

# Framework for in-service teacher education for sustainability

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## Some principles and strategies.



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## LIST OF ABBREVIATIONS

**EduS** - Education for sustainability

**ESD** - Education for sustainable development

**GAP** - Global action program

**GCE** - Global citizenship education

**SDGs** - Sustainable development goal(s)

**UNECE** - United Nations Economic Commission for Europe

**UNESCO** - United Nations Educational, Scientific and Cultural Organization

**UNICEF** - United Nations International Children's Emergency Fund

**TEDS** - Teachers educating for sustainability.

**WCED** - World commission on environment and development

**WIA** - Whole institution approach

# TEDS INTRODUCTION



FRAMEWORK FOR IN-SERVICE TEACHER EDUCATION FOR  
SUSTAINABILITY SOME PRINCIPLES AND STRATEGIES

## TEDS PROJECT: CONTEXTUALIZING

This framework for in-service teacher education for sustainability results from the work carried out by the team of TEDS - Schools educating for sustainability: Proposals for and from in-service teacher education - Teacher education for sustainability, an Erasmus+ project (2019-1-PT01-KA201-060830) that took place between 2019 and 2022. The project involved a network of teachers, educators and researchers from five European universities: University of Aveiro (UAVR), Portugal; Université de Nantes (UN), France; Helsingin Yliopisto (UH), Finland; Vytauto Didžiojo Universitetas (VMU), Lithuania; and Università ta' Malta (UOM), Malta.

The main aim of the project was to build knowledge about Education for Sustainability through the design, development, and evaluation of teacher education programs, whose analysis led to a reference framework for (in-service) teacher education, produced in collaboration between teachers and teacher educators from different disciplinary areas and institutions (for example, CFAE-AVCOA, in Portugal). These teacher education programs (TedP) took place in the five countries of the consortium and covered different areas of education for sustainability (EduS): diversity, dialogue and inclusion; environment and natural resources; responsible use of technologies; and economic and financial literacy. In this sense, these TedP shared a common and integrated vision of education for sustainability, understood as a learning process (Ryan et al, 2010), mobilizing different types of knowledge, skills, values and attitudes in order to contribute to the education of subjects more capable of promoting change towards the construction of communities more respectful of the environment and human rights.



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Being aware of the urgency of embedding EduS in TedP, something which has been claimed for many years through calls from international institutions (Stevenson et al., 2017; UNESCO, 2020), it was the team's intention to integrate "principles, values, and practices of sustainable development into all aspects of education and learning" (Imara & Altinay, 2021, p. 1). In this sense, the members of the TEDS project conceived this publication as a framework of reference for institutional, local, regional, national and international policies and practices in the field of teacher education for EduS, by seeking answers to the following questions: i) How to educate teachers for EduS? ii) How to promote teachers' professional knowledge about EduS in in-service teacher education contexts? iii) What characteristics should teacher education programs present?

The search for answers to these questions involved different phases with multiple research and teacher education activities.

## A FRAMEWORK FOR EDUS AND A REPORT ON SOCIAL REPRESENTATIONS

In the first phase of the project, the team worked on two main activities: the construction of a framework for EduS (IO1) and the identification and analysis of teachers' representations of EduS (IO2).

The framework for EduS (Juuti et al., 2021b, [https://teds.web.ua.pt/assets/relatorio\\_teds.pdf](https://teds.web.ua.pt/assets/relatorio_teds.pdf)) resulted from the content analysis of

educational policy documents in the different countries, as well as articles, dissertations, and theses on EduS. The members of the project used the UNESCO education for sustainability competences as categories. These are: systems-thinking competence; anticipatory competence; normative competence; strategic competence; and interpersonal competence (Wiek, Withycombe & Redman, 2011; Wiek, Withycombe, Redman, & Mills, 2011). This framework provides a literature review, practical activities for school contexts, and design principles that are adjusted to each country's specific scenario (Sá, Andrade, Machado, & Sá, 2021).

The project team also characterized the social representations of teachers about EduS in different educational and political contexts, providing tools for analyzing these representations and drafting a report that draws a portrait of the beliefs of educational actors concerning notions, principles, and practices of EduS. This work - IO2 - started from the assumption that EduS faces challenges that involve the relative uncertainty of knowledge and scientific fields dealing with sustainability problems, as well as the "socially acute" nature of these problems. In fact, EduS does not only address complex and controversial questions, with social, ethical and political implications, but it may also challenge deep beliefs and social representations shared by individuals and groups and confront their social practices (Barthes, Alpe, & Lange, 2016; Block, Van Poeck, & Östman, 2019; Simonneaux, & Simonneaux, 2012). IO2 was based on two interconnected studies, which

## TEDS INTRODUCTION

were developed through a common survey questionnaire. Study A aimed at understanding how teachers from the countries of the five TEDS's teams represent Sustainability and EduS. Study B focused on the Lithuanian and the Portuguese samples, with the objective of identifying the internal structure of teachers' social representations (see more details, in Gonçalves et al., 2022; [http://teds.web.ua.pt/assets/relatorio\\_teds.pdf](http://teds.web.ua.pt/assets/relatorio_teds.pdf)). This intellectual output was based on the assumption that social representations consist of socially elaborated and shared knowledge, including beliefs, values, social norms and information, which allow for the construction of a common reality to a social group, providing a framework not only for the interpretation of everyday life, but also for the action. Thus, Sustainability and EduS are socially represented by teachers, depending both on their history as well as on the sociocultural, historical and ideological context surrounding them (Abric, 2008; Jodelet, 2005, 2016; Moscovici, 2013). A deeper understanding of these issues may contribute to more adequate and contextualized teacher education proposals. Changes in educational conceptions and practices do not result, in a simplistic way, from working on the teachers' rationality, but rather depend on complex processes - not only cognitive, but also socio-affective and cultural where representations play an important role.

### IN-SERVICE TEACHER EDUCATION PROGRAMS (TEDP) AND MULTIMODAL CASE STUDIES

In the second phase of the project, the team members focused on two major activities: the development of a multimodal in-service

teacher education programs (TedP) (IO3) and the construction of multimodal case studies to be used in teacher education contexts (IO4).

The development of the TedP included the design, implementation and analysis of different multimodal modules focusing on the themes of EduS (natural resources, environment and technologies; diversity, dialogue and inclusion; economic and financial education), as well as the adaptation by the national teams of modules of the other teams (<https://teds.web.ua.pt/index.php?page=33>).



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The multimodal case studies on teacher education for EduS – available in video format and in different languages – are reflections and examples of processes and practices of EduS developed by teachers in school contexts, trying to highlight important aspects of in-service teacher education in this field. The multimodal case studies focus on the process(es) of trainee’s development during the TedP, identifying the reasons that enhanced and/or constrained professional learning about EduS and providing suggestions for the future. (<https://teds.web.ua.pt/index.php?page=34>).

## A FRAMEWORK FOR IN-SERVICE TEACHER EDUCATION

This final framework for in-service teacher education programs intends to break down the boundaries of disciplinary domains in order to build a most holistic notion of EduS contextualized in local/regional/national and international conditions. In other words, this product of the TEDS project aims to offer a synthesis of theory and practice regarding EduS, in order to contribute to future TedP and teacher work focused on EduS. The aim of this publication is not to go into the multiple concepts that EduS mobilises, given the purpose and length of this document, but to present some clues for their development according to the features of the contexts and the teacher educators’ competences. It is not, therefore, about offering rigid and pre-defined paths or recipes for teacher education contexts, but rather to contribute to the promotion of the objectives of sustainable development, in particular Goal 4 - Ensure access to quality

education and promote lifelong learning opportunities for all, setting out some principles that can serve as guidelines for activities, programs or training courses on EduS, which might support teaching professional learning. As Stevenson et al. (2017, p. 406) write, “Within school education, the embedding of complex combinations of interdisciplinary knowledge, understanding, skills, values and dispositions into the curriculum is an important research focus and established challenge”.

The development of the capacity among teacher educators to embed EduS in teacher education contexts implies the construction of flexible teacher education scenarios (Biasutti, De Baz, & Alshawa, 2016), which can be built on the ten education principles illustrated with one or two training activities or on their combination, resulting from the knowledge built by teacher educators who developed TedP on and for EduS in different contexts. These principles are: promote articulation with other types of education; promote the work in contexts; promote commitment and engagement; promote autonomy; conceived in an inter/multi/and transdisciplinary way; based on research and including it; integrate theory and practice; develop in a collaborative way; develop in a recursive and cyclical way; and promote future thinking.





## TEDS INTRODUCTION

These ten principles – trying to answer to What matters in teacher education for EduS? And how can we do it? – are crossed by two major assumptions in order to develop flexible, critical and contextualized TedP for EduS:

- Prior social representations of teachers need to be identified and discussed with them;
- Sensible and problematic questions that affect the planet, the human communities and each one of us need to be discussed.

Related to the first assumption, considering that knowledge is a social product resulting from processes that take place in historical, political and cultural contexts (Connell, Collyer, Maia, & Morrell, 2017), to promote EduS requires a critical contextualization, namely by identifying how teachers represent the subjects Sustainability and Education for Sustainability. The social representations of teachers must be conceived as a tool to understand how to embed EduS in teacher education contexts, which are in close articulation with the cultural, political-ideological, and educational contexts that frame the professional activity of teachers. In fact:

- If most teachers believe they understand what Sustainability and Sustainable Development are, there is variability according to their national contexts, which must be further explored in educational contexts, especially given the “multitude of definitions in reference materials (politicians, experts, scientists, etc.)” (Barthes & Jeziorski, 2012; Chuliá-Jordán, Vilches Peña, & Calero Llinares, 2022);
- Considering the key competences for sustainability, the strategic competence appears to be the one that teachers feel less confident to develop (even with variability according to the different countries), which suggests the need to pay special attention to how to develop the practical application of knowledge, aiming at coming up with inclusive and applicable solutions and strategies to cope with complex problems;
- As non-consensual matters, Sustainability issues may (or not) be deeply rooted in the social representations of teachers, which must be understood in articulation with the cultural and political contexts. This is a challenge to teacher education programs. For example, concerning Sustainability, Lithuanian teachers seem to present less stabilized representations, but these are also more consistent with a holistic perspective; in turn, Portuguese teachers reveal eco-centric representations, thus a non-holistic perspective on Sustainability;
- In-service teacher education appears to play a key role regarding EduS, in a process of considering prior social representations of teachers, identified and discussed with them, in order to develop integrated perspectives (environmental, economic, social and cultural) and knowing that social representations change slowly over time.

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In this sense, TedP on EduS must consider “critical questions [that] remain as to how to most effectively organize research and connect it to actions that advance social and natural wellbeing” (Miller, 2014). That is the second assumption: problematization of the issues that affect the planet, the human communities and each one of us.

Problematization is a French educational way of thinking about learning, considering the relationship between problem, solution, and knowledge. Its founders, Michel Fabre and Christian Orange (Fabre, 2009; Fabre & Orange, 1997; Orange, 2005) noted that didactics and pedagogy were very interested in the position of a problem (awareness) and in its solution, but did not take sufficient account of the process of problem construction<sup>2</sup>. This is why they conceived problematization as an epistemology of the construction of a problem, sharing Jean-Pierre Astolfi’s idea that the school knowledge taught lacked ‘flavour’ (Astolfi, 2006, 2008), because of over-simplification, fragmentation or because it was taught in a dogmatic way (knowledge removed from its questions and therefore unrelated to problems) or in an empiricist way. However, if the function of the school is to educate, it is also to emancipate learners, to integrate them into the community, and to develop them individually, in order to be able to choose their own goals (Reboul, 2011). From this alliance between philosophy of education and didactics, the learning by approach was born, to give meaning and relevance to the knowledge to be taught, while aiming at the emancipation of learners (citizens) by an approach fighting conformism, obscurantism and dogmatism.

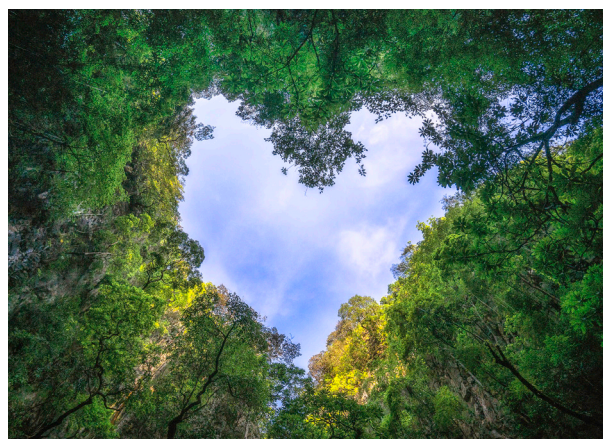
<sup>2</sup> We can cite the contributions of Dewey (for the theory of enquiry), Deleuze, Bachelard and Canguilhem (on the importance of the construction of the problem, the pedagogy of rupture and the notion of epistemological obstacle), Meyer (importance of questioning), Popper (science begins with problems and its aim is to find explanations) or Foucault (on epistemological analysis).



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Based on many studies<sup>3</sup>, we establish a parallel between the process of construction of scientific knowledge and school knowledge that can be explained in three successive points to contribute to restoring “the flavour of knowledge”. Firstly, while knowledge is often presented to students as results to be learned, there is a temptation to ‘forget’ that this knowledge is an answer born of research into a given scientific problem. From this perspective, it is necessary to focus not only on the knowledge itself, but also on the original problem. Therefore, the knowledge to be acquired then takes on the status of a solution to “solve” the problem. Secondly, problematization gives a large place to the construction of the problem, to the understanding of why it is a problem. The construction of new knowledge is neither easy nor linear<sup>4</sup>; it is confronted with resistance on the part of learners linked to internal obstacles which are as much a support on which to build new knowledge as an obstacle to the construction of the latter. They are neither conscious nor visible, but their presence can be identified by analyzing the representations of learners (Astolfi & Peterfalvi, 1993). In this context, learning is not only knowing such a thing, but also a real intellectual revolution, an internal paradigmatic reconstruction. Finally, more recent research within problematization focuses on showing the importance of exploring possibilities in the construction of this apodicticity (Doussot, 2010; Orange-Ravachol, 2012). If knowing something means understanding that this knowledge is the only possible answer to the problem posed, then we have also understood that other possibilities have been ruled out and why they have been ruled out.

Problematization is an intellectual activity which, starting from a problem in a given context, engages in a process of construction and search for a solution. To do this, it is necessary to build reasoning that articulates data (constructed in a particular environment) and conditions (which give meaning to the data) within a given framework (what gives meaning to the problem, allows us to move towards solving the problem and allow us to move). Problematization places particular emphasis on the construction activity, which helps to give relevance to the knowledge thus constructed (Doussot, Hersant, Lhoste & Orange-Ravachol, 2022) and in this sense it is very important for the development of teacher education programs for EduS.



<sup>3</sup> We can mention some examples of researchers such as Denise Orange-Ravachol, Sylvain Doussot, Magali Hersant, Yann Lhoste or Céline Chauvigné.

<sup>4</sup> From an epistemological point of view again, when we look at the analysis of the construction of a concept, we can see major moments in its construction, “qualitative leaps”, what Kuhn called a “paradigm shift” (Kuhn, 1983) and which was then reused by Bachelard with the contribution of the notion of “epistemological obstacle” (1938, 1949).

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The context of EduS presents particularities compared to traditional, so-called stabilized knowledge. Knowledge must be triply vivid (Legardez, 2006) and this for all the actors of the educational community:

“- socially, because it is a social issue, and therefore a matter of debate for all school actors (due to its media coverage in particular);

- scientifically, because if certain elements of knowledge seem to be stabilized, others are still debated (between specialists and experts in the disciplines, but also in the social practices of reference);

- and didactically, because it differs from the traditional pedagogical model” (Op. cit., 2006, p.21-22, our translation).

For these reasons, many researchers<sup>5</sup> suggest a different didactic approach to new “hybrid objects between science and governance” (Girault & Alpe, 2011) to promote teaching methods that can deal with the complexity of these objects and the diversity of the targeted knowledge. In this context, problematization is one approach among others, but pertinent for teaching and learning about sustainability (Voisin, 2018; 2022).

Firstly, social discussion involves taking into consideration not only the scientific dimension of the debate but also the political-economic and social dimensions (all social actors concerned by this debate in a given context).

<sup>5</sup> Jean-Marc Lange and Jean-Louis Martinand, for example.

<sup>6</sup> Michel Fabre (2021) describes the wicked problem in terms of five main dimensions: polysemy, potential conflictuality, complexity (multiplicity of interacting sub-problems, looping effects), critical spatio-temporality (urgency, one-of-a-kind problems, local/global), problem openness or lack of solution (no real resolution and problems that cannot be truly constructed).

As far as problematization is concerned, it seems to us that the importance given to the analysis of all the dimensions of a problem, the elucidation of the points of controversy, the uncertainties, the consideration of the different positions of the actors involved in a specific context and the concern given to the analysis of representations are all elements that make it possible to take charge of the social controversy. Next, taking scientific controversy into account is central to the construction of knowledge through problematization. This approach, built against a positivist notion of science, assumes that the dynamics of knowledge construction include struggle, disagreements, ruptures and provisional agreements. This position rejects the absence of ideology and the idea of science autonomy in its capacity to find its own foundations (Lecourt, 1974, p. 10). This point seems to be particularly important in the context of the didactics of Socially Acute Questions, where controversies are still vivid, knowledge is still under construction, or even where there are no solutions and where the problems are even impossible to construct in the case of “wicked and pernicious problems”<sup>6</sup> related to the idea of the Anthropocene (Fabre, 2021).



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In this sense, problematization is defined as an epistemology of research which also aims to rationalize ideologies. This brings us to the last point concerning the didactic controversy. Indeed, the singular character of EduS or of a socially sensitive issue implies a particular didactic vigilance, but this does not seem to impact on problematization, which proposes an approach that makes it possible, through questioning and investigation, to consider the complexity and controversy of the issues at stake without locking the learners into a predetermined vision (Voisin, 2017). If we want an emancipating education, we must educate citizens capable of adapting, innovating and acting without fixing them in a given model, which may itself be subject to controversy.

In conclusion, learning by problematization is an approach among others, possible and fruitful within the framework of teacher education for EduS with the aim of emancipating the citizen through the construction of educational knowledge in different dimensions including education to politics. The objective is to develop intellectual tools so that the teacher and the pupils can use them to understand, analyze and deal with contemporary issues in their contexts of intervention.

After these main assumptions for teacher education for EduS – to consider social representations of teachers about Education for Sustainability and to use approaches of problematization with hybrid objects of analysis, reflection and intervention that concretize the challenges that the construction of EduS arises – we propose 10 principles for the design and implementation of TedP for EduS.

### PRINCIPLES FOR TEACHER EDUCATION FOR EDUS

In this framework for in-service teacher education principles are key aspects that need to be considered for the development of activities and programs. These key aspects are essential elements to conceive, build and develop actions for professional learning paths which allow educators to transform their knowledge and/or their practices in a certain way. The 10 principles that TEDS proposes for teacher education for EduS emerged from the analysis of the trainees' representations and the results achieved with the continuing education programs, which were based on the development of competences for sustainability, as proposed by UNESCO (2020).

Each principle selected and defined in this document is presented differently and in light of the theoretical framework and the experience of each team in relation to teacher education for EduS. In this sense its development is not uniform, remaining open to new contributions that allow its adaptation to other educational contexts.

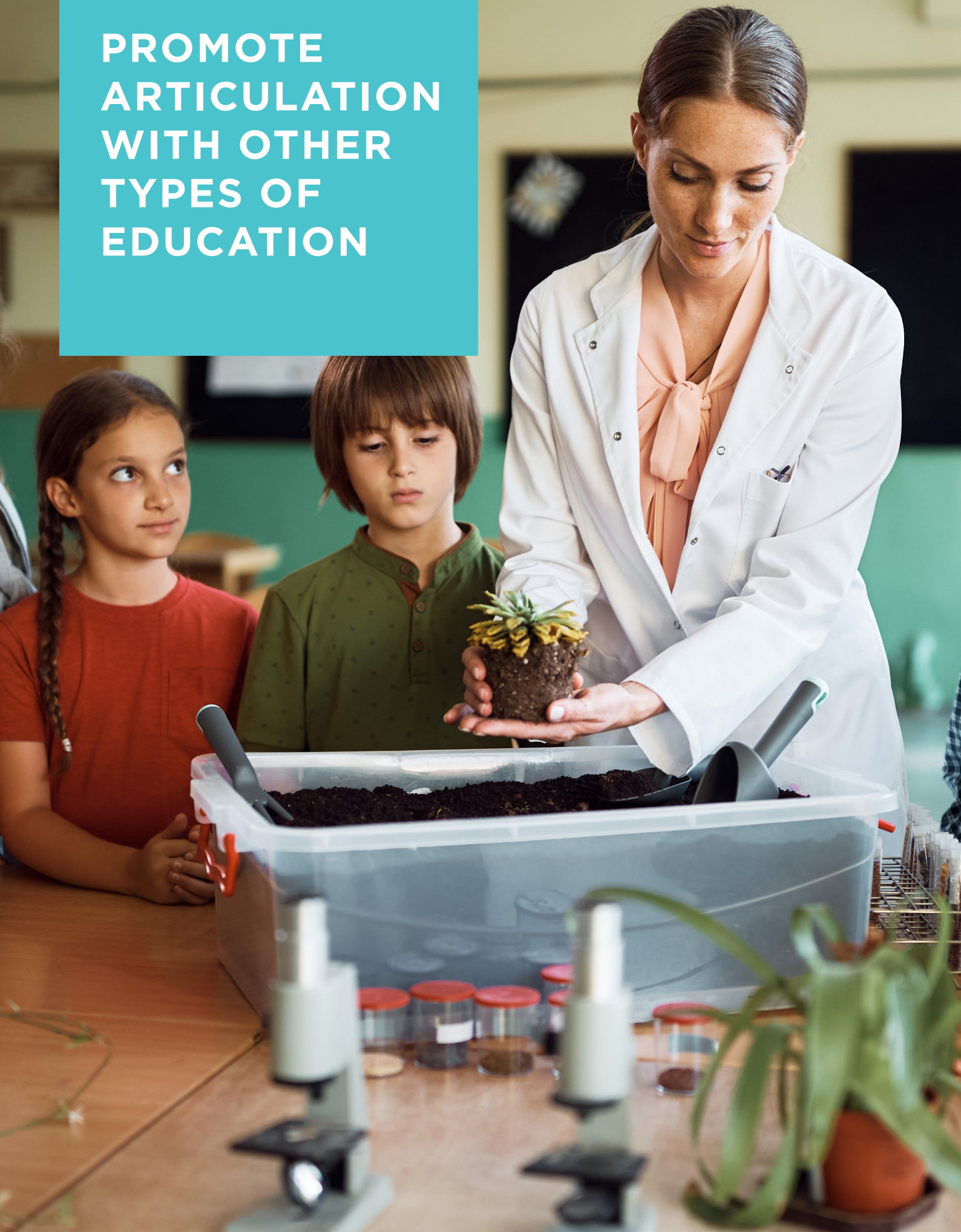
All the principles will be defined and accompanied by one activity for teacher education contexts. In the same way of the principles, these activities are examples which could be adapted to the specificity of each context, remaining open to reconstruction, extension and/or other types of development.

# TEDS INTRODUCTION

## LIST OF PRINCIPLES



**PROMOTE  
ARTICULATION  
WITH OTHER  
TYPES OF  
EDUCATION**



## TEDS PROMOTE ARTICULATION WITH OTHER TYPES OF EDUCATION

### *What matters in teacher education for EduS?*

The role of education in securing a more sustainable future, with social justice for all and for the planet, is perhaps nowhere clearer than in the Agenda 2030 for Sustainable Development, a plan of action for people, planet and prosperity (United Nations, 2015). The document includes 17 Sustainable Development Goals (SDGs) and 169 targets, which constitute transformative steps that are urgently needed to shift the world onto a sustainable and resilient path. Target 4.7 of the SDGs focuses specifically on the transformative potential of education in fostering engaged, active and critical learners, who act for sustainable development. It highlights the intention to:

ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development (United Nations, 2015, n.p.).

Considering the above, it is fundamental to “promote on-going teacher education to ensure teachers develop the necessary confidence, knowledge and skills to teach about and for sustainability” (Lourenço & Andrade, forthcoming). In particular, it is important to support teachers in developing not only theoretical knowledge about education for sustainability (EduS) and other types of education that are interrelated (e.g., peace education, human rights education, global citizenship education, multicultural education/education for diversity), but also pedagogical knowledge, concerning the approaches, activities and resources that can be used to bring issues of peace, social justice, citizenship and diversity into the classroom within an EduS perspective.

In this sense, in-service TedP should help teachers understand the multidimensionality of the concepts of sustainability and sustainable development, moving from a narrow view, which reduces these terms to an environmental dimension, to consider the social and economic dimensions of sustainability as well (WCED, 1987). A step in that direction is to promote articulations between different types of “education for...”, which are sometimes (implicitly) included in official policy documents but are nonetheless considered in isolation. Indeed, as TEDS multi-country analysis shows (Juuti et al., 2021b), education policy documents include references to the role of teachers in catering for linguistic and cultural diversity, in promoting sustainable lifestyles, in helping students solve problems, create their own visions of the future and adopt ethical and responsible behavior. These requirements are often overwhelming for teachers, who feel that they must balance a



## TEDS PROMOTE ARTICULATION WITH OTHER TYPES OF EDUCATION

plethora of goals and educational perspectives if they are to assume their role to the fullest. By helping in-service teachers analyze different educational approaches, establish links between their goals and preferential approaches, and find the possibilities that are better suited to their own groups of students, teacher educators can promote teachers' ability to integrate EduS into their teaching practice in a more intentional and meaningful manner.

One possibility is to establish links between EduS and global citizenship education (GCE). The latter promotes a transformative pedagogy whose purpose is to educate citizens to be autonomous and think critically, so that they can understand the existing social inequalities and act in a committed way seeking to transform society (Santamaría-Cárdaba & Lourenço, 2021). GCE plays a crucial role in developing the knowledge, skills, values, and attitudes required by citizens to lead productive lives, make informed decisions, and assume active roles in facing and resolving current and future global challenges. GCE also helps individuals understand the structural causes of inequalities at a global level and dismantle power relations to create alternative (i.e., more socially just and sustainable) modes of living (Andreotti, 2016; Bamber et al., 2018). Therefore, global citizenship is at the core of EduS and the four areas of sustainability – economic growth, social inclusion, governance and environmental protection – it rely on the contribution of glocally (i.e., globally and locally)-oriented citizens.



## TEDS PROMOTE ARTICULATION WITH OTHER TYPES OF EDUCATION

As evidenced in the teacher education program conducted by the Portuguese team of the TEDS project, through becoming aware of GCE principles and methodologies, teachers were better able to define learning goals and design activities that catered for sustainability. They were also capable of integrating GCE in the curriculum, in line with current education policy developments (e.g., the introduction of a new subject of Citizenship and Development in Portuguese curricula), and to broaden the scope of EduS, moving past its environmental focus (Lourenço & Andrade, forthcoming). As they expressed in the individual reflections, they wrote at the end of the teacher education program:

*Education for sustainability is about much more than environment/nature, it is based on integrated education for adopting and changing attitudes and behaviors towards the environment, human rights and social justice (JT, primary school teacher).*

*I learned that education for sustainability is an integral part of education for citizenship, assuming by its transversality a privileged position in the promotion of attitudes and values, as well as in the development of skills essential to meet the challenges of today's society (JD, primary school teacher).*

It is also possible to help teachers establish links between EduS and an education for linguistic and cultural diversity, namely with pluralistic approaches, such as intercomprehension<sup>7</sup>. This would allow teachers to develop their students and their own multilingual and intercultural repertoires to contribute to the construction of more inclusive and cohesive societies (Juuti et al., 2021b). Moreover, an approach to EduS through intercomprehension supports the development of a better understanding about the existing relations between the sociocultural, environmental, political, and economic dimensions of EduS. As it depends on personal and societal values and attitudes towards alterity, intercomprehension implies an analysis of the role that languages and cultures play in (the development of) society.

Whilst different faces of globalization set pace all around the globe, what we can find in common between them is the proliferation of multicultural and plurilingual interactions in citizens' everyday life. Thus, it is indispensable that education be oriented towards the development of global critical citizens capable of dialoguing and to build dialogue with the Other in a respectful and compassionate way – as EduS intends. Intercomprehension can help to achieve that goal, as it conveys a positive view of linguistic and cultural diversity and aims to support students in transferring and (re)organizing their linguistic and cultural knowledge and linguistic-communicative abilities to develop a communicative competence that is plurilingual and supports dialogue (Andrade, 2003; Bekemans, 2014; Tarozzi & Torres, 2018).

<sup>7</sup> Intercomprehension is a form of plurilingual communication where everyone understands the languages of others and expresses himself/herself in the language(s) he/she masters, thus establishing equity in dialogue, while developing, at different levels, receptive and pragmatic skills.

## TEDS PROMOTE ARTICULATION WITH OTHER TYPES OF EDUCATION

In short, although linking EduS with other types of education might seem a complex and arduous task, it is beneficial for both teachers and students, as the following quote from a teacher who participated in the Portuguese in-service teacher education program shows:

(...) the development of students' knowledge was remarkable, the enthusiasm with which they developed some of the activities was clear, it was transdisciplinary, it allowed them to perfect their working techniques, it allowed them to improve their knowledge and their know-how, it allowed them to exercise their creativity, to count on the collaboration of all (teachers, regular education students, special education students, family members), and finally it allowed them to act as global citizens (MJ, Geography teacher).

In teacher education contexts, it seems important to understand the articulation between the different areas of knowledge, because the transdisciplinary is also achieved from the disciplinary education, as it most often appears in the curriculum organization.

### ACTIVITY FOR PROMOTING ARTICULATION BETWEEN EDUS WITH OTHER TYPES OF EDUCATION



## TEDS PROMOTE ARTICULATION WITH OTHER TYPES OF EDUCATION

TITLE	“Education for...”
GOALS	To get acquainted with and to reflect critically about the concept of EduS and to discover links with other interrelated types of education.
TIME	90 minutes
RESOURCES	<ul style="list-style-type: none"> <li>- Cards/paper sheets with the printed definitions</li> <li>- Cards with the names of the educational approaches being defined</li> <li>- A2 paper sheets (420 x 594 mm) with a Venn diagram</li> <li>- Empty card/paper sheet to redefine the concept of EduS</li> </ul>
APPROACHES/ METHODS	Debate, reflection

### PREPARATION.

The teacher educator selects and prints the definitions of EduS and other types of education (e.g., global citizenship education, peace education, human rights education, intercultural education...). Each definition is printed on a separate sheet of paper/card and should not contain any words that explicitly identify the educational approach being defined. The teacher educator then hangs the definitions on the wall separating them to allow the trainees to move around.

### STEP 1.

The trainees move around and read the definitions of the types of educational approaches that have been hung on the walls of the room. After reading the definitions, trainees are asked to stop by the one they think is most connected to the concept of EduS and to justify their choice. After listening to the opinions of the trainees, the teacher educator corroborates (or not) their hypotheses.

### STEP 2.

The trainees try to find out what type of “Education for...” approaches are defined in the other sheets of paper. The teacher educator can provide the names of those approaches (printed on cards) allowing participants to match the name to the definition. After listening to the opinions of the trainees, the teacher educator corroborates (or not) their hypotheses.

## TEDS PROMOTE ARTICULATION WITH OTHER TYPES OF EDUCATION

### STEP 3.

In groups (of three to four people, depending on the size of the group) the trainees complete a Venn diagram listing the similarities and differences they find between the educational approaches. Then, they present their results to the whole group.

### STEP 4.

After a group discussion on the results of the previous activity, the teacher educator emphasizes the conclusions: while different types of “education for...” may have their particular histories and interests, they have a lot in common – in particular, in their scope, content, pedagogies and transformational interests, which are closely related.

### STEP 5.

After the group reflection, the teacher educator asks the trainees if they would like to change/add something to the definition of EduS. If so, the teacher educator invites the trainees to develop and write down a new concept.

### STEPS FORWARD.

The teacher educator can suggest to the trainees the reading of a text on the dimensions of sustainability, which can be explored in the following sessions. One possibility is: Powlowski, A. (2008). How many dimensions does sustainable development have? *Sustainable Development*, 16, 81-90. <https://doi.org/10.1002/sd.339>.

### QUESTIONS - EXAMPLES TO BE CONSIDERED IN TEDP FOR SUSTAINABILITY

*How can several curricular domains affect (in a positive or negative way) the conception, implementation and evaluation of projects related to EduS?*

*In what ways can teacher education for EduS be articulated with other initiatives? What links can you discover between EduS and other types of education, such as global citizenship education or intercultural education?*

**PROMOTE  
THE WORK IN  
CONTEXTS**



## TEDS PROMOTE THE WORK IN CONTEXTS

Education for sustainability (EduS) empowers individuals to actively participate in decision making processes which are compatible with living within the environmental limits of our planet in a just, diverse, equitable and peaceful society. EduS aims at empowering individuals and communities with skills, attitudes, and values to become socially responsible global citizens. To teachers and learners this may be a rather challenging process to implement within the school parameters (Mifsud, 2012a). There are several relatively effective pedagogies (Caruana & Mifsud, 2014) to work towards EduS. Through the TEDS project, the seminal importance of competences was highlighted – and research in the project delineated the relative lack of strategic competence in communities of learning.

These new ideas and particular direction were then weaved through a relatively well-established environmental education model by Lucas (1980) and then amended by Sterling and Cooper (1992). This model was amended from its more focused environmental roots into one which encompasses a broader and wider vision model about sustainability, which describes its components as education in, about and for the environment. In this model education about the environment is mainly concerned with providing cognitive understanding and skill development, education for the environment, refers to environmental conservation and preservation for particular purposes, and education in the environment means a special type of instruction that usually concerns the world outside the classroom (Lucas, 1980). Therefore, education here is seen as being a vehicle for the environment, while the environment is seen as a vehicle for education (Sterling & Cooper, 1992).

## TEDS PROMOTE THE WORK IN CONTEXTS

The philosophy and vision of target 4.7 of the SDGs that looks at the importance of the global context and fuses the importance of EduS with GCE was also considered. The target 4.7 of SDGs pronounces that by 2030 all 'learners should acquire knowledge and skills needed to promote sustainable development, including among others through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship, and appreciation of cultural diversity and of culture's contribution to sustainable development'. (United Nations, 2015). Local research from a small island state that exhibits the importance of outdoor learning through a family community was fused to the above to better flesh out the local links to the global scenario (Mifsud et al., 2017). This work researches the effectiveness of outdoor EduS, through a variety of walks for families, in the urban and rural landscape of the Maltese islands, intertwined with the pillars of sustainability. The main aim was to instill a sense of ownership and belonging towards the local holistic environment of the Maltese islands. The methodological model, which includes various activities, aims to develop sustainability awareness and pro-environmental behavior through collaboration between members of the various families. In doing so, such activities will help families develop critical thinking and problem-solving abilities, while also providing them with leadership positions during any particular activity or the entire process.

This sustainability model builds on the previous studies mentioned and therefore brings to the fore the importance of context and contextualization within effective education for sustainable development.

The three main pillars to achieve contextualization include:

- (i). Education about Sustainability – It is about learning on sustainability issues and sustainable development. This should include both the local and global contexts – although a number of studies do suggest that with young people it is more effective to start with the context that is closer to them as it helps them to relate and therefore is more effective (Mifsud, 2012b);
- (ii). Education in Sustainability – It refers to a pedagogy that uses experiences that are outside the traditional walls of formal learning and can include natural environments, industrial areas, and anything in between. This usually involves the teacher carrying out lessons within natural, urban, rural or any other context that he/she considers useful in achieving effective learning;
- (iii). Education for Sustainability – It refers to specific competences and values that students should achieve in order to be sustainable as individuals and within a community. This also implies a particular pedagogy that can be effective in achieving this particular change.



## TEDS PROMOTE THE WORK IN CONTEXTS

The context mentioned in the ‘direction drivers’ above needs to include a pedagogical vision that utilizes Creativity, Cooperation and Conduction (leadership) and in this manner Context becomes the ‘atmosphere’ in which activities that lead to effective change take place. The family can serve as a good example to fulfill all this, promoting EduS in informal settings and contextualizing cooperation between family members, affording leadership opportunities and promoting creativity. Research about families and informal EduS settings has been limited, even though there is growing interest in intergenerational learning. Thomas (2009, p. 5, in Finsden & Formosa, 2011) describes intergenerational learning as “activities which purposely involve two or more generations with the aim of generating additional or different benefits to those arising from single generation activities.”

Intergenerational learning promotes social capital for sustainable development where interlinked and contextualized forms of learning happen: adults and the elderly teach the younger generation while the young people contribute towards adults’ learning – this all happens in a context which is full of experiences for all the family members since they are “shapers of and shaped by the world around them” (UNICEF, 2013).

Formal education is the main ‘arena’ in which teachers carry out their activities and a community of learning develops. In several countries documents and structures that facilitate EduS in school settings already exist. However, it is very important that these suggestions are carried out in teaching

episodes while respecting the culture and the context within which they are occurring. Attention should be afforded to the fact that these activities should promote a sense of belonging and a sense of ownership within the students and teachers and eventually in the wider community.

Opportunities for this type of context-based education abound and teachers, in their role as pedagogy experts, should actively seek such opportunities and not only be bound by classroom practices. Teachers can become change agents in their respective education systems by developing strategies and designing development plans that not only address the ‘within classroom’, but also a much wider school, national and international context



# TEDS PROMOTE THE WORK IN CONTEXTS

## ACTIVITY FOR THE PROMOTION OF THE WORK IN CONTEXTS

The activity involves a sense of belonging through sustainability walks including context creation and co-operation.

TITLE	“Education for EduS in my context – sustainability walks”
GOALS	To get acquainted with the characteristics of the context, identifying activities that can take place in the sustainability walks with students – including critical thinking, collaboration between family members, future understanding, and creative solutions.
TIME	120 minutes
RESOURCES	<ul style="list-style-type: none"><li>- Material for photographing.</li><li>- Leaflets describing contexts</li><li>- Cards/paper sheets</li></ul>
APPROACHES/ METHODS	Observation, debate, reflection

### STEP 1.

Students are briefed of a walk that will be part of their learning journey. A number of preselected walks are described in small leaflets which the teacher will distribute to students.

### STEP 2.

Contact is established with the family of the students through this leaflet and/or also through email/letter etc.

### STEP 3.

The walks can take place individually per family at a time that suits the family.

### STEP 4.

In the leaflet, the teacher will identify activities that can take place in the sustainability walks – including critical thinking, collaboration between family members, future understanding, and creative solutions. The context is provided by the walk and the family members – ensuring that the about/for and through dimensions are all catered for.

### STEP 5.

Students will prepare pictures of the walk and do a presentation in class of their experiences.

## TEDS PROMOTE THE WORK IN CONTEXTS

### QUESTIONS - EXAMPLES TO BE CONSIDERED IN TEDP FOR SUSTAINABILITY

*How do sustainability issues relate to national and/or local curriculum and how can we integrate sustainability competences in subject specific curriculum?*

*When is it more important to use local resources and when is it better to employ a global context when integrating theory and practice?*

**PROMOTE  
COMMITMENT  
AND  
ENGAGEMENT**



## TEDS PROMOTE COMMITMENT AND ENGAGEMENT

Project TEDS dealt with several dimensions, including attitudes, dispositions, and values that the teacher educators and trainees need to develop or strengthen to carry out EduS. One of the principles of education towards sustainability that needs to be considered is the promotion of commitment. It is imperative to promote the ethics of commitment, of caring for oneself and for others, for the planet, the common home in which we live and lead with common and different cause(s).

Klein, Solinger, & Duflot (2022, quoting Klein, Molloy, & Brinsfield, 2012, p. 137) define commitment as “a volitional psychological bond reflecting dedication to and responsibility for a particular target”. Thus, the idea of commitment is associated with personal characteristics (responsibility, persistence, resilience), but also with a voluntary and intentional act, with a view to achieving something in which one believes and, therefore, it becomes necessary to intervene.

Making commitments to the planet, to others, to oneself and to society is essential for the sustainability of EduS in itself and is reflected in the perspective of Integral Ecology (Cervi & Hahn, 2017; Fundação Gonçalo Silveira, 2018). Thus, commitment is part of an ethical dimension of EduS, in addition to the environmental, social, economic, cultural and political dimensions.

Promoting engagement emerges as a social responsibility (The Cambridge Life Competencies Framework, Social Responsibilities, 2020) and involves, among others, “Understanding personal responsibilities as part of a social group; Showing intercultural awareness; Understanding aspects of one’s own culture; Understanding aspects of other cultures; Interacting with others across cultures; Recognizing personal impact on global issues.” (pp. 5-6).

Considering that “Educators remain key players in facilitating learners’ adoption of sustainable lifestyles in an era where information is available everywhere and the role of educators is changing” (UNESCO, 2020, p. 30), it is necessary that the commitment to education and sustainable ways of life, in the different spheres of social intervention and domains (cognitive, affective, cultural, social, ethical), is assumed by educators and trainees, proceeding in an exemplary manner and conferring credibility to speeches and actions, in order to contribute individually and as a member of a community to the construction of a more just and sustainable world, combining equity and social solidarity with dialogue and social inclusion.



## TEDS PROMOTE COMMITMENT AND ENGAGEMENT

The commitment to educate teachers for sustainability is part of a simultaneously cognitive, affective and behavior dimension, in which knowledge about the different dimensions of sustainability education acts, being therefore seen in a systemic way, in which each individual believes in its importance and wants, intentionally and voluntarily, to intervene and to change mindsets and behaviors of oneself and of others taking concrete steps towards sustainable transformations in the personal, societal and political spheres (UNESCO, 2020).

Commitment emerges as a principle both at the level of teaching and learning and at the level of teacher education for EduS. At any level we will try to adopt a curricular perspective, considering the curricula in force (both for primary and secondary education and for teacher education programs), where competence-based teaching and learning take place. These competences also integrate attitudes, values, dispositions, behaviors, and knowledge. Therefore, the principle of commitment emerges as transversal to the curricula and underlying its management and development, regardless of the area of study and level of education.

### ACTIVITY FOR PROMOTING COMMITMENT AND ENGAGEMENT

TITLE	“Common House - Common Cause”
GOALS	<ul style="list-style-type: none"><li>- To discuss and develop a collective concept of commitment;</li><li>- To work on the ability to look in depth at the cause(s) of a problem and the co-definition of approaches that contribute to its solution;</li><li>- To become aware of the planet as a unique space, a common home, in which we all live and for which we are all responsible.</li></ul>
TIME	30 + 60 minutes
RESOURCES	<ul style="list-style-type: none"><li>- Scenery paper</li><li>- Coloured pens</li><li>- Cards for the role play</li><li>- Roll of wool for the role play (optional)</li><li>- Equipment to take a photo (optional)</li></ul>
APPROACHES/ METHODS	Debate (30 minutes)

# TEDS PROMOTE COMMITMENT AND ENGAGEMENT

## **STEP 1.** What words do you associate with commitment?

Draw the word commitment in a large sheet of scenery paper and challenge each member of the group to write or draw his/her ideas about commitment on the scenery paper.

**STEP 2.** If we do a search for images linked to commitment, most refer to “more given” or “handshake”/compliance. How do you explain the symbolism? Relate it to the previous collective scheme written on scenery paper.

## **STEP 3.** Role play (60 minutes: 40 + 20)

The group is challenged to play a role in the imaginative scenario of a sinking ship which is a metaphor for a specific sustainability problem (e.g. Climate change).

- Divide the groups in two and distribute them into two different rooms.
- Distribute in each group the cards with the specific roles considering the crew of a ship (e.g. captain, pilot, machine operators, chambermaids, etc.) and different persons outside the ship (e.g. tourists, journalists, migrants, students, teachers, politicians, ...).

Initiate a big paper silent discussion around the causes and possible ‘solutions’ of the [wicked] sustainability problem. As a starting point you can use the scenery paper to draw a ship and state “How can this [wicked] sustainability problem be approached?”

- Each member writes down his/her ideas on the scenery paper trying to connect to other ideas. The goal is to present a collective approach that helps to minimize the problem considering its causes.

Optional: The person who is the captain uses the roll of wool to choose the first person to write and share his/her perspective. After sharing, this first person chooses the next to share and so on. The web that will be obtained symbolizes the connection between all stakeholders (regardless of being inside or outside the ship).

Get together the two groups of the rooms. Initiate a collective debate to compare the process and the approaches of the two groups. What is different/what is similar? Was the concept of commitment different between the groups? Why? What can we learn from this?

If you wish, take a photo of the committed hands of your group (and the obtained web) and include a title or a caption.

## **STEP 4.** Autonomous work

Challenge for autonomous work: Search your subject area curriculum for allusions to engagement /commitment and see how it is/isn't articulated with EduS. If so, which one is most prominent? Explain why.

# TEDS PROMOTE COMMITMENT AND ENGAGEMENT

## QUESTIONS - EXAMPLES TO BE CONSIDERED IN TEDP FOR SUSTAINABILITY

*When a teacher educator is planning TedP for EduS what would he/she like to see in the classroom?*

*How do we engage teachers in developing their teaching through a sustainability approach?*

*Why is commitment one of the fundamental educational principles in EDUS?  
Which other principles can be articulated with commitment?*



# PROMOTE AUTONOMY



## TEDS PROMOTE AUTONOMY

Teachers are professionals. Traditionally, they have had pedagogical freedom to select teaching methods and approaches. The level of professional status varies. At the same time, the level of professional autonomy varies to. In the context of teacher education, where teachers' professional status is acknowledged, the importance of promoting teacher's autonomy is recognized (Darling-Hammond, 2009; Juuti et al., 2021a). Teachers in such contexts are responsible, not only for selecting teaching methods, but also for curriculum planning, final evaluation of learning, the development of school practices and participating in shared leadership (Reinius et al., 2022). Furthermore, even though there is available in-service teacher education, teachers are responsible for their own professional learning.

Teachers as professionals are not necessarily willing to participate in traditional top-down in-service teacher education. In some contexts, like Finland, there is a very minimal number of compulsory actions in in-service teacher education even though there are a lot of in-service TedP available. Schools and teachers decide on the needs and ways to update the professional teaching knowledge competencies. However, teachers are not always very motivated to participate in actions for professional development.

According to self-determination theory (Deci & Ryan, 1985), an individual will be motivated to do something if basic psychological needs are fulfilled. These psychological needs are feeling of competence, feeling of relatedness, and feeling of autonomy. A professional teacher with a university degree may feel competent and being a member of the school community may promote a feeling of relatedness. Several kinds of external incentives or demands that teachers face may suppress the feeling of autonomy. External pressure may weaken their motivation to participate in teaching professional learning programs. While planning the teachers professional learning program, it is important to take into consideration how the program could acknowledge professional teachers' need for feeling of autonomy.

In the TEDS project, in-service teachers' modules of EduS have been piloted. For example, in the Finnish module, teachers were invited to participate. Teachers participated voluntarily. Participating teachers were those who saw the topic of the pilot as important, and perceived the need to learn more about such topics (circular economy inventions). This is the first level decision that promotes autonomy. All teachers participating in the program should find professional interest in the topic of the program. Professional interest is something that professional teachers (should) have to work better as teachers. During the program, teachers are encouraged to design teaching sequences in their own context. Teacher educators provide a framework within which participating teachers have a lot of freedom to tailor the teaching sequence. Teacher education programs for professional teachers must rely on participating teachers' professional ethics that they are willing to improve teaching and their willingness to professional learning. Theoretical expectation is that nurturing professional autonomy, teachers will be more motivated to bring new pedagogy in their teaching and they are more willing to develop teaching.

## TEDS PROMOTE AUTONOMY

Autonomy promotion is not a specific activity or task. The key for autonomy support is to organize the program in a way that participating teachers have real possibilities to make decisions concerning their teaching. The autonomy promotion relies on acknowledging the teacher's professional status. Therefore, the teacher educators' role is to use respectful and collegial discursive language that reduces the status difference between teachers and teacher educators. Autonomy promotion relies on collegial language and also on intrinsic motivators such as interests, preferences, choice-making, curiosity, and sense of challenge (Reeve et al., 2004). It is important to note that autonomy promotion in professional development programs avoids controlling language such as incentives, but stresses the importance of the goals of the program. In a TedP, there must be room to reflect on and listen to teachers' concerns and complaints. Furthermore, teacher educators need to show explicitly that complaints and negative emotions are acceptable and understandable while learning new kinds of pedagogical approaches.

### ACTIVITIES FOR AUTONOMY PROMOTION VERSUS DEMOTION

AUTONOMY PROMOTION EMPHASIZES	AUTONOMY DEMOTION EMPHASIZES
Teachers have a lot of possibilities to make real decisions concerning their own teaching.	Program provides detailed lesson plans for teachers to enact
Teachers intrinsic motivation concerning the topic and values and importance	Program provides detailed lesson plans for teachers to enact
Aims and goals of teaching	Students learning outcome measurements
Collegial and informal language	Formal and hierarchical language

As a summary, autonomy promotion may better engage teachers in current TedP and thus teachers may learn new content and pedagogy. There are indicators that autonomy promotion features in teachers' professional development programs may encourage individual teachers to participate more willingly in new programs (Loukomies et. al., 2018).

#### QUESTIONS - EXAMPLES TO BE CONSIDERED IN TEDP FOR SUSTAINABILITY

*What is the role of autonomy (of teachers, teacher educators and schools) in the development of projects for EduS?*

**CONCEIVED AS A  
INTER/MULTI/  
TRANSDISCIPLINARY  
WAY**



## TEDS CONCEIVED AS A INTER/MULTI/ TRANSDISCIPLINARY WAY

Teacher education to promote EduS should be conceived and developed in and by multidisciplinary teams for the development of projects focused on problem solving (concerning problems of unsustainability) that are also multidimensional and multidisciplinary. Several reasons can be presented to support this principle.

First of all, sustainability is a rather complex concept. Generally, it is related to environmental issues. This tendency is correct since many sustainability challenges today's society must face result from environmental problems. But limiting the understanding of the sustainability concept to its environmental dimension would be quite reductive. Understanding the complexity of this concept and its scope, in a holistic and integrated perspective, implies attending to all its dimensions. The environmental will be one of them, of course, but it is also important to bear in mind the social, economic, cultural, political and ethical dimensions. It is possible to find in the reference literature several proposals of dimensions to consider. While not all proposals agree on which dimensions should be considered, they all agree on the multidimensionality of the concept (Sá, 2008).

In this sense, it is important to recognize this multidimensionality in education contexts, explicitly assuming/addressing not only the environmental dimension, but also other dimensions such as: cultural and linguistic (related to the recognition of the linguistic and cultural diversity associated with respect for other languages and cultures); social (associated, for example, with intergenerational relationships and taking into account the glocal level); economic and financial (particularly covering responsible consumption).

Project TEDS dealt with several dimensions of sustainability: i) environment (European Environmental Agency, 2019); ii) technology (namely the one related to ICT, that plays such a relevant role in modern society) (Bates, 2015); iii) economy and financial literacy (related to important ideas such as the creation of a circular economy less dependent on raw materials and promoting the use of recycled materials or changes in the consumer habits that generate more sustainable life styles) (Ellen MacArthur Foundation, 2017); iv) equity and social solidarity combined with dialogue and social inclusion, which are key-words for a more peaceful world (Bekemans, 2014).

These ideas lay the foundations of a critical and active citizenship adapted to modern society. Undoubtedly education is very relevant to its development since (formal, non-formal or even informal) educational contexts are crucial for the preparation of individuals devoted to the implementation of sustainability considering all dimensions it may include (UNESCO, 2017). Such an education entails a teaching and learning process in which the students develop competences based on skills, knowledge, values and attitudes. This demands the conception, implementation and evaluation of projects which try to solve local problems with a view on global issues affecting modern society. Students must play the central role in this process supported by their teachers working collaboratively to attain goals

## TEDS CONCEIVED AS A INTER/MULTI/TRANSDISCIPLINARY WAY

which are meaningful for all the participants in the action. It is undeniable that such projects require the mobilization of knowledge and skills from different areas and different perspectives.



These projects should be: i) conceived taking into consideration research (objectives, methodology, results) and promoting the work in local contexts perceived as relevant parts of more global contexts conceived from a perspective of complexity and considering the multiple dimensions of sustainability, namely the environmental, economic, social and cultural dimensions (among others possible); ii) developed in cyclical and recursive ways, on the basis of curricular integration and using an inter/multi/transdisciplinary approach promoting commitment and engagement; iii) evaluated to reconstruct representations essential to determine individual and collective

(at several levels) courses of action. The use of an inter/multi/transdisciplinary approach is ideal to promote transversal features such as integrating theory and practice, articulating several domains of knowledge and kinds of education, developing skills and promoting collaboration.

### How is it possible to transpose these conceptions to a TedP?

To attain this goal demands several operations: i) first of all, composing a team involving teacher educators and in-service teachers coming from various curricular domains and dealing with several kinds of education; ii) identifying the in-service teachers' representations on sustainability and EduS - using questionnaires, for example - and discussing the convergent and divergent aspects of such conceptions; iii) identifying local problems with glocal impact that must be solved, defining aims to be attained and designing plans to fulfill that purpose on the basis of research concerning those issues; iv) determining what contribution each curricular domain and kind of education can give the common project; v) implementing the project in several cycles each one including data collection and analysis and the drawing of conclusions that must be discussed to plan the next cycle; vi) promoting individual and collective moments of critical reflection in order to analyze the evolution and transformation of conceptions; vii) disseminating the results of the ongoing project and promoting their discussion in other contexts.

# TEDS CONCEIVED AS A INTER/MULTI/ TRANSDISCIPLINARY WAY

## ACTIVITY-ONEFORALLANDALLFORONE:INTER/MULTI/TRANSDISCIPLINARY APPROACH OF EDUS

### A - LEVEL OF IN-SERVICE TEACHERS

#### STEP 1. PREPARING TO ACTION

##### Identifying and discussing representations

- Fill an online questionnaire on sustainability and EduS taking into consideration their articulation with several curricular domains and kinds of education;
- Prepare an oral presentation on the ideas underlying the answers given to the questionnaire to discuss with the other in-service teachers and the teacher educators;
- Contribute to the identification of convergent and divergent aspects of the in-service teachers and the teacher educators' representations on sustainability and EduS and the reflection on their possible consequences.

##### Identifying a problem and designing a plan for intervention

- Take part in a brainstorming activity to identify local issues related to sustainability with possible global features (such as, for example, demographic issues, consumption, asymmetries, and bio-socio-cultural diversity)
- Contribute to:
  - The definition of aims;
  - The search for other projects dealing with the same issue;
  - The reflection on how different curricular domains and kinds of education may contribute to the resolution of that problem (therefore framing the project in conceptual and curricular terms);
  - The design of an action plan (including intervention, data collection and analysis, drawing and discussion of conclusions).

#### STEP 2. ACTION

##### Implementing the plan for intervention

- Implement the project in one's context;
- Collect and analyze the data;
- Draw conclusions.

##### Evaluating the plan for intervention

- Discuss the conclusions with the other in-service teachers and the teacher educators involved in the TedP;
- Contribute to redesigning the plan of intervention.

##### Engaging in a cyclical intervention

- Implement and evaluate new cycles of intervention projects or activities for EduS.

<sup>8</sup> This questionnaire may be based on the one included in IO<sup>2</sup>. The teacher educator would choose some questions mainly taking in consideration the specific characteristics of the group of in-service teachers enrolled in the TedP.

# TEDS CONCEIVED AS A INTER/MULTI/ TRANSDISCIPLINARY WAY

## STEP 3. POST ACTION

### Identifying changes in the conceptions

- Write an individual essay on conceptions about sustainability and EduS based on the participation in the TedP and taking into consideration:
  - The results of the questionnaire and the group discussion and reflection on these results (Step 1);
  - The developed and implemented Project (Step 2);
  - The perspective of one's specific curricular domain and kind of education;
  - The contributions from other curricular domains and kinds of education;
  - Points of convergence and divergence;
  - Propositions to take advantage of the convergent aspects and to reduce the possible negative impact of divergent aspects;
- Prepare an oral presentation on that subject to discuss their ideas with the other in-service teachers and the teacher educators involved in the TedP;
- Contribute to the identification of the changes in the conceptions and their possible consequences.

## B - LEVEL OF TEACHER EDUCATORS

## STEP 1. PREPARING TO ACTION

### Identifying and discussing representations

- Present an online questionnaire on sustainability and EduS taking into consideration their relation with the several curricular domains and kinds of education of the in-service teachers enrolled in the TedP:
- Ask them to individually
  - Answer the questionnaire;
  - Prepare an oral presentation on the ideas underlying the answers given to the questionnaire to discuss with the other in-service teachers and the teacher educators involved in the TedP;
  - Present their ideas.
- Organize
  - The discussion of the representations of all the participants in the TedP concerning sustainability and EduS;
  - The identification of convergent and divergent aspects of those representations;
  - The reflection on their possible consequences.

### Identifying a problem and designing a plan for intervention

- Organize a brainstorming to identify local issues related to sustainability with possible global features (such as, for example, demographic issues, consumption, asymmetries and bio-socio-cultural diversity)
- Promote a discussion leading to
  - The definition of aims;
  - The search for other projects dealing with the same issue;
  - The reflection on how different curricular domains and kinds of education may contribute to the resolution of that problem;
  - The design of an action plan (including intervention, collection and analysis of data, drawing and discussion of conclusions).

<sup>9</sup> This questionnaire may be based in the one included in IO<sup>2</sup>. The teacher educator would choose some questions namely taking in consideration the specific characteristics of the group of in-service teachers enrolled in the TedP.



# TEDS CONCEIVED AS A INTER/MULTI/ TRANSDISCIPLINARY WAY

## STEP 2. ACTION

### Implementing the plan for intervention

- Supervise
  - The implementation of the project in the contexts where the in-service teachers enrolled in the TedP;
  - The collecting and the analysis of data;
  - The drawing of conclusions.

### Evaluating the plan for intervention

- Organize
  - The discussion of the conclusions involving all the in-service teachers and the teacher educators involved in the TedP;
  - The redesigning of the plan of intervention.

### Engaging in a cyclical intervention

- Supervise the implementation and evaluation of new cycles of intervention.

## STEP 3. POST ACTION

### Identifying changes in the conceptions

- Present to the in-service teachers enrolled in the TedP the guidelines to assist the writing of an individual essay on conceptions about sustainability and EduS based on the participation in the TedP and taking into consideration:
  - The result of the questionnaire and the group discussion and reflection on these results (Step 1);
  - The developed and implemented Project (Step 2);
  - The perspective of one's specific curricular domain and kind of education;
  - The contributions from other curricular domains and kinds of education;
  - Points of convergence and divergence;
  - Propositions to take advantage of the convergent aspects and to reduce the possible negative impact of divergent aspects;
  - The preparation of an oral presentation on that subject to discuss their ideas with the other in-service teachers and the teacher educators involved in the TedP.
- Organize
  - The discussion of the representations of all the participants in the TedP;
  - The identification of changes in their conceptions;
  - The reflection on their possible consequences.

## QUESTIONS - EXAMPLES TO BE CONSIDERED IN TEDP FOR SUSTAINABILITY

*What are the relevant dimensions of sustainable development, sustainability and EduS?*

**BASED ON  
RESEARCH AND  
INCLUDING IT**



## TEDS **BASED ON RESEARCH AND INCLUDING IT**

Research literature on teacher's professional development highlights several features for the success of teacher education programs. There is rather a wide consensus that a high quality of teaching professional development program provides extended time for teachers to practice and reflect on classroom experiences. TedP for EduS should focus on content that is highlighted in the local curriculum and adjust it with district and national policies and assessment teaching practices. Furthermore, teaching professional development programs should engage teachers in active participation in analyzing examples of teaching and student work (National Academies of Sciences, Engineering and Medicine, 2015). Consensus features of teachers' professional development programs seem to position teachers as learners who must be guided to do certain activities to adopt new teaching methods and approaches. However, the positioning of a teacher as a learner may not be optimal in the contexts where teachers are positioned as autonomous professionals.

In the context where teachers are positioned as autonomous professionals (Krzywacki et al., 2015; Loukomies et al., 2018), the focus of professional learning programs should be placed in the development of teaching. In such contexts, the aim should not be to pressure teachers to adopt new skills or to push them to implement new techniques (Juuti et al., 2021b). Juuti et al. (2021a) present teacher - researcher partnership as a model for inviting teachers as members of the research team. The model has three main features that promote teachers' professional status as experts in teaching and learning: i) teachers and researchers share the same goals; ii) teachers and researchers co-design teaching sequences; iii) activities are integrated with ongoing educational research. Juuti et al. (2021b) apply the term 'researcher' as a rhetorical choice to stress the role of ongoing research within the teachers' professional learning program. While organizing the teachers' professional development program the organizers are university affiliated teacher educators - as they were in the TEDS project. Considering the teacher - researcher partnership, it is a big challenge to require that teachers and researchers have the same goals. It is important in the TedP invitation to inform researchers' interests as well. Teachers who are voluntarily enrolling in the program have shown to a certain extent the same interests as researchers and/or teacher educators.

In the TEDS project, teachers and teacher educators were invited to co-design teaching sequences for EduS. One of such teaching sequences focused on circular economy inventions. The co-designing and trials of co-designed teaching sequences served as a way to better understand students' learning for the development of sustainability competences and concepts (Juuti et al. 2021a). There was a shared goal to understand how to improve EduS. At the beginning of the program, there was time for sharing common values and creating collegial atmosphere and mutual understanding of the goals. During the program, there was time for co-planning. During the enactment part, there were pedagogically motivated ways to collect students' artifacts and to analyze learning in a designed setting.

## TEDS **BASED ON RESEARCH AND INCLUDING IT**

There was a second meeting focused on reflecting about teachers' experiences of the co-designed teaching sequences. Due to the relatively short pilot of the teacher education module, there was not the possibility to include analysis of the students' artifacts in the reflection section as suggested in research literature on teacher – researcher partnership (Juuti et al. 2021b). However, teachers were invited to create a new pedagogy and to build new knowledge on EduS. Thus, teachers were positioned as members of the research groups whose professional autonomy and competence were acknowledged and applauded.

In general, in the teacher – researcher partnership, it is important to stress that teachers are members of the research group even with a different status and motivation – at least at metaphorical level. If the research project continues for a long period of time, teachers can be members of the research group in a very concrete way and bring their expertise of school context. This expertise ensures the validity and feasibility of the co-designed teaching sequences. One main benefit of the research - practice partnership is that teachers are not only acquiring the latest research-based knowledge, but they are invited to create new research-based knowledge on teaching and learning. This position changes from adopter of knowledge to creator of knowledge is crucial concerning the teachers' professionalism and how to promote expert teachers professional learning.

### **ACTIVITY FOR PROMOTING RESEARCH IN TEDP**

To embody the ideal of based on research and including it, the following elements may be applied in TedP.

#### **STEP 1 - INVITATION:**

teachers could be invited as participants and members of the integrated research and development project of teaching that is possible to recognize as an in-service training course or equivalent depending on the educational context.

#### **STEP 2 - DESIGNING TEACHING SEQUENCES:**

Teachers and researchers / teacher educators co-design teaching sequences that take into consideration theoretical assumptions and possibilities of new learning that are aimed to design in the classroom and better understood by integrating educational science research.

# TEDS **BASED ON RESEARCH AND INCLUDING IT**

## **STEP 3 - SHARED UNDERSTANDING OF THE THEORETICAL FOUNDATIONS**

Researchers' responsibility is to bring solid and inclusively explicated introduction to the theoretical background of the teaching sequence. Teachers and researchers should have open and respectful discussion of the theoretical ideas - e. g. circular economy inventions - before the actual designing of the teaching sequence. Furthermore, researchers should bring preliminary research questions in the shared discussion. Thus, teachers are involved to reflect on the importance of such questions from the point of view of how to develop the teaching practice and students' engagement in sustainability or learning sustainability competencies.

## **STEP 4 - DATA GATHERING AND REFLECTION:**

Researchers invite teachers to co-plan research data gathering methods to have valid data for understanding students' learning and to reflect on teaching. In projects with extended time, teachers reflect on and analyze their experiences and researchers present the preliminary analyses of the data for teachers to interpret. Teachers' tacit knowledge of contexts and practices might become visible in such situations. Teachers' reflection could serve as a participant-check for validity.

## **STEP 5 - AUTHORSHIP IN PUBLICATIONS AND DOCTORAL STUDIES:**

The highest level to embody the ideal of based on research and including it is to invite teachers as co-authors for publications. Teachers may provide a big contribution to research design and interpretation of the results. While a teacher has such academic and intellectual contribution for research, then it is natural to invite the teacher as co-author. Furthermore, some teachers may start their doctoral studies in the field of teaching and learning. Then the teacher may have a dual role in the research group as teacher and researcher.

### **QUESTIONS - EXAMPLES TO BE CONSIDERED IN TEDP FOR SUSTAINABILITY**

*How can we promote the development of sustainability competences in schools?*

*How do we know that learners develop sustainability competences?*

# INTEGRATE THEORY AND PRACTICE



## TEDS INTEGRATE THEORY AND PRACTICE

Theory contributes to teachers being able to critically reflect on classroom practice in an attempt to ensure the best learning outcomes for students. The results of research (Shokeen & Gupta, 2020) revealed that there is a gap between how teachers present things or theories, or they are disclosed on papers and how things are actually received by the students. Transitions towards sustainability need radical and structural changes in the social, cultural and organizational dimensions in addition to technological innovations and infrastructural changes (Idil & Elif, 2018) when it comes to EduS.

The didactic decisions are very important for teacher education for the development of sustainability competences for (future) teachers, during in-service TedP, as well as its implementation in school settings. The role of active learning is stressed (Tejedor et al., 2019) pointing out the problem-based learning, project-oriented learning, simulation games, case studies, including learning by doing and having the learner serve as a teacher of what they are learning in EduS. To maximize learning, teachers need to combine theory and experience, classroom learning and practice (Hirst, 2019; Wrenn & Wrenn, 2009), and the best results are achieved when theory and practice are integrated across the curriculum, rather than in a single subject, topic or activity.

Theory and practice help to internalize learning as two interdependent but complementary phases during TedP. Integration helps (future) teachers to more closely associate the practical value of learning theoretical concepts. It is imperative that teachers in TedP area able to put into practice what they have learned in theory.

Formulating practical tasks and reflecting on the performed task based on theory and personal experience gives learners the opportunity to become active and continuous creators of their own educational process. The reflective skills they acquire also help them to be more aware of their own and others' actions in different situations. All of this makes it possible to experience learning as meaningful.

When designing activities, teachers have to provide Recent, Relevant and 'Ready to use' teaching resources and materials (4Rs - Recent, Relevant and 'Ready to use' Resources). As EduS implies new ways of learning, it also requires that educators and teachers expand their former teaching practices and learn new teaching methods and ways to approach the curriculum.

For that purpose, it is important that trainees have at their disposal the most recent, relevant and 'ready to use' resources. By 'ready to use' we mean that the resources made available to trainees have a de facto usability. For example, the body of literature made available to trainees needs to be: i) recent, discussing current teaching methods/practices and/or world issues; ii) relevant in relation to trainees' past experiences and teaching professional knowledge, and to the context in which the education program for EduS is taking place; and iii) 'ready to use' in the sense that EduS is mainly discussed/approached from an empirical and practical perspective.

# TEDS INTEGRATE THEORY AND PRACTICE

## ACTIVITY FOR INTEGRATING THEORY AND PRACTICE

TITLE	“Let’s do it”
BACKGROUND	Let’s do it is a widespread activity in Lithuania where the whole community is invited to get out of the house, usually in the spring (for example in April), to look around, pick up litter, sort litter, clean community areas from litter therefore contributing to nature protection and experiencing the feelings of responsibility for the environment around us.
GOALS	The activity aims to develop participants’ awareness on sustainability and a sense of responsibility to protect the environment, develop strategic and anticipatory competence.
TIME	15 + 60 + 45 minutes (accordingly steps 1, 2, 3)
RESOURCES	Presentation on local environmental issues that come from littering and enormous use of non-reusable products.
METHODS / STEPS	Information sharing (presentation); discussions; active participation.

### STEP 1

Using the provided materials (such as presentation on environmental issues) a discussion is organized to identify reasons for indicated environmental issues;

### STEP 2

Practical activity - participation in “Let’s do it” - community activity to pick up trash and make their school surroundings clear from trash is organized;

### STEP 3

Digital content creation inviting to stop littering (or sort trash, or reuse materials, or other);

### STEP 4

Students listened to the teacher’s stories and presentations and explained why it is important to protect nature and not litter. Then they went to pick up trash from the area around the school or institution. Afterwards, students or teachers individually created a poster that reflects an orderly sustainability. By applying new and existing knowledge, they created posters using Google’s AutoDraw tool; discussed activity results in small and large groups.



## TEDS INTEGRATE THEORY AND PRACTICE

### QUESTIONS - EXAMPLES TO BE CONSIDERED IN TEDP FOR SUSTAINABILITY

*How do we know that teachers have learned about sustainability and about EduS?*

*When is it more important to start with theory and when is it more important to start with practice when learning on sustainability issues and sustainable development?*

**DEVELOPED IN A  
COLLABORATIVE  
WAY**



## TEDS DEVELOPED IN A COLLABORATIVE WAY

Better knowledge on EduS can be collaboratively constructed more efficiently. Wiek, Withycombe, Redman, & Mills (2011) argue on the need for close collaboration with researchers from other disciplines, and stakeholders in government, businesses, and civil society in order to develop five components of sustainability competence (systems-thinking competence; normative competence, strategic competence, anticipatory competence, interpersonal competence). The collaboration co-creates knowledge, builds capacity, and develops shared ownership for the intervention strategies. Collaboration is a key factor between teacher educators, teachers themselves in sharing their professional knowledge, exchanging and improving various innovative methodologies, activities, digital technologies, discovering problems and mastering new solutions in the classroom. Findings relating sustainability competences to appropriate pedagogies for their development indicate that among the most effective approaches are problem- and project-oriented learning (Hirst, 2019), as they

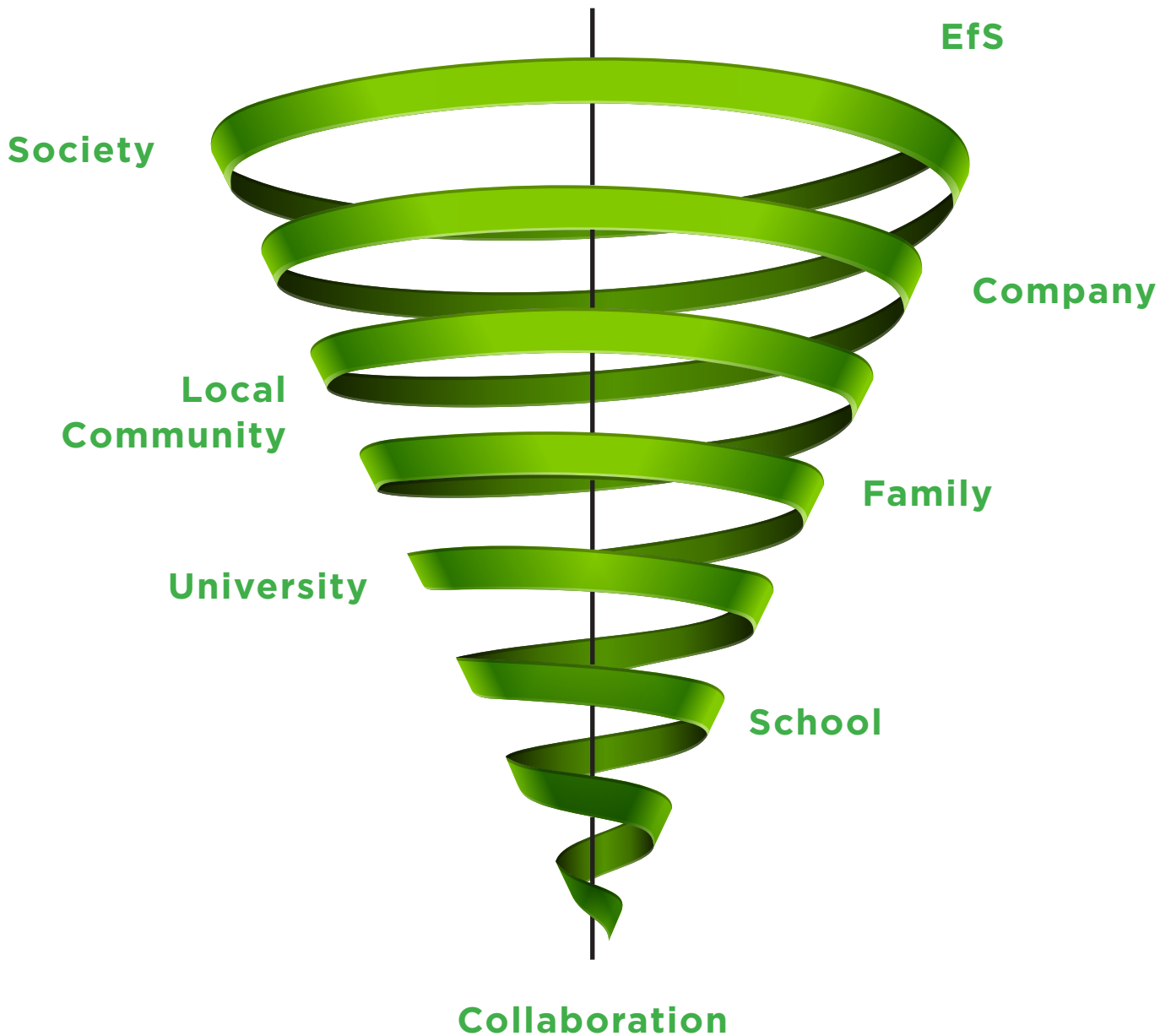


offer opportunities for active, collaborative, and action-oriented learning (Kioupi & Voulvoulis, 2022). Through collaboration, teachers develop advanced knowledge, skills and practices, ground theoretical approaches in practice facilitated by distinguished affiliates, receive professional orientation by providing meaningful application of the learning in their schools, working together on sustainability projects.

Collaboration is crucial in developing sustainability competences, because together teachers and teacher educators (as well as teachers with students) can learn to solve problems related to sustainability, in order to be able to fight for sustainability competences

development which is important for every citizen of the world. Moreover, the broader involvement of different representatives for collaboration can contribute to the change in mainstream education in schools and generate the desired learning when it comes to EduS. The other representatives, such as the families of students, the school principals, the local community where the school is located, entrepreneurs, higher education institutions, should be involved in the processes of collaboration (Figueiró, Bittencourt, & Schutel, 2016) which is a central element for social learning (fig. 1), thus generating new perspectives for EduS in schools. The authors proved that effective EduS requires social interaction and the integration of different interests, realities and experiences, which are described as a spiral. The quality of decisions is enhanced when a wide range of representatives are involved and share their information and experience (Curşeu & Schruijer, 2017).

## TEDS DEVELOPED IN A COLLABORATIVE WAY



Spiral of interactions between different actors (Figueiró, Bittencourt, & Schutel, 2016).

It was found that the effectiveness of EduS (Figueiró, Bittencourt & Schutel, 2016) lies not in a particular individual, but rather in the power of the collective, of a spiral centered on collaboration. Teachers' understandings of EduS seem to influence their educational practices (Inoue, O'Gorman, & Davis, 2016), therefore, collaboration with others builds a deeper understanding of EduS and its implementation in school settings, promoting the development of sustainability competencies in a collaborative way.

## TEDS DEVELOPED IN A COLLABORATIVE WAY

### ACTIVITY FOR DEVELOPING TEDP IN A COLLABORATIVE WAY

TITLE	“Collaboration for solving Sustainable development problems”
GOALS	This activity aims at teacher educators working collaboratively to create an activity for their trainees, where (future) teachers work collaboratively and create different projects using technologies.
TIME	45 minutes
RESOURCES	<ul style="list-style-type: none"><li>- Presentation of the sustainable development goals;</li><li>- Revision of technologies in the class, creating a list of apps/It can be used for the activity.</li></ul>
METHODS / STEPS	Teamwork, discussions, problem solving

#### STEP 1

Choose the subject and sustainable development goals that your activity will be addressing;

#### STEP 2

Create an activity for your future teachers where they collaboratively aim at solving certain sustainable development problems. Discuss how technologies will help reach activity goals. Finalize the activity with trainees’ presentations and discussion on the impact for sustainability;

#### STEP 3

Implement the activity with your (future) teachers;

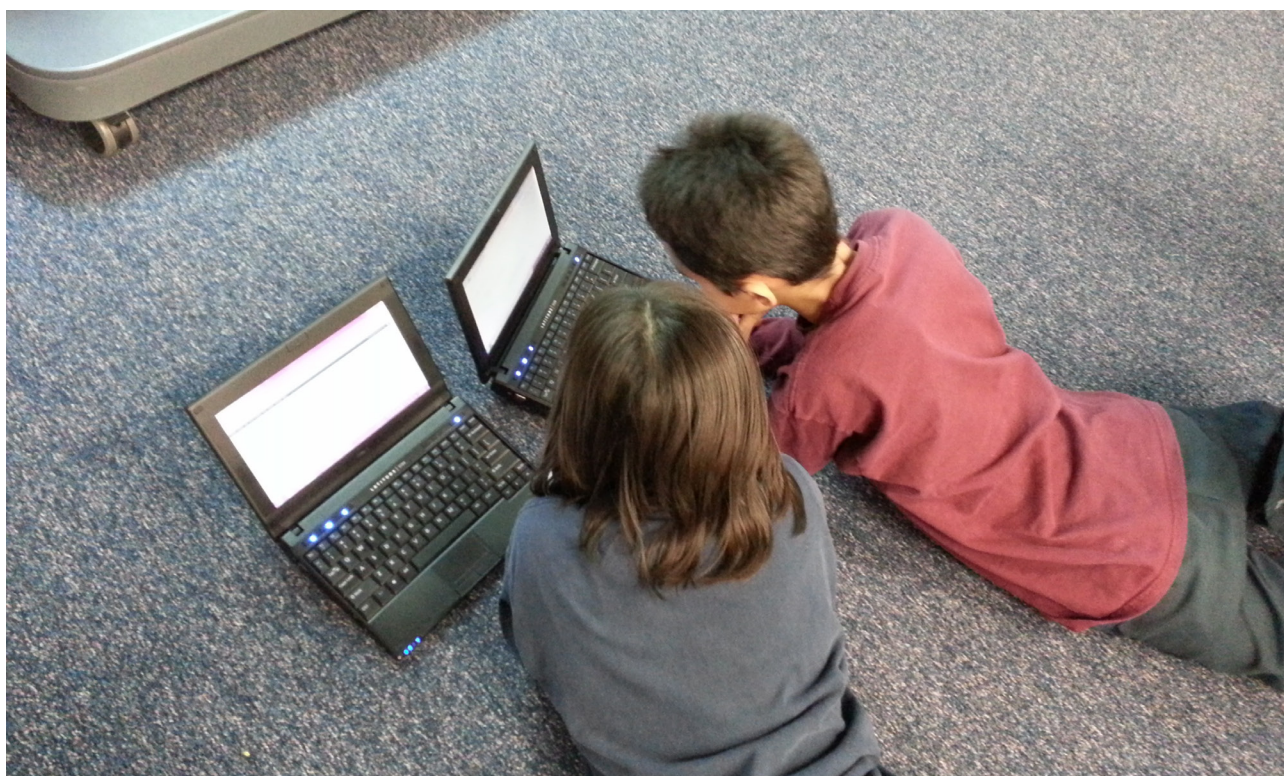
#### STEP 4

Share the results with your colleagues, with teachers in TedP reflecting on the impact it could have for students in schools.

## TEDS **DEVELOPED IN A COLLABORATIVE WAY**

The aim of the activity is to analyze technologies discovering how people communicated. The activity stimulated learners' normative competence by analyzing present norms and values, to identify their potential regarding a balanced use of technology and interpersonal competence by presenting group perspectives on the use of technology and its consequences and accepting the need to compare them with other points of view.

The use of digital tools is an innovation, and as such tools become more widespread, they will remain an innovation in the future. The importance of technology in school, its integration into the educational process, where the teacher not only helps students to learn, but also sets their values to protect nature and health, act responsibly and honestly in a virtual environment, and communicate sincerely and respectfully.



This example of activity also focused on anticipatory competence development when students created future communication platforms. The challenges of the activity (indicated by teachers) are: difficult to foster collaboration online (children lack digital competencies) and to keep attention while working online; require thorough preparation (didactical and IT), agreements between teachers and exact sequence of the activities to be implemented; technical challenges limit the expression of ideas. Teachers liked creating an activity in a group as it contributed to more qualitative final activity; more ideas were shared.

## TEDS **DEVELOPED IN A COLLABORATIVE WAY**

### **QUESTIONS - EXAMPLES TO BE CONSIDERED IN TEDP FOR SUSTAINABILITY**

*How can the teacher educators in the TedP take advantage of the convergent aspects and avoid the harmful consequences of divergent aspects of the several perspectives on sustainability and EduS?*

*In what ways can teacher education for EDUS be articulated with other initiatives and areas outside the formal education and training context? What links can you discover between EduS and other types of education, such as global citizenship education or intercultural education?*

*How do we involve relevant stakeholders in order to solve sustainability problems and act in EduS?*

*What are the most effective activities in your school community that involve different members of the community in EduS?*

**DEVELOPED IN  
A RECURSIVE  
AND CYCLICAL  
WAY**





## TEDS DEVELOPED IN A RECURSIVE AND CYCLICAL WAY

When we consider the current demands of a world in constant transformation regarding the environment and the society, TedP for sustainability should create conditions for the enthusiastic and collaborative construction of professional teaching knowledge capable of enabling the design, experimentation, and evaluation of EduS activities. This construction of teaching professional learning about EduS must be developed with empathy and compassion in a complex process, because it is ecological, interdisciplinary, and multidimensional. In this sense, teacher education for EduS is a way to expand the opportunities for teacher learning that arise in the times and spaces of education and that must be cyclical, recursive, and developed throughout life with multiple actors, organizations, and different fields of knowledge (UNESCO, 2022).

In order to design, develop and evaluate curricular significant practices on EduS, teachers and teacher educators will have to dialogue about desirable futures (UNESCO, 2022, p. 156), where the sharing of knowledge and experiences is in constant movement of re-signification given the contexts involved. The TedP for EduS must be able to involve teachers and teacher educators in a constant learning movement that makes them revisit their own knowledge, making transformation possible and support teaching professional development: “It wants teaching, learning and assessment processes that emphasize values, ethical motivation and the ability to work with others to build a sustainable future” (Martin et al., 2007, p. 352).

Teacher education programs need to create conditions and pedagogical spaces that afford opportunities to teach professional learning, supporting teachers who are thinking, observing, and acting in curricular projects for EduS. Due to the complexity and multidimensionality of EduS, teacher education programs must be organized in “formative cycles among pedagogical and disciplinary components” fighting against fragmentation of knowledge (Hopper, Sanford & Fu, 2016, p. 1016), i.e. positive and recurrent environments for teacher professional development that mobilize different components of sustainability. As one of the trainees emphasized in the reflection about the TedP for EduS: “the help, the mutual help, the complementarity and the empathy that was being generated ... this in terms of group relationships, within the working group, then the learning that we take away... from this joint journey ... this moving between various disciplines ... it’s the basis for a better future in education ... it boosts the projects. And I want to try again, I want to return to the partnership.” (Case A - PT ; these are words of a trainee in the TedP of Portuguese team).

## TEDS DEVELOPED IN A RECURSIVE AND CYCLICAL WAY

Teacher education for EduS is a never-ending process becoming more and more complex and we are facing the need for connectedness between ideas, domains, subjects, organizations, and partnerships. Then there is a need to focus on the “readiness” to learn and the ability to build strong social networks between peers and other actors in lifelong learning (Ellis, Souto-Manning, & Turvey, 2019). The attention to the cyclical and recursive nature of TedP is focused on the idea that in different moments of teaching professional learning, teachers must make a critical re-examination of the purposes of EduS: What is EduS? Why is EduS needed? How do we achieve EduS in our school contexts? On the basis of what and whose values? On the basis of whose actors and networks? How can I/we learn more about EduS?

Taking into account the implementation of a TedP for EduS, we consider it is worthwhile to bring the results that trainees showed in the final reflections about their professional learning. The results draw attention to the multifaceted and complex nature of EduS and the different possibilities of teacher education in this field; they show that TedP must create conditions for the enthusiastic and collaborative construction of professional teaching knowledge capable of enabling the design, experimentation and evaluation of EduS activities. The trainees designed, developed, implemented and evaluated strategies to address EduS in the curriculum in their schools, following up on existing EduS activities, gaining new perspectives on their professional knowledge and practice, learning about sustainability. We observe that teachers became more motivated to integrate EduS in their practices and to continue learning about it, gaining a better understanding of their role as professionals responsible for a more sustainable future. The constructed multimodal cases show a process of awareness raising and broadening of the notion of EduS, including the understanding that this type of education, to bear fruit, has to continue, to be recurrent and to be cyclical. One of the trainees said: “this teacher education program was undoubtedly an asset in my journey as an educator. I learned

a lot and I will learn more when reviewing the content taught” (Case A - PT - extract from reflection by a trainee). The trainees’ discourses reveal that teacher education for EduS must be longer, interdisciplinary, collaborative, cyclical, recursive (mobilizing prior knowledge and addressing new knowledge at different times), not forgetting the different dimensions of professional teaching knowledge, theoretical and practical, collective, and individual, technical and political.



# TEDS DEVELOPED IN A RECURSIVE AND CYCLICAL WAY

## ACTIVITY FOR DEVELOPING TEDP IN A RECURSIVE AND CYCLICAL WAY

TITLE	Teacher education: resources and educational policy for sustainability
GOALS	To reflect about resources and TedP for EduS. To make proposals for new programs for teacher education for EduS.
TIME	90-120 minutes
RESOURCES	- Cards/paper to write reflections. - Empty card/paper sheet to make proposal.
APPROACHES/ METHODS	Individual and group work, debate, reflection.

Work to be developed in dyads (or larger groups) for reflection, discussion and recording on what it means to educate teachers for EduS.

### STEP 1 - WHICH TEACHER EDUCATION PROGRAMS FOR EDUS HAVE YOU ATTENDED? WHICH ARE YOUR MAIN PERCEPTIONS ABOUT IT?

1. Reflect on EduS Teacher Education Programs you have participated in for the first time was like. Record your perceptions in a table, by identifying notions, aims, contents, resources, partners and purposes.
2. Compare the results of the previous task, by recording positive and less positive aspects of the teacher education program attended. Prepare a table with the result of the discussion to share in the large group.

### STEP 2 - WHAT SHOULD TEACHER EDUCATION FOR EDUS LOOK LIKE WHEN YOU WANT TO PROMOTE TRANSFORMATIONAL CHANGE?

Based on the framework developed in the previous step, think individually about how you would like the Teacher Education Program for EduS to be developed. Record on a piece of paper what you consider necessary for the future and compare your perceptions with those of your colleague(s), recording them in a table, identifying notions, objectives, contents, resources, partners and purposes that should be considered.

# TEDS DEVELOPED IN A RECURSIVE AND CYCLICAL WAY

## STEP 3 - WHAT DOES IT MEAN TO LEARN ABOUT YOUR PROCESS OF LEARNING AND TEACHING FROM A CRITICAL PERSPECTIVE ON EDUS?

Write a text about your teacher education programs for EduS, narrating how you have evolved in this dimension. Use the narrative format – stories of learning to teach for EduS: How can daily life experiences of individuals be transformed in learning activities for EduS? Who are you as a teacher in your relation to EduS? How can we promote EduS in teacher education should create new valuable ideas for of society and the natural world?

Give the text to be read to your colleague(s) to ask questions and do the same to your colleague(s)' text.

## STEP 4 - WHAT SHOULD TEACHER EDUCATION FOR EDUS LOOK LIKE WHEN IT WANTS TEACHERS TO BECOME SOCIALLY, ENVIRONMENTALLY, POLITICALLY, AND CULTURALLY COMMITTED TO THE SCHOOL COMMUNITY AS AN EDUCATIONAL INSTITUTION?

Reflect and discuss with the people around you (colleagues, family, friends, headmasters... etc.) and write together a small manifest for educational policy with measures that should be taken in order to allow the development of more meaningful EduS practices. The writing of the manifest may consider some questions such as: What policies do they consider important for the development of teacher educators and teachers for EduS? What has been the role of teacher education institutions, including universities? What do they think it should be? What about other institutions? What resources should be available to transform schools? Etc.

### QUESTIONS - EXAMPLES TO BE CONSIDERED IN TEDP FOR SUSTAINABILITY

*How do we fuel the permanent reconstruction of the 'problem' of sustainability in TedP? And in schools?*

*Have you ever used WebQuests in the past? If so, how was your experience? To what extent did you find them useful in identifying and working towards a preferable future?*

**PROMOTE  
FUTURE  
THINKING**



## TEDS PROMOTE FUTURE THINKING

When the United Nations Decade of Education for Sustainable Development (ESD) was launched between 2005-2014, its main aim was to “mobilize the educational resources of the world to help create a more sustainable future” (UNESCO, n.d.). Resource were here understood to include both material resources and human resources. Undoubtedly teachers are at the fore of the resources needed to create a more sustainable future. This was further confirmed in the Global Action Program (GAP) on Education for Sustainable Development (ESD) which sought to scale-up action and to accelerate progress towards sustainable development though focusing on five priority action areas, one of which was building the capacities of educators and teacher educators (One Planet, 2018).

Within such a framework and understanding, the TEDS project has recognized the “promotion of future thinking” as a fundamental principle in the training and formation of teachers and educators. The competence of imagining future scenarios is also considered as one of the essential competences linked to participatory and empowering teaching and learning methods that lead to action for sustainability (UNECE, 2022).

There are various justifications for promoting future thinking. One such justification is forthcoming from the World Cities Report 2022: Envisaging the Future of Cities, which proposed “a state of informed preparedness that provides us with the opportunity to anticipate change, correct the course of action and become more knowledgeable of the different scenarios or possibilities that the future of cities offers (UN-Habitat, 2022, p. 29). While focusing on cities, one can easily extrapolate the need for such preparedness to different geographies and situations. Another justification is given by the Nottingham Trent University that developed the Future Thinking Framework as a means to ‘futureproof’ students “with the right knowledge, skills and attributes to contribute to a better future” (Nottingham Trent University, n.d.).

Hulzebos (2019) sees future thinking as a way to avoid unwanted situations as well as to increase the chances of innovation. He has designed what he calls the 5 stages of future thinking, namely: 1) Visual thinking; 2) Conceptual thinking; 3) Scenario thinking; 4) Strategic thinking; and 5) Design thinking. Such stages are not linear with one ending before the next one starts, but rather each stage is a layer that remains throughout the thinking process, bringing in more detail each time. The first stage starts with having a dream. With respect to sustainability this can be a dream of a different school, a different city, a different economy, or a different way of doing politics. At the design thinking stage one navigates to reach the destination, and Hulzebos’ (2019) writes “all steps of the development process and ... decide(s) the right moment to start that process to realize (ones) dream”. This is a very empowering process in that one is able to reimagine a different future – a future that still looks like a dream – and plan and design to make it a reality. As per good practice in EduS, it is action oriented and transformative. As explained eloquently by Fisher and Ponniah (2003): “we are constantly bludgeoned into believing that there are no alternatives to globalization [...] But there are alternatives. And the movement for global justice and solidarity is giving voice to them” (back page). The stage 5 of design thinking is also coherent with the design

## TEDS PROMOTE FUTURE THINKING

processes of permaculture whose 12 principles taken together form what Waddington (2022) calls “a ray of hope - a way forward ... the chance to be part of the transition to a more eco-friendly, ethical and sustainable future”. Brooks (2021) further positioned permaculture as designing a future for all, emphasizing that this is about reaching our goals however using less energy to do so. Particularly relevant is the 12th principle of permaculture ‘Creatively use and respond to change’, with permaculture principles (n. d.) positing that this is about the possibility of having “a positive impact on inevitable change by carefully observing, and then intervening at the right time”.

The principle of future thinking is presented within a rights-based approach, a response which ought not to be according to the whim of the educator concerned, but a moral and essential response to a reasonable and rightful need. This outlines the importance of teacher education institutions ensuring that teachers have the necessary support to respond to what ultimately is a student entitlement. One sometimes cannot imagine a different future if too much is unknown, e.g., one might find it hard to imagine a different economy to the ‘free’ market dominated by huge corporation if one has not been exposed to a certain extent to the social economy and the dearth of experiments taking place within such a framework, such as community supported agriculture, social enterprise, fair trade, micro-credit and so on. This consideration also highlights the importance of exchanges and study visits, both for teachers and students, where one would be able to see first-hand experiments taking place in different countries, which one might not be able to witness within one’s own immediate environment (UNECE, 2022).

One approach to be developed with teachers is the whole school or whole institution approach (WIA). This is because one can now co-create the future one wants in the present, with the school or institution being considered a microcosm of the world one would like to have in the future. Typical characteristics of such an approach are participatory approaches with students at the core, infusing ESD across the curriculum as well as substantial extra-curricular events, and extending ESD considerations beyond educational activities to the overall operations of the school or organization.



Buckminster Fuller is credited to have said that “You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete” (Kidadi Team, 2021). The call here is to reimagine what is possible, visualize it, commit, and strategize to move towards it, and co-create it with others. This requires teachers and learners that are committed to further developing their own future and anticipatory competences, and teacher training institutions are called upon to ensure such considerations are included in their curricula.

# TEDS PROMOTE FUTURE THINKING

## ACTIVITY FOR PROMOTING FUTURE THINKING

TITLE	“Probable, Possible and Preferable Futures”
GOALS	<ul style="list-style-type: none"> <li>- To understand the most probable future with a business-as-usual scenario;</li> <li>- To evaluate to what extent is the most probable future a preferable future;</li> <li>- To re-imagine new possible futures;</li> <li>- To envision preferable futures;</li> <li>- To learn to see things not as they are but as they could be;</li> <li>- To design ways on how to move closer to our preferable future;</li> <li>- To take practical actions to move incrementally forward to the identified preferable future;</li> <li>- To renew a sense of hope and a sense of possibility.</li> </ul>
TIME	<p>This exercise can be adapted according to time availability and typically can take anything between one hour to half a day or more. If the exercise is designed to also include design thinking linked to solutions to help move towards the preferable future, it can be extended to a day or done over two sessions.</p> <p>The time that allows such an exercise should also accommodate practical actions that learners choose to think about how to achieve a better future, which depends on creative imagination: the ability to see where we might want to go, and how we might want to get there.</p>
RESOURCES	<p>The activity is planned for group work. This is in harmony with Gorbis’ 5th principle of creating community and envisioning futures as a collaborative affair.</p> <p>This exercise can easily be combined with WebQuests, in which case access to computers and internet will be necessary. Use of computers is also suggested in identifying best practices, which can inspire one to identify preferable futures.</p> <p>Depending on the “future” being considered, learners might actually need access to the physical environment. For example, if the future under consideration is one’s town or city, it might be advantageous to hold such an exercise in the actual town or city under consideration, since physical presence can enhance both an understanding of the probable future, as well as that of the different possible futures, which will in turn allow participants to identify the preferable future.</p>
APPROACHES/ METHODS	<p>This activity can be done at different levels and the future under consideration can be one’s school, one’s town or city, one’s country or else a topic of common interest such as food or agriculture.</p>



# TEDS PROMOTE FUTURE THINKING

## STEP 1.

Discussion on how the future can look like with a business-as-usual scenario. The future can be further divided into the immediate future, as well as the mid-term and long-term future;

## STEP 2.

Discussion on to what extent is the probable future a preferable future. As strand can here be identified where there is discord between what is probable and what is preferable;

## STEP 3.

Identification of possible futures to the future under consideration. Here one might need to analyze trends as well as research good practices. The availability of pre-prepared resources, as in WebQuests, or a computer for research is suggested here;

## STEP 4.

Identification of the preferable future. E.g. if it is my school, how can I re-imagine my school next year and then say in five years' time. The role of the teacher can here be to ask questions to help learners gauge to what extent is the future they are imagining in line with a sustainability vision and/or in line with "earth care, people care and fair shares" – the three basic permaculture ethics;

## STEP 5.

Design thinking – using imagination to visualize where to go and how to get there;  
Steps 4 and 5 can be supported through the creative and visual arts. E.g. Learners might want to create an installation of a convivial city.

## STEP 6.

Taking the actions sparked by the design thinking.

### QUESTIONS - EXAMPLES TO BE CONSIDERED IN TEDP FOR SUSTAINABILITY

*What kind of future are we aiming at with education for sustainability?*

*What is the added value of envisioning probable, possible and preferable futures in our journey towards sustainability?*

*What is the role of Active Hope in transitioning towards our preferable future? What is the role of the teacher educator in the collective transition towards a preferable and sustainable future?*

## FINAL REFLECTION

The centrality of the role of teacher educators was captured brilliantly by UNESCO when it stated that “education alone cannot achieve a more sustainable future; however, without education and learning for sustainable development, we will not be able to reach that goal” (UNESCO, n.d.). In this sense, we need to invest in TedP for EduS.

The 10 principles stated in this framework want to present some ways of working in this field with concrete activities to be used in teacher education, in order to allow the design and development of other TedP for EduS.

According to TEDS, and their results and principles, TedP for EduS should consider the representations and discourses of teachers and teacher educators in an engaged, interdisciplinary, collaborative and recursive way, mobilizing previous knowledge, and addressing at different times new knowledge and new experiences, not forgetting the contexts and articulating theory and practical dimensions of work with learners with whom it is important to build new ideas for a desirable and sustainable future.

EduS implies a transformation in education, creating a more transformative learning experiences for people, learners, teachers, and teacher educators. Teacher education for EduS is a key tool in the response to the glocal socio-environmental problems of the planet which is realized in the relationship with other human beings and with the other forms of life on our Planet based on the understanding of social representations and discussions from sensitive issues to problems that affect today’s world.

Thus, we need to invest in TedP for EduS, which should consider the representations and discourses of teachers and teacher educators in an interdisciplinary, collaborative, recursive way, mobilizing previous knowledge, approaching new knowledge and new experiences at different times, without forgetting the contexts and the practical dimensions of working with students with whom it is important to build new ideas for a desirable and sustainable future. There is an urgent need for dialogue, which enables the connections to a planetary awareness and responsibility, justified by the complexity and interdependence of problems, which no longer allow individual thinking. Teachers and teacher educators need, in the 21st century, to develop environmental awareness and be prepared to act in this complex reality that is also economic, linguistic, cultural, social and political.

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FRAMEWORK FOR IN-SERVICE TEACHER EDUCATION FOR  
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