, we have covered the most

relevant international journals and the UN and EU policy documents from this period. We have also relied upon the literature reviews published in this topic in the last 10 years including a systematic review published in 2020 (Corres et al., 2020). Since our goal was to identify the core common competences present in the most influential existing frameworks and not to provide an exhaustive map of this topic in the literature now, we decided that this approach to the literature review would be suited to attain our goals.

We have reviewed 169 documents that mentioned teacher, competences and Education for Sustainable Development or Education for Sustainability as well as sources listed in literature reviews on the topic of ESD published in the last 10 years. The literature includes few proposals of TCESD (Vare et al. 2022). The six frameworks that we have identified and considered are: UNECE (UNECE, 2012), CSCT (Sleurs, 2018), A Rounder Sense of Purpose (RSP, 2019), KOMBiNE (Rauch and Steiner, 2013), Bertshcy et al. (2013), and Cebrián and Junyent (2015). These are also the most widely quoted frameworks in the literature we have reviewed. UNECE is the most influential in terms of other frameworks referencing to it. If we look at papers on ESD that refer to Teacher Education we can see that, even though the majority do not refer to a TCESD framework - other than their own proposal, UNECE is also the most widely cited.

In addition to the above mentioned TCESD frameworks, we have used the GreenComp (Bianchi et al 2022) framework to inform about the competences students should achieve as the result of ESD. Our choice of the GreenComp is eminently practical: this is the mostly likely framework of reference for policies in EU countries in the immediate future. Furthermore, we think that the GreenComp is located in a wide consensus on ESD which means that, while making explicit reference to it, our proposal should be useful for other ESD competence frameworks.

We have started our analysis by comparing the UNECE and the GreenComp frameworks. Both frameworks use a matrix to define the competences. One axis contains (education for) Sustainable Development characteristics and the other elements we have considered competence dimensions. Table 7 shows the elements included in these two axes for both frameworks.

We considered then the definitions of those elements in each framework with the goal of eliciting connections and commonalities. This has led us to propose some changes in the formulation of some of the elements of the axes.

Table 7: The UNECE and GreenComp frameworks axes

Elements	GreenComp	UNECE
(E)SD characteristics	Embracing complexity	Holistic approach
	Envisioning futures	Envisioning change
	Acting for sustainability	Achieving transformation
	Embodying values	
Competence dimensions		Learning to live together
	Attitudes	Learning to be
	Knowledge	Learning to know
	Skills	Learning to do

Table 8: Comparison of core elements of the competence frameworks GreenComp, UNECE, RSP, and CSCT

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

We have contrasted the other two frameworks with a significant presence in the literature (RSP and CSTC) with the UNECE framework, considering the re-definition of the elements of its axes and insights from the other three frameworks we have identified in the literature. To do so we have looked at the core elements of the RSP and CSCT frameworks and have analysed how they relate to the core elements of the UNECE proposal. Table 8 shows the result of this analysis.

To these core elements we have added agency because of its presence in the literature. We have also decided to include four more elements that are very present in the literature, and in the selected frameworks but that are neither an ESD characteristic nor a competence dimension in the frameworks but rather aspects that are expected to permeate ESD. These elements to be taken into consideration in ESD are the global-local relation, the past-present-future connection, the uncertainty, and the orientation towards action of education. We have included these elements as orientations to the ESD characteristics and the competence dimensions to constitute the core common elements we have identified in the literature to be considered when defining the ESD teacher competences (see Table 9).

Table 9: 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

These core elements are intended to serve as the basis to define the core ESD teacher competences. Since our goal was to define an operationalizable framework that connected with the views of experts and practitioners, the process of defining competences from these elements had to be informed by the views of teachers, ESD experts and policymakers. The following section will present the insights from these

groups. The final section will bring all this information together into our competence framework proposal.

VIEWS FROM TEACHERS, ESD EXPERTS AND POLICY MAKERS ON ESD TEACHER COMPETENCES

In the following lines we present a summary of the most remarkable results arising from the analysis of the data collected in the WP2. The results are presented following the same themes that were discussed in the interviews and workshops in the form of questions.

What do we expect from a competent teacher regarding ESD?

Interviews and workshops with teachers have provided valuable information on the expectations of what an ESD expert teacher should know, should know how to do and should be as a teacher.

The most common expectations referred to pedagogical skills including a big diversity of examples depending on the context: from project-based learning to problem-solving designing, most of which can be placed under the umbrella of active learning and transformative learning.

Other significant role descriptions regarding an ESD expert teacher refer to the relation with students, particularly about being a role model for them through their actions, decisions or even the way they relate to others or the environment.

We have found four significant dimensions to explain the expected teachers' competences regarding ESD:

Know-what: ESD teachers are expected to have knowledge of different natural science disciplines but also the ability to make connections between the different disciplines. So, we are asking for a transdisciplinary approach for the teachers to have some understanding of the broad framework of sustainable development and to understand sustainable development as a whole. This means, being able to grasp its complexity, embrace uncertainty chaos and friction in the learning process as well as freedom to explore. To be able to develop such understanding, an ESD teacher should be also literate in transformative learning, futures literacy, transformative design, collaborative caring, systems thinking and critical thinking.

Know-how: ESD teachers should also acknowledge basic pedagogical knowledge including teaching and assessment methods such as active learning methods, project-based learning, student-centred, inquiry-based learning, service-learning or cooperative-learning. They should be capable of bringing balance between the theoretical and the practical activities, assuring that there is enough presence of practice, experimental work, field work and outdoor activities. This implies a knowledge of the surrounding environment of the educational centre. To provide meaningful learning opportunities, teachers should connect their proposals with day-

to-day experiences and knowledge. Finally, an ESD teacher is encouraged to use technology and to have some digital skills or interests to know where to find information, knowledge, or resources, to be able to make the difference between disinformation, misinformation, fake news and identify reliable sources.

Know-being: this dimension is about being a role model as a teacher, advocating for the practical application of what they teach, cultivating the curiosity and passion of their students, and fostering inclusivity. They should remain open to innovation, constantly seeking ways to enhance their teaching, and demonstrate the courage to admit their limitations, showcasing vulnerability as a source of strength. Furthermore, they exhibit empathy, building strong relationships with their students and the wider community. They prioritize trust-based relationships, favouring coaching and interviews over traditional lecturing. Their aim is to reignite students' love for learning, ensuring they become lifelong learners. These educators engage in meaningful dialogue, encouraging students to develop their critical thinking skills, while addressing moral and ethical dilemmas. They maintain a positive outlook, inspiring faith in a better future and serve as examples themselves. Collaboration with various professionals and the integration of sustainability into their teaching are also key. In essence, an ESD competent teacher embodies these qualities, serving as a guiding light for their students, nurturing both personal and intellectual growth.

Know-acting: teachers equipped with transversal competences such as leadership, networking, teamworking, and fostering a community of learners have the potential to be catalysts of change within their schools. With a positive outlook, they can effectively drive change initiatives, promoting a culture of active citizenship. These educators play a pivotal role in nurturing their students' competences for democratic culture by facilitating open dialogue and fostering the development of civic and social skills. Moreover, they gain the confidence to lead community projects with far-reaching global impacts. They possess the ability to organize projects that prioritize sustainability and environmental awareness, fostering a conscientious attitude towards the planet. These teachers would actively promote relationships with the broader community and establish networks among schools and social actors, contributing to a more interconnected and socially responsible educational environment.

What is the situation around teacher training for ESD in the EduSTA partners' countries?

There is a wide agreement among teachers and experts on the training on ESD when identifying teachers' needs. Data from all the national studies point at the importance of specific knowledge regarding ESD issues as a key element to be included in teacher training, precisely to address the hesitation that some teachers manifest: they do not feel confident enough on science related issues. The need for training on knowledge is more often mentioned by primary school and VET teachers than by university

teachers. Transdisciplinary approaches, as well as other approaches like systems thinking, critical thinking or futures literacy, are seen as relevant to teacher training.

In all the national contexts we have studied (the Czech Republic, Finland, the Netherlands, Catalonia – Spain and Sweden), there is a recognition of the importance of Education for Sustainable Development at the national level. Governments emphasize its integration into educational systems to address issues like sustainability, climate change, or gender equality. Across the board, there is a common acknowledgment of the crucial role of teachers in implementing ESD. The challenges related to teacher competence, including the need for training and support, are a shared concern. Each country faces challenges in the implementation of ESD. These challenges include resource constraints, systemic and educational conditions, and the need for greater attention to ESD in specific educational sectors, such as vocational education. The integration of ESD into the curriculum is a common theme. Countries strive to embed sustainability principles across various subjects and educational levels.

However, the approach to integrating ESD varies: in the Finnish context, there is an emphasis on a holistic institutional development approach, inclusive of a certification system. In the Swedish educational landscape, ESD is integrated into teacher education courses, whereas the Netherlands adopts a national plan involving research universities. Regarding vocational education, challenges surface in the Swedish scenario where vocational teachers encounter obstacles due to insufficient national support. In contrast, within the Czech Republic, secondary vocational schools actively incorporate ESD. The recognition of ESD knowledge manifests differently across regions. In Catalonia, challenges encompass the absence of specific pre-service teacher training and the necessity for additional resources and time. Conversely, in the Dutch setting, challenges are linked to systemic and educational conditions. Government support for ESD exists universally; however, the magnitude and efficacy of this support exhibit variations. Overall, while the countries share common goals in promoting ESD, the specific approaches, challenges, and emphases vary based on their unique contexts and priorities.

Despite the different contexts, we have been able to summarise the most remarkable needs, identified by teachers and experts, in order to define a common framework to outline the characteristics of ESD teacher training:

Networking opportunities: In a dynamic educational landscape, teachers are encouraged to actively participate in networking opportunities that extend beyond the classroom. This involves establishing connections with other public institutions, being open to collaboration with the private sector, and engaging with the local community. These networks extend further, connecting schools with universities, environmental education centres, and various social actors. International networks, including participation in programs like Erasmus+, expand the horizons of education. They serve as valuable sources of information and offer opportunities for cross-cultural learning,

broadening the global perspective of students and educators alike. Through international cooperation and diverse partnerships, the educational landscape evolves to offer a more holistic and globally aware perspective. These platforms serve as a means of enhancing the visibility of diverse educational practices that are currently in progress, creating a vibrant and dynamic educational ecosystem.

School and professional oriented: Practical training is a key component, incorporating professional excursions tailored to the specific content of the academic year. These excursions, lectures, seminars, and collaborations with experts from universities and industry professionals provide students with a real-world perspective. They go beyond the classroom, actively engaging with the field to gain practical insights. In-service teachers are encouraged to tap into ongoing experiences, creating a robust community of practice, leveraging the experience of seasoned educators with years of practical knowledge. One notable effort involves integrating ESD into the basic curriculum for teachers' training. This initiative is strengthened by connecting students with authentic teaching examples and materials that reflect real-world challenges and solutions. The overarching theme is to provide pre-service and in-service teachers with the time and freedom to experiment, share ideas, and engage in peer collaboration, fostering a continuous learning environment.

Digital learning: ESD teacher training should encompass advanced digital technologies and digital literacy. Flexibility and hybrid learning are important, with online teaching platforms at the core. Compensatory measures are needed for disadvantaged students to access mobile devices. Technology's ecological and well-being impact is considered, promoting digitalization as a sustainable choice. Embracing new tech for sustainable development is evident, reducing emissions, losses, and promoting economic sustainability. Tools like videos, games, and virtual visits make sustainable practices visible, and new technologies facilitate networking and resource sharing, ensuring education remains innovative and well-equipped for contemporary challenges.

Values awareness and emotional management: Design for all principles should guide ESD teacher training, including LGBT+ diversity and embark on courses that address racism head-on. Scaffolding strategies to integrate discussions about racism and diversity into the classroom are advised. ESD teacher training should also address how sustainability values and sustainable lifestyles are strengthened through teaching specific subjects or in specific vocations. ESD teacher training should also provide the tools and opportunities to navigate these challenges constructively. Furthermore, the prevalence of eco-anxiety among students and educators necessitates training to manage these new emotions effectively, transforming anxiety and stress into positive and hopeful outlooks.

Learning and assessment methodologies: Addressing the needs of ESD teacher training means meeting the need for a transformative shift, embracing design-based, problem-based learning, and collaborative learning. Education becomes more flexible,

incorporating smaller, manageable learning units, fostering multidisciplinary and interdisciplinary learning offering a more holistic perspective that's connected to practical life and competence-oriented activities. Dialogue and pedagogical renewal remain key, with teachers encouraged to adopt a forward-thinking attitude. The emphasis on dialogue and values-driven discussions is a core aspect, with an ongoing commitment to renewing pedagogical approaches. Assessment, too, undergoes a transformation, with a shift towards "assessment as learning", focusing on self-assessment, peer-assessment, and personal goal setting, fostering future teachers to become reflective.

A COMMON UNDERSTANDING OF THE DIVERSITY

Our main goal was to provide a common framework for the badge design on teacher ESD competences and for related training proposals. We have also built a common understanding of the different contexts that we are considering in this project. Their commonalities and differences are as much a challenge as a potential for more significant results.

A comparison of the results in each country has suggested that elements connected to national strategies, education level, and institutional interest and commitment are usually relevant in how ESD is implemented in an educational institution. Most contexts do not have an ESD expert figure and lack a description of the professional roles of ESD teachers. In most contexts, ESD strategic plans include specific teacher training, but this is often not mandatory, it appears as a recommendation, or as a criterion to be able to apply for funding.

The role of ESD in policy documents varies considerably from country to country. In countries where ESD is not identified as a national priority, ESD is mentioned as a transversal issue, cross-curricular agenda or as means to achieve Sustainable Development Goals. However, whatever the presence of ESD in national priorities we have found that there are valuable initiatives which can be used to advance ESD in all countries.

When looking at national policies, in most cases there are no legal requirements on ESD competences, nor comprehensive documents available on the professional development of ESD teachers. Although we find ESD mentioned in all the policy documents reviewed there is not a clear path on how to implement those policies neither in pre-service nor in in-service training.

WHAT ARE THE NEXT CHALLENGES THAT WE FACE?

In the five national contexts participating in the project and within the 2019-2023 European main strategic plans (The European Green Deal) there's a promising opportunity to embed Education for Sustainable Development (ESD) into the educational landscape: the curriculum in all the participant partners

agenda recognizes sustainability as a key competence to be achieved, paving the way for positive change; ESD is already integrated into policy documents, offering a favourable moment to advocate for its expansion; and sustainable goals are now included in the cross-curricular themes of the educational program framework. In essence, there is a collective desire to promote teaching a sustainable way of life. On the other hand, ongoing training is essential to foster innovation and the ability to offer fresh approaches each year. Schools have a demand for an ESD specialist, in fact, in-service teachers are currently modelling as ESD specialists in their schools, but there is at present no specific training on ESD neither in pre-service, VET nor in-service teachers that would support teachers in acknowledging their professional competence on ESD.

This situation leads to two challenges that we try to respond below:

- How to address the lack of specific ESD training programs in pre-service and VET teacher training?

Teacher training should respond to the legislative guidelines by exploring the compulsory inclusion of Education for Sustainable Development (ESD) training within the curriculum. This entails developing ESD-curricula and integrating sustainability across subjects, aligning with the existing regulatory framework. The school curriculum serves as the foundation, encompassing cross-curricular themes and the entirety of the ESD domain. Students acquire fundamental knowledge of sustainable development.

Teacher training should be an integral part of the curriculum, working in harmony with legislative mandates. Collaboration and close cooperation with colleagues are crucial for integrating sustainability into curricula, making environmental education an inherent aspect of teacher training curriculum.

- How to address the lack of specific ESD training programs in in-service teachers?

To incentivize innovation in Education for Sustainable Development (ESD) among in-service teachers, a dedicated certification process has been proposed. This process is designed to validate ESD professional competences, thus in-service teachers would be encouraged to certify their ESD-related competences, supported by professional development initiatives.

At the school level, teachers are already taking on the role of ESD referents, but recognition and rewards for their efforts are currently lacking. Educators often find themselves experimenting as they navigate ESD practices, relying on their literature-based knowledge. Notably, there is a lack of structured teacher education for ESD.

To address these challenges, several proposals are suggested: universities can offer specific postgraduate and professional development courses tailored to ESD; moreover, additional training and professional support can be made available based on individual needs; finally, a specialist teaching profile can also be created to ensure

the continuity of ESD initiatives, allowing for a seamless transition when substitutes are needed.

Teachers need institutionalized opportunities for reflection and evaluation. Currently, teachers working on sustainability often feel isolated, lacking references. Peer support, interdisciplinary teamwork, and communication spaces for ESD experts are crucial. Teachers should have the time and freedom for experimentation and collaboration, such as peer supervision and communities of practice.

To truly embed sustainability into the educational institution's culture, a shift in mindset is imperative. Teacher training for sustainability competence should encompass knowledge, skills, and attitudes, extending to leadership, teaching, counselling, and shaping the institutional culture.

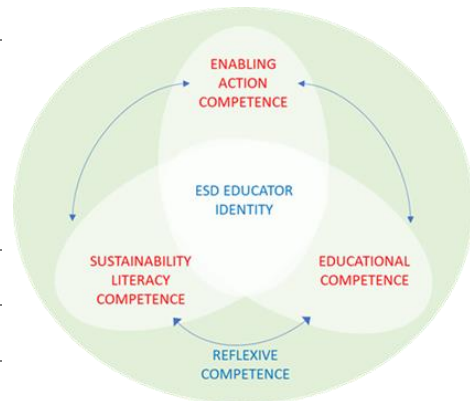
We have summarized the insights into teachers' competences in ESD, drawing from both existing literature and frameworks, as well as perspectives from experts, researchers, policymakers, and both in-service and pre-service primary and VET teachers. In the upcoming section, we introduce the EduSTA proposal for ESD teacher competences as a potential response to the numerous challenges identified through the comprehensive data collection process.

THE EDUSTA PROPOSAL OF ESD TEACHER COMPETENCES

Once the analysis of the data from teachers, ESD experts and policy makers was completed, we used it in our development of operationalizable competences that would bring together the core elements we had defined from the literature review. The result is a framework of 3 competences (Enabling action, Sustainability literacy and Educational competences) that interact through a fourth competence (Reflexive competence) to develop the ESD educator identity (see Table 10).

Table 10: 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
	Learning to know
	Learning to do
	Considering global-local
Orientations	Considering past-present-future
	Integrating uncertainty
	Action oriented



We have defined these competences as follows:

Sustainability competence: Ability to integrate ways of knowing, being, doing for sustainable development relevant to the educator’s (societal) context (incl. SDC).

Educational competence: Ability to apply appropriate educational methods in different contexts and justify pedagogical-didactical choices through vision on ESD.

Enabling action competence: Ability to anchor ESD in society, by enabling student action (on societal issues) and action within education systems.

Reflexive competence: Ability to reflect on (aligning) process, decisions, and implementation of ESD.

We have reached this initial proposal through a generative dialogic process where members of the consortium discussed about the articulation of the core elements identified in the analysis of the literature into a set of competences considering that these competences must be operationalizable and respond to the insights gained in the data collection of the views of teachers, ESD experts and policymakers. We have considered these insights holistically, but the process of discussion has meant that

we have kept our proposals accountable to the criteria so that personal bias or interpretations have been moderated by the group discussion.

This process does not entail including all the views and requests gathered in the data collection. We had to make decision guided by our professional criteria and the literature, by the need to define a coherent set of competences, and by the aims of our project. For instance, teachers and ESD experts from different countries have mentioned the need for training on knowledge about SD and how to teach it. This included requests for ready-made materials. We have taken these views into account but rather than designing materials to be used to teach we take a capacity building approach and hence have defined a competence that includes this knowledge.

This initial proposal has been further discussed in the EduSTA consortium in order to define these competences in a way that is grounded in practice and was best suited to be operationalized in terms of training proposals and certification via open badges. The result of this work are the following four competences.

Sustainability literacy. This competence entails that the educators use knowledges in a responsible way to further Sustainable Development through education. In particular, this includes that educators comprehend the interconnection between Sustainable Development Goals (SDGs) and Education for Sustainable Development (ESD) in their educational settings. They must recognize challenges in implementing SDGs and ESD, discussing observations with colleagues and engaging students in active observation. Integrating sustainable development knowledge and ESD approaches into teaching practices is crucial, considering the dynamic and contradictory nature of sustainability-related information. Teachers should evaluate sustainability aspects in their teaching, stay updated on sustainability developments, and be willing to revise materials regularly. Awareness of diverse worldviews on sustainability, application of reflective dialogical techniques, and embracing complexity demonstrate a commitment to fostering a holistic understanding of sustainability issues.

Learning ecosystem design. This competence entails that the educator designs learning environments and processes that facilitate the development of Green Comps. In particular, this includes that the educators can design and implement learning processes that enable students to grasp systems, addressing challenges while considering interconnectedness, fostering futures literacy and values awareness. They should be able to identify and utilize learning opportunities, environments, and methods that help students navigate complexity and uncertainty, justifying choices in terms of sustainable development and enhancing sustainability competences. Encouraging transformative learning, and reflection on actions are essential components. Teachers should be able to design learning processes in their context to support students in using future insights, envisioning alternative futures, and making informed decisions. This includes fostering empathy, helping students express values, and analysing the sustainability impact of their actions. Utilizing community-driven

learning, justifying pedagogical choices, and reflecting on personal values in terms of sustainability are integral to effective teaching practices.

Enabling action. This competence entails that the educators organise collaborative communal action and facilitate the development of student's agency. In particular, this includes that the educators can identify sustainability challenges within their educational context and encourage communal action to address them. They should be able to identify and engage relevant stakeholders, both within and outside the school environment, fostering collaboration. Teachers can take individual initiative and create learning opportunities for students to initiate sustainability efforts. Facilitating students in identifying and addressing communal sustainability challenges, helping them connect with stakeholders, and supporting collaborative actions towards sustainable change are crucial aspects of effective teaching.

Reflexive practice. This competence entails that the educators learn purposefully from their actions to improve in a dialogue with community, society, and science. In particular, this includes that the educators are considered as active agents at advocating for change in education, envisioning sustainable possibilities, and exploring diverse solutions. They critically assess their role as an educator, understanding how policies and values impact Education for Sustainable Development. Additionally, they prioritize maintaining optimism and acknowledging emotions while anticipating and driving changes for ESD.

FINAL REMARKS

The work we have presented in this book is intended to be part of a larger endeavour, the EduSTA project, where it is to serve as the basis for the design of, on the one hand, a constellation of open badges to certify the competences for ESD teaching and, on the other, a set of training proposals addressing the development of those competences. The design of these elements is the main outcome of the project, and we hope that they will help address our central aim: defining a framework of competences of ESD teachers that is relevant for teachers in all educational levels, that can be used internationally and that presents operationalizable competences so that they can be directly related to educational praxis.

The competence and context analysis has already revealed the diversity of teachers' realities and of the competences related to successfully furthering sustainable development through education. The latter relates to the fact that instead of calling our competences for ESD, we call them "Teacher's sustainability competences". This addresses that through their work, teachers apply GreenComp themselves and, at the same time, facilitate students learning towards GreenComp.

We want these competences to be relevant to existing educational contexts and initiatives and, hence, to be directly connected to the competence frameworks on ESD that are influencing policy and practice now. Taking these aims into consideration, we

have reviewed the literature and cross analysed the information collected in each participant country from teachers ESD experts and policy makers. The outcomes of this work, which we have presented in this book, will underpin our further work in EduSTA but we hope they might also be valuable for other professionals when designing training programmes or materials for educators.

The development work will continue through piloting in all partner countries in 2024 and presenting a revised badge-constellation in spring 2025. The competence proposal will, undoubtedly, be further develop as our open badge constellation and training proposal are designed, piloted and revised. Furthermore, we hope that future application of these products outside the EU will improve them contributing, in a co-creation process of academics, teacher trainers and practitioners, to design tools with the potential to assist and foster the efforts to bring about the profound changes required to transform education to be part of, and to contribute to, sustainable development.

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APPENDIX 1. WORKSHOPS AND INTERVIEWS REPORTING FORM



WP2 Data collection

<input type="checkbox"/> Interview Date of data collection: <input type="checkbox"/> Policy-maker <input type="checkbox"/> Expert <input type="checkbox"/> Teacher Job title:	<input type="checkbox"/> Workshop Date of data collection: <input type="checkbox"/> Face-to-face <input type="checkbox"/> On-line Number of participants In-service educators: Pre-service educators:
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For each of the following topics, if they have been covered in the interview/workshop, write down the most important points (up to three).

Known catalyst for ESD change are included in italics. If your data refers to any of them, please provide a brief account.

1. Characteristics of an educational institution that is working on ESD.

2. ESD teachers: competences, knowledge and praxis

C1: Is ESD included in role descriptions? Are there specific responsibilities associated to ESD?

3. Teacher education for ESD

C2: Are there clear pathways to teacher development? Are there opportunities for reflection and evaluation?

4. Situation of ESD in each country (and internationally, in Europe and the World).

5. ESD taking place in educational institutions

C3: How is ESD recognised, rewarded or funded?

C4: What kind of ESD resources are made available to educators?

6. Connecting educational institutions to their surroundings/communities

7. ESD in the context of educational change

C5: Are new technologies being used in ESD in your context? If so, how?

C6: Is Futures Education part of ESD in your context? If so, how?

8. ESD policy

C7: Is there a "whole-of-government" approach?

Write down here any other information you deem important.

TEACHER TRAINING FOR EDUCATION FOR SUSTAINABLE DEVELOPMENT (Developing a shared competence framework)

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