

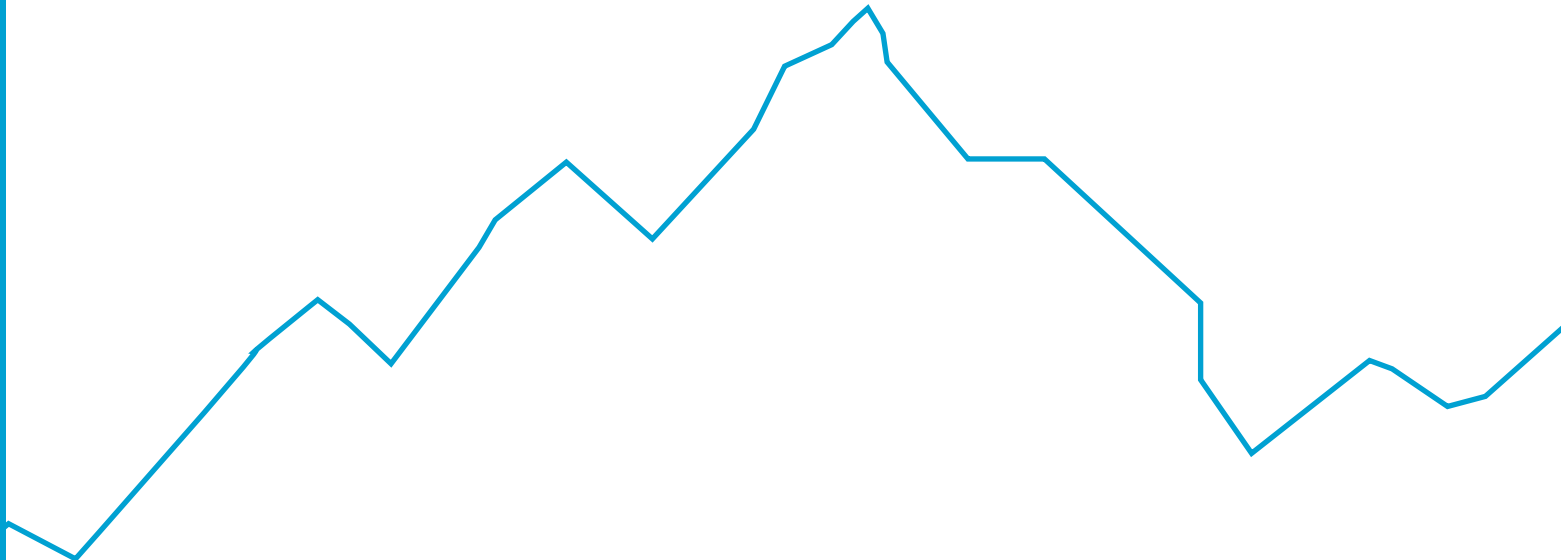
Nº

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YOUrALPS

**Political Strategies on Education for sustainable
development and Mountain-oriented Education**

Path to implementation into the formal education
system of five Alpine adjacent states





For an
inspiring
future in
the Alps

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Corresponding Authors
Lukas Fritz &
Maximilian Riede
University of Innsbruck

Co-authors
Urška Kleč
Veronika Widmann
Stefania Fontana
Matej Ogrin
Tatjana Resnik-Planinc
Isabelle Roux
Anne-Laurence Mazenq



Research questions

1. Which already existing structures in formal education such as system flexibility or cross-curricular teaching can be used in each of the five EU Alpine countries?
2. Which new structures would need to be created?



On a global scale, human activities in the agriculture, crop, livestock, forestry, fisheries and aquaculture sectors contribute significantly to the recent human-induced climate change (Food and Agriculture Organization of the United Nations 2017, Organization for Economic Cooperation and Development 2014) by releasing greenhouse gases such as carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) and thus offer great potential for both climate change mitigation and adaptation measures (Smith & Olesen 2010). Lately, research investigating farmers' beliefs and perceptions of climate change-related risks for their own business is growing (e.g. Mase et al. 2017, Menapace et al. 2015). Whilst studies reveal that farmers' actual adaptation behaviour is rather driven by financial motives and managerial considerations (Li et al. 2017), the overall awareness of personal and professional contribution to climate change effects on non-monetary long term features of natural resources and related problems like biodiversity, soil degradation or groundwater lowering among people planning a professional career in the agriculture sector hasn't been explored in much detail to date. Consequently, YOUrALPS project partners want to i) fill this research gap by eliciting potential future green jobbers' general attitudes towards global change and ii) thereupon

on creating target group oriented education measures both in formal and non-formal education systems which will help raise awareness among youth about what is their share of global (environmental) change, both professionally and in private. Chapter B.1 of this comprehensive comparative report highlights main findings of the survey in which more than 600 young people in the Alps were interrogated.

Based on this, one of the main goals of YOUrALPS project is to raise awareness of the valorisation of the natural and cultural heritage of the Alps among youth (6-30 grades) in the Alpine space for their personal future and the one of the society by better integrating formal and non-formal education measures for sustainable development (ESD)/environmental education (EE), and thus allowing young people for more beneficial real-life experiences. This paper at hand indicates, not exclusively to interested educators and the policy making sector, which already existing structures in formal education such as system flexibility or cross-curricular teaching can be used in each of the five EU Alpine countries Austria, France, Germany, Italy and Slovenia, and secondly, if not sufficient, which new structures would need to be created in order to serve the realisation of the overall objective of YOUrALPS noted above.

Perception of personal and professional climate change related causes and effects of future green jobbers hasn't been explored in much detail so far.

Technical and Vocational Education and Training (TVET) and Sustainable Development

Permanent economic growth and increase in productivity are [...] the most powerful driving forces of economic life [...] subordinating various other aspects regardless of accompanying social and environmental costs.

UNESCO emphasised nearly two decades ago that “Technical and Vocational Education [and Training (TVET); annotation by the authors], as an integral component of lifelong learning, has a crucial role to play [...] as an effective tool to realize the objectives of a culture of peace, environmentally sound sustainable development, social cohesion, and international citizenship” (United Nations Educational, Scientific and Cultural Organization (1999), both in the present, and in the future. The reality, however, is that permanent economic growth and increase in productivity are widely regarded as the main prerequisite and at the same time the most powerful driving forces of economic life, affecting and subordinating various other aspects regardless of accompanying social and environmental costs (Fien & Wilson 2005). One decade later, after having witnessed both a severe financial crisis followed by

mass unemployment especially among young southern Europeans (see European Commission 2012), as well as clear effects of a human-induced changing climate, a low-carbon, green economy is recognised as one major piece of a jigsaw which is highly promising to support societies to face and shape current and future changes (see European Centre for the Development of Vocational Training & International Labour Office 2010, Organisation for Economic Co-operation and Development & European Centre for the Development of Vocational Training 2014). While the premises of sustainable development should also be addressed through in-service TVET, the following analyses and conclusive recommendations predominantly refer to pre-workforce learning. As a whole, TVET has the potential to foster [...] ‘cultural change’ by presenting alternative entrepreneurial [and life; annotation by the authors] models to students (Fien & Wilson 2005).



The following analyses and conclusive recommendations predominantly refer to pre-workforce learning

What

is

**Mountain-oriented
education**

MoE

Education for sustainable development (ESD) and environmental education (EE) form the basis for mountain-oriented education (MoE). MoE emphasizes the interrelations between mountain regions and society. In the Alpine context, MoE enables youth to face and shape present and future Grand Challenges in that it strengthens capacity, competencies and resilience among them on the basis of the rich Alpine cultural and natural heritage. Participation, the capacity to act, self-determination, lifelong learning, identification with the Alpine natural environment as the most vital resource of life, and the integration of formal and non-formal education are the main principles helping to promote the change in the education system while at the same time favouring the transition of the entire Alpine territory according to the premise of sustainable development.

Why do we need MoE if there is already ESD(Gs)?

In a nutshell, sustainable development is outlined by some authors as a moral precept rather than a scientific concept (Fien & Wilson 2005). Accordingly, education for sustainable development as a vast collection of different topics with associated intended learning outcomes can be educationally implemented through a variety of ways which have to be balanced between wide-ranging abstract goals and detailed concrete objectives at any stage of each practice or activity, particularly in the context of vocational education and training (Scott & Gough 2010). What's more is "the lack of conceptual and consequently methodological unity within the research and practice of ESD" and thus open questions about effectiveness, value and evaluation of ESD-related activities and initiatives remain (Kopnina & Meijers 2013) which are gradually tackled by nascent approaches (e.g. Pauw et al. 2015).

On a more practical level, as various evaluation and assessment reports on national level indicate (e.g. Chinién et al. 2009), and furthermore, is underlined in informal discussions with educators involved with both planning and realizing educational activities according to the key principles of ESD, educators still struggle with implementing ESD-related elements in their daily teaching routine despite all the efforts made both on national and supranational level in the course of the UN decade for education for sustainable development (2005–2014) and in its aftermath (see e.g. United Nations Educational, Scientific and Cultural Organization 2014).

Formal educators report

1 Being overstrained by the challenge of breaking down something as abstract as one sustainable development goal (SDG) for didactical refinement for an identified target group and

2 ... not having enough internal resources to adequately explore ESD-related topics in their teaching because they compete with external offers and interests from other fields (e.g. digitalisation, sports, and many more)

Furthermore, if supposed to be successfully put into practice according to the conceptualisation of competence-based education, prepared ESD-/MoE-related contents, materials and methods have to be arranged in a way that students should be able to perform an incrementally more complex set of tasks in a self-determined, self-reflected and hands-on manner by only using the provided materials and own compe-

Competence-based education

Students should be able to perform an incrementally harder set of tasks in a self-determined, self-reflected and hands-on manner by only using the provided materials and own competencies

Competence-oriented education

The more measurable one activity is the more abstract and intangible it is usually in return and therefore the less relevance to everyday life it can have.

Educators still struggle with implementing ESD-related elements in their daily teaching routine despite all the efforts made both on national and supranational level

tencies, in order to serve the overall objective of one task – which is a significant and verifiable enhancement of one's skill level – and at the same time proof for one being competent (Hoogveld 2003). Not surprisingly, also in prototypical application-oriented TVET, many teachers still stick to 'traditional', teacher-centred instruction (Bohne et al. 2017) in light of these requirements. Moreover, the more measurable one activity is the more abstract and intangible it is usually in return and therefore the less relevance to everyday life it can have, also in respect of career opportunities (Mulder 2012). Thus, problems of justification of extending ESD-related interventions in formal education might arise, if, on the one hand, they are easily assessable but quixotic, and vice versa.

One can conclude that monitoring & evaluation (M&E) challenges of ESD practices still remains persistent (see United Nations Educational, Scientific and Cultural Organization 2014) while teaching is often not aiming at what it should be on both a more philosophical level targeting at general educational goals (see

Longo 2010) and on a very concrete, practical level (see Mulder 2012) to the benefit of young professionals in the sense of developing shaping competence (see de Haan & Harenberg 1999).

Therefore, in a first step, YOUrALPS project consortium aims at:

a) developing knowledge, skills and competencies of a person's life and career while at the same time promoting sustainable development as the main pre-requisite for the former in a boosted cooperation model together with non-formal (education) experts (e.g. 'patrons' from companies, NGO representatives, non-formal educators etc.) while

b) not putting more load on educators' shoulders in the formal education sector by highlighting the opportunities how both efficient and effective learning can also take place extra-curricular and outside school but with additional value of meeting certain

mandatory standards of formal education

Considering these very ambitious goals, it is evident that this paper can only give examples of how these aims are already achieved in some cases and how their achievement could be most likely realised, also in other domains or contexts. Further research though is highly indicated for both, multiplier teaching and training as well as examining how cooperation networks are established and qualified most suitable.

Teaching is often not aiming at what it should be

The present study seeks to examine relevant legal documents by answering the following research questions:

- 1.** What is the current status of national official documents in the domain of education for sustainable development in each country of interest?
- 2.** Which structures in valid curricula, oriented at (higher) vocational schools for the alluded, would be basically appropriate for the implementation of integrated formal & non-formal education activities in the sense of MoE/ESD as outlined in the Alpine school model (ASM)? If insufficient for the realm of the ASM: Are new structures necessary to implement the transdisciplinary approach of MoE / ESD in Alpine context?

Outline of the Global Action Programme & post UN-decade

Political agreements, financial incentives or technological solutions alone do not suffice to grapple with the challenges of sustainable development" (United Nations Educational, Scientific and Cultural Organization 2014). Bearing that in mind, it has taken 30 grades, starting with the sober assessment of the so-called Brundtland Report (World Commission on Environment and Development 1987) addressing the endangerment of fragile ecosystems, reaching the milestones:

- 'Rio Declaration on Environment and Development' ("Agenda 21") (United Nations 1992)
- Johannesburg 2002 with the agreement on the 'UN-decade for education sustainable development 2005-2014' (United Nations Educational, Scientific and Cultural Organization 2005)
- The final report of the UN-decade called 'Shaping the Future We Want' (United Nations Educational, Scientific and Cultural Organization 2014)

...that education for sustainable development has become mainstream in the education systems of the self-committed UN member states. The post-2015 documents, the 'Global Action Programme (GAP)' on ESD (United Nations Educational, Scientific and Cultural Organization 2014), and the just recent-

ly published document on 'Education for Sustainable Development Goals' (United Nations Educational, Scientific and Cultural Organization 2017) should pave the way for the attainment of the 'Global Education 2030 Agenda' (United Nations Educational, Scientific and Cultural Organization 2016).

In order to advance the ESD agenda as claimed in the Global Action Programme, YOUrALPS project consortium contributes with assistance of this document in that it reveals two main leverage points which will serve as a profound information base for policy makers. These points are (consistent with the UNESCO wording) – see chapter E:

a) Transforming learning and training environments in that we suggest how the integration of formal and non-formal education can be achieved best and

b) Accelerating sustainable solutions at local level by scaling up ESD programmes and multi-stakeholder ESD networks, as highlighted by the example of pilot site activities

Methodology

Both on national and on supra-national level, various institutions are periodically analysing the progress of implementing ESD-related activities and topics in the formal education sector of the respective country. If accessible and suitable, key findings of recently published official documents are being summarised accordingly as a first approximation. However, some considered states have not made as strident progress as pledged due to self-commitment in the course of the post UN-decade for education for sustainable development (DESD) process (United Nations Educational, Scientific and Cultural Organization 2015).

Therefore, additional qualitative content analysis (Mayring 2015) of auxiliary data implying the current state of implementation of MoE/ESD in the formal education system was performed using maxQDA software (Kuckartz 2014).

The following documents are taken into account for comparative analysis of the current status of implementation of MoE/ESD in formal education in the five Alpine states Austria, France, Germany, Italy and Slovenia:

a) [Official national documents comprising taken measures on national level subsequent to the 'UN decade for Education for Sustainable Development \(DESD\)' – analysis of National Action Plans/Strategies on ESD of the five Alpine countries, including secondary literature and complementary expert elicitations where necessary](#)

b) [Legal curricula both on national/regional level \(if applicable due to responsibility according to each education system\) valid for \(higher\) vocational schools \(secondary education\) focussing on "green jobs \[...\] in all sectors –](#)

[agriculture, industry, services and administration" \(United Nations Educational, Scientific and Cultural Organization 2012\)](#)

Previous research conducted examining the implementation of sustainable development in (higher) education curricula, publications and/or teaching contents was mainly performed in two ways:

- by screening relevant documents towards didactic principles (e.g. Waltner et al. 2017) or learning objectives (e.g. Lechner 2009) related with ESD
- by screening relevant documents towards thematic contents related with ESD (e.g. Lozano 2010)
- by analysing student teachers' learning processes in case studies (e.g. Singer-Brodowski 2017)

While some studies predominantly do (semi-) automatized keyword search with help of predefined thematic word lists (e.g. Otte & Singer-Brodowski 2017), more in-depth research designs make use of a mixed-methods approach, combining standardised (quantitative) analysis and qualitative data acquisition and evaluation methods (e.g. Steiner 2011).

Key findings of recently published official documents are being summarised accordingly as a first approximation

Chosen way of proceeding

As the stage of progress in the countries covered by this study in terms of implementing ESD in formal education is uneven as is the form and characteristic of single curricula, the automatized was only appropriate for review of individual documents. In all other cases, qualitative content analysis was performed either using MaxQDA software or 'by hand'.

When additional keyword search was necessary, text passages containing key topics defined for each Sustainable Development Goal (SDG) were identified and double checked manually in order to exclude text passages that were detected by mistake. It has to be said that due to the basic structure of the curricula, some recurrences might occur as it is distinguished between educational and teaching tasks and teaching contents themselves. Nevertheless, the chance of this redundancy can be neglected due to inclusion of one sentence before and one sentence after each sentence containing a single keyword.

Therefore, comparability between the stages of progress between the examined states is limited. The status quo of each country has to be considered as individual cases. Nevertheless, at the end of this report, the intended general recommendations as well as the developed action plan can be regarded as possible means how to reach the common vision of better anchoring mountain-oriented education for sustainable development in formal education.



(Education for) Sustainable development goals

In the 2030 Agenda of the UN General Assembly, 17 Sustainable Development Goals (SDGs) should pave the way for sustainable developments of various areas, addressing (basic) human needs but also indicating concrete measures how these goals can be achieved by the year 2030.

Among the 17 goals or challenges, one is Quality Education (SDG 4). Although the SDGs mustn't be seen isolated, indicative topics and pedagogical approaches are given for each Sustainable Development Goal. Focus on the following analyses will be, as indicated by UNESCO, if in the revised approaches to the implementation of ESD on the basis of the four SDGs of concern (see below), ESD is seen as a stand-alone subject or rather comprehensively integrated in the various curricula (United Nations Educational, Scientific and Cultural Organization 2017).

Selected SDGs of concern

"Climate change, biodiversity, sustainable production and consumption, and reduction of poverty are outlined as key themes within ESD" (Rieckmann 2018). The SDGs of main interest for our purpose are – with one exception, namely "Sustainable cities & communities" – identical to these key themes as follows:



SDG 11 – Sustainable cities & communities



SDG 12 – Responsible consumption & production



SDG 13 – Climate action



SDG 15 – Life on land

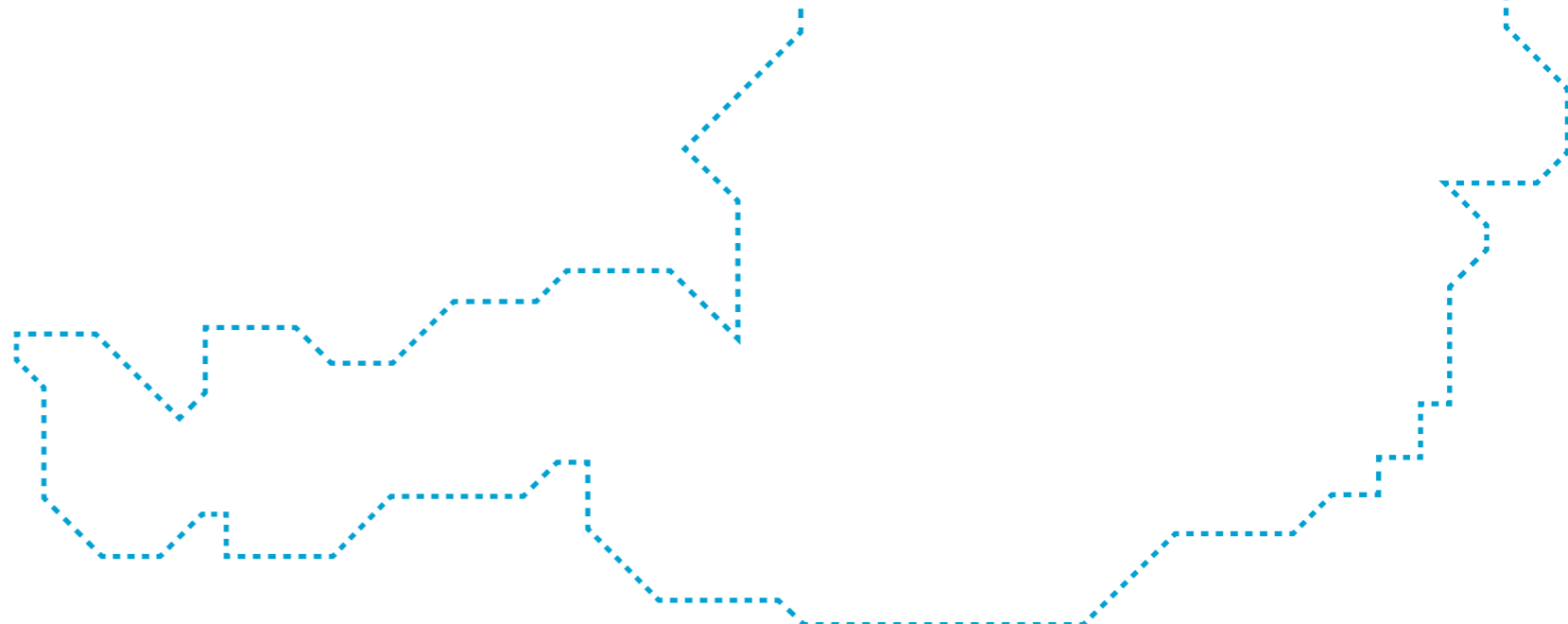
Educational goals entailed in the curricula related with nutrition and resources as main commodities of the 'green jobs' sector could also be attributed obviously to SDG 2 – Zero hunger. But in the Alpine context, they are more soundly

assigned to SDG 12 – Responsible consumption & production. SDG 15 – Life on land includes all topics subsuming biodiversity, ecosystem services and neobiota issues. SDG 11 – Sustainable cities & communities here includes aspects of (circular) economy, energy and water supply, infrastructure on the one hand (economic aspect), social aspects of future resilient communities (e.g. political participation in general, but also sub-aspects as disaster management, spatial planning, waste management and many more). Lastly, SDG 13 – Climate action should be seen as a bestriding educational goal as climate change will highly probably affect all other areas of activity.

Document

analysis

The context of ESD in Austria



Milestones

2004

Interministerielle Plattform Bildung für nachhaltige Entwicklung

2006

EU Education for Sustainable Development towards Responsible Global Citizenship conference

2008

Österreichische Strategie zur Bildung für nachhaltige Entwicklung

2014

Grundsatzklass Umweltbildung für nachhaltige Entwicklung

2015

comprehensive final report on the UN Decade on Education for Sustainable Development

Milestones in the history of EE & ESD in formal and non-formal education in Austria

In 1983, the [ARGE Umwelterziehung](#) (working group environmental education) was formed. One decade later, in 1994, both the [EU-Umweltbüro](#) (European Environmental Bureau) in Vienna and the [Alpenkonventionsbüro](#) (Alpine Convention office of CIPRA Austria) in Innsbruck were inaugurated ([Available online here](#)). The ARGE was later on merged into the FORUM Umweltbildung (Forum environmental education) under the umbrella of the so-called Umweltdachverband gGmbH (Environmental Umbrella Organisation), and bundles, as an initiative of the two responsible political institutions of environmental education/education for sustainable development in the country, namely the Austrian Federal Ministries of Agriculture, Forestry, Environment and Water Management and Ministry of Education, Science and Research, all efforts to implement education for sustainable development and environmental education into the Austrian educational landscape ([Available online here](#)), addressing both stakeholders and target groups from formal, non-formal and informal (environmental) education. In 2004, beforehand the official UN Decade for Education for Sustainable Development (2005–2014) kicked off finally, the [Interministerielle Plattform Bildung für nachhaltige Entwicklung](#)

(interministerial platform on education for sustainable Development) was established to cross-link interdisciplinary endeavours from various related actors and fields (e.g. school sector, tertiary education, research) in order to set up [research-education-cooperations](#). The platform was then also co-host of a EU conference called “[Education for Sustainable Development towards Responsible Global Citizenship](#)”, which was held in Vienna and contributed to the first (interim) report on national endeavours (Austrian Federal Ministry of Education, Arts and Culture) (Gössinger 2007) with regard to the UN Decade for Education for Sustainable Development, followed by the second interim report (Sulkakoski-Schaller 2010) just at half-way of the decade. For 2012 yet, the third interim report was published, this time edited under supervision of the meanwhile installed Dekadenbüro Bildung für nachhaltige Entwicklung (Austrian Decade Office Education for Sustainable Development) (see Österreichisches Dekadenbüro Bildung für nachhaltige Entwicklung 2013). 2014, the back then Austrian Federal Ministry of Education and Women’s Affairs presented the fourth interim report on the UN Decade for Education for Sustainable Development, which served concurrently as an overview report of all initiatives and activities undertaken during the decade, as well as a foundation for the subsequent Global Action

Programme (United Nations Educational, Scientific and Cultural Organization 2014) on national level (Löffler 2014). One year later, the [comprehensive final report on the UN Decade on Education for Sustainable Development](#) was compiled (Bouslama et al. 2015), concluding that, among other things, a “[development potential in non-formal \[...\] education](#)” sector could be identified.

On a more precise and in-depth level, in 2008, the so-called [Österreichische Strategie zur Bildung für nachhaltige Entwicklung](#) (Austrian Strategy on Education for Sustainable Development) was mapped out by the at that time three competent Federal Ministries (Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft et al. 2008), [aiming at reaching key strategic milestones in the realm of the UN Decade including both concrete implementation measures as well as wide ranging evaluation activities](#). Among many other accompanying explanations and analyses recorded in several consecutive reports

during the UN decade, some addressing the yet untackled but likewise vital issue of teacher education and training according to the novel requirements of education for sustainable development (e.g. Steiner & Rauch), some of them focus on the main objective of realised activities – the necessary competences and skills to be developed among the

learners (e.g. United Nations Economic Commission for Europe 2012), while a third group of publications combine the just mentioned topics (e.g. Steiner 2012).

Beyond the sole educational context ...

1 Sustainability as a whole, accompanied also by the commitment to both fundamental and applied research, has been elevated to constitutional law rank towards the end of the UN decade in 2013 (Austrian Federal Government 2013).

2 In 2014, based on the legislation just outlined, the so-called [Grundsatzklass Umweltbildung für nachhaltige Entwicklung](#) (Basic degree on environmental education for sustainable development) entered into force summarising the boundary conditions of a globalised world with its accompanying challenges and needs for society and thereby emphasising the relevance of environmental education and inherent competences, teaching principles as well as contents and how they ought to be conveyed. [This basic decree applies to all levels at all types of schools and addresses both education on all levels as well as lucidly all institutions of teacher training](#) (e.g. universities, teacher training colleges) (Bundesministerium für Bildung und Frauen 2014).

Selected relevant documents considered for assessment

- Eder, F. & Hofmann, F. (2012): *Überfachliche Kompetenzen in der österreichischen Schule: Bestandsaufnahme, Implikationen, Entwicklungsperspektiven*. In: Herzog-Punzenberg, B. (ed.) (2012): *Nationaler Bildungsbericht 2012. Band 2. Fokussierte Analysen bildungspolitischer Schwerpunktthemen*. Leykam, Graz, p.71-110.
- Friesenbichler, K., Zwettler, K. & Bouslama, S. (2017): *Biodiversität in Lehrplänen und Unterricht. Eine Bestandsaufnahme*. Edited by Umweltdachverband, Vienna.
- Forum Umweltbildung (2015): *Österreichischer Bericht zur UN-Dekade für Bildung für nachhaltige Entwicklung 2005-2014*. Edited by Umweltdachverband, Vienna.

THE CURRICULA OF THE FOLLOWING TYPES OF SECONDARY SCHOOLS (ALL WITH A DIRECT CONNECTION TO 'GREEN JOBS') HAVE BEEN ANALYSED PARTICULARLY, BUT NOT EACH CURRICULUM FOR EACH SDG OF CONCERN.

Fachschule für Landwirtschaft (agricultural technical school)	3 years
Höhere Land- und Forstwirtschaftliche Lehranstalt – allgemein (Higher educational institution for agriculture and forestry – in general)	5 years
Höhere Lehranstalt für Wein- und Obstbau (Higher educational institution for viticulture and pomology)	5 years
Höhere Lehranstalt für Gartenbau (Higher educational institution for horticulture)	5 years
Höhere Lehranstalt für Garten- und Landschaftsgestaltung (Higher educational institution for garden and landscape design)	5 years
Höhere Lehranstalt für Forstwirtschaft (Higher educational institution for forestry)	5 years
Höhere Lehranstalt für Landtechnik (Higher educational institution for agricultural engineering)	5 years
Höhere Lehranstalt für Landwirtschaft und Ernährung (Higher educational institution for agriculture and nutrition)	5 years
Höhere Lehranstalt für Lebensmittel- und Biotechnologie (Higher educational institution for food science and biotechnology)	5 years
Höhere Lehranstalt für Chemieingenieure (Higher educational institution for chemical engineers)	5 years
Höhere Lehranstalt für Biomedizin- und Gesundheitstechnik (Higher educational institution for bio-medical and medical engineering)	5 years
Höhere Lehranstalt für Chemie (Higher educational institution for chemistry)	5 years
Höhere Lehranstalt für Betriebsmanagement (Higher educational institution for operational management)	5 years
Höhere Lehranstalt für wirtschaftliche Berufe "Wirtschaft und Umwelt" (Higher educational institution for commercial professions „Economy and Environment“)	5 years
Höhere Lehranstalt für Tourismus (Higher educational institution for tourism)	5 years

Unlike environmental education, which is classified in the legal taxonomy of the Federal Ministry of Education, Science and Research, containing intended generic (or cross-curricular) competencies, as a teaching principle, education for sustainable development in Austria is run under the label *Bildungsanliegen* (educational concern) (see Eder & Hofmann 2012), implying it being less overarching than its original wide definition would indicate, reducing it to a compendium of desired learning objectives (see Scott & Gough 2010) rather than treating it as a complete new way of how to approach the challenge of transforming future learning environments (United Nations Educational, Scientific and Cultural Organization 2015).

For reasons of vividness, in some cases also other types of schools are addressed.
(Source: Bundesministerium für Bildung, Wissenschaft und Forschung: Various curricula for the higher agricultural and forestry schools. Available online [here](#) checked on 05/30/2018).

Results



Results regarding SDG 11 Sustainable cities & communities

All but one curricula, namely the one for higher educational institutions for bio-medical and healthcare engineering, contain paragraphs in which topics related with SDG 11 – Sustainable Cities and Communities – are thematised. As the name already implies, the so-called higher educational institution for com-

mercial professions "environment and economy" exhibits the biggest share of text passages dealing with themes subsumed under the label "sustainable cities and communities". Whereas curricula qualifying for rather specialised professions such as agricultural engineering or horticulture do not have much emphasis quantitatively on SDG 11, there is a second group of curricula (n=3) showing around 30 mentions

of any of the keywords listed above. Another group, comprising of the curriculum entailing general provisions for agriculture and forestry curricula, and the curricula for environmental and resource management as well as the one for agriculture and nutrition, encompass between 30 and 60 text passages. Interestingly, the syllabus for HEI for tourism entails the second highest number of codings covering the depicted keywords.

HLW, FR Umwelt und Wirtschaft	HEI for commercial professions "environment and economy"	98
HLTourismus	HEI for tourism	75
HLA für Landwirtschaft und Ernährung	HEI for agriculture and nutrition	57
HLA für Landwirtschaft	HEI for agriculture	48
HLA für Umwelt- und Ressourcenmanagement	HEI for environmental and resource management	47
HLA Land- und Forstwirtschaft – Allgemeine Bestimmungen	HEI for agriculture and forestry - general provisions	37
HLA für Forstwirtschaft	HEI for forestry	36
HLA für Chemieingenieure	HEI for chemical engineers	32
HLA für Garten- und Landschaftsgestaltung	HEI for garden and landscape design	29
HLA für Wein- und Obstbau	HEI for viticulture and pomology	27
HLA für Lebensmittel- und Biotechnologie	HEI for food science and bio-technology	27
HLA für Landtechnik	HEI for agricultural engineering	13
HLA für Gartenbau	HEI for horticulture	8
HLA für Biomedizin- und Gesundheitstechnik	HEI for bio-medical and healthcare engineering	0

Keywords used for automated search:

abfall beteilig gebäude sanier dämm altbau energiespar grundversorgung hitzeinsel partizipat vorsorg katastroph luftqualität feinstaub städt stadt gemeinde dezentral raumplan grünfläch wohnraum leistbar siedlung flächenverbrauch lokal regional bevölkerung mitbestimm milder abschwäch widerstandsfähig energieeffizien ressourcenverbrauch reduktion bedürfnis nachhaltig urban abfall grundwasser abwasser wasserversorgung regionalentwicklung kultureerbe naturerbe mobilit risiko anpassung wiederherstell entscheidungsfind wohlfinden solidar gemeinschaft zugang teilhab smart nahversorg nutzungskonflikt nahverkehr verkehrsmittel



Learning tasks or contents of higher complexity are not primarily intended

Because of both, their dichotomous structure – teaching contents on the one hand and educational tasks and teaching duties on the other hand – and their orientation towards qualifying specialists in a rather narrow field, they cannot be designated as competence- or output-oriented learning objectives in the sense of ESD in that they address, for one thing, the different dimensions, viz. knowledge, skills and attitudes, and secondly, involving the cognitive domain, the socio-emotional domain, self-competence as well as shaping competence. Nevertheless, single or partial competences are already entailed in the examined curricula and just have to be complemented in order to be brought up to date.

Single or partial competences are already entailed in the examined curricula and just have to be complemented in order to be brought up to date.

Results regarding SDG 12 Responsible consumption & production

Text passages containing one of the keywords regarding topics with reference to SDG 12 – Responsible Consumption and production - as outlined above could be retrieved in each of the examined documents ranging from 10 codings in the curriculum for higher educational institutions for bio-medical and healthcare engineering to a total of 105 in the curricula for higher educational institutions for agriculture and nutrition. Some redundancy in the detected text passages might occur due to the fact that the framework

curriculum exhibits overarching general learning objectives, contents etc. which are taken up in the specialised curricula where they are being further elaborated.

The identified prevalence on production rather than on consumption issues in the majority of revised curricula is due to the fact that nearly all of the curricula aim at qualifying students for industrial vocations where consumer's perspective is obviously secondary. In this regard, the provision of information to customer is only present in the curriculum for horticulture, the critical discussion

of both the role of producers and consumers and change of perspective is only addressed in the curriculum for Higher educational institutions for tourism as well as in the one for the higher educational institutions for commercial professions, specialisation environment and economy. In contrast to the examined curricula of higher vocational schools in Germany, the global perspective of consumption and production, e.g. food security or its situation in other world regions is only covered in the curriculum for higher educational institutions for agriculture and nutrition.

It can be concluded that there are a lot of potential contact points for

implementing SDG4-related learning objectives and contents in the already existing curricula, but there is also the danger that all teaching contents could also be covered in a poor sustainable way with emphasis on economic aspect only or its prioritisation at least – only attached with the nice label of being "ecological" or "sustainable". This assumption is proven by the fact that in many cases, skills directly related with production processes are described which should be analysed towards their economic and ecologic consequences – as if these two would also be opponents. As a result, the social aspect of sustainability is nearly entirely missing, addressed only in the curriculum for higher educational institutions

for agriculture and nutrition, where e.g. socio-cultural aspects of nutrition are thematised. Regarding the didactic perspective, second level operators are prevailing, but the lack to a great extent of third level operators indicate that learning tasks or contents of higher complexity are not primarily intended. This result ties closely with the observation that the contents of the curricula predominantly address the acquisition of knowledge and skills, but exhibit very little emphasis on other learning objectives or rather competencies such as the critical thinking competency, the integrated problem-solving competency or the collaboration competency (see United Nations Educational, Scientific and Cultural Organization 2017).

Keywords used for automatized search:

kreislaufwirtschaft konsum dekarbon ökologisch energieeffizien ernährung abfall fossil bereitstell treibhaus lebenszykl marktversag turbulen ressource recycel fußabdruck reduktion erneuer verantwortungsvoll wiederverwert wieder-gewinn nachhaltig lokal regional verfügbar extensiv kooperation rückführ verringer verschwend lebenszyklus zertifiziert obsoleszen bodenspar zugang teilhab herkunftsnachweis nullwachstum subsisten wertkette lebensstil

HLA für Landwirtschaft und Ernährung	HEI for agriculture and nutrition	105
HLA für Umwelt- und Ressourcenmanagement	HEI for environmental and resource management	85
HLW, FR Umwelt und Wirtschaft	HEI for commercial professions "environment and economy"	76
HLA für Landwirtschaft	HEI for agriculture	70
HLA für Lebensmittel- und Biotechnologie	HEI for food science and bio-technology	51
HLA für Chemieingenieure	HEI for chemical engineers	51
HLA für Wein- und Obstbau	HEI for viticulture and pomology	39
HLTourismus	HEI for tourism	37
HLA für Gartenbau	HEI for horticulture	36
HLA für Landtechnik	HEI for agricultural engineering	34
HLA Land- und Forstwirtschaft – AllgemeineBestimmung 2016	HEI for agriculture and forestry - general provisions	31
HLA für Garten- und Landschaftsgestaltung	HEI for garden and landscape design	31
HLA für Forstwirtschaft	HEI for forestry	16
HLA für Biomedizin- und Gesundheitstechnik	HEI for bio-medical and health-care engineering	10



Results regarding SDG 13 Climate action

All but one curricula, namely the one for higher educational institutions for bio-medical and healthcare engineering, contain paragraphs in which topics related with SDG 13 – Climate action – are thematised. In the 14 analysed documents as listed below, in total 141 text passages (=codings) could be identified in relation to climate (action) relevant themes. Unsurprisingly,

the just recently established curriculum for higher educational institutions for environmental and resource management exhibits, as the name might implicate, the highest number of codings related with climate action. In addition, it is one of the few curricula explicitly incorporating competencies according to the demands of learning outcomes claimed by several UNESCO documents aiming at developing sustainable development relevant skills.

Besides that, a lot of tagged codings represent learning objectives which are assigned to the lowest requirement area in the hierarchy of competence-oriented learning tasks, where students e.g. have to describe, recall, summarise or define some special facts (Hofmann-Schneller et al. 2014). These basics should not be neglected, but emphasis in modern curricula should be also or even more on generic competencies and on more complex ones. With regard to key competencies, one can conclude that the priority of learning outcomes as defined in the sections covering postulated competencies, the priority is given to the areas knowledge and skills rather than attitudes (cf. European Commission 2018). If general schooling exhibits a deficit of action orientation, then one could argue that higher vocational schools in Austria with emphasis on 'green job' education show a tremendous need to catch up in terms of humanistic education.

HLA für Umwelt- und Ressourcenmanagement	HEI for environmental and resource management	22
HLA für Forstwirtschaft	HEI for forestry	18
HLA für Landtechnik	HEI for agricultural engineering	16
HLW Umwelt und Wirtschaft	HEI for commercial professions "environment and economy"	16
HLA für Chemieingenieure	HEI for chemical engineers	13
HLA für Gartenbau	HEI for horticulture	12
HLA für Wein- und Obstbau	HEI for viticulture and pomology	10
HLA für Landwirtschaft	HEI for agriculture	9
HLA für Landwirtschaft und Ernährung	HEI for agriculture and nutrition	9
HLA Land- und Forstwirtschaft - Allgemeine Bestimmungen	HEI for agriculture and forestry - general provisions	5
HLA für Garten- und Landschaftsgestaltung	HEI for garden and landscape design	3
HLA für Lebensmittel- und Biotechnologie	HEI for food science and bio-technology	3
HLA für Tourismus	HEI for tourism	3
HLA für Biomedizin- und Gesundheitstechnik	HEI for bio-medical and healthcare engineering	0

Keywords used for automatized search:

klima erwärmung emission treibhaus katastroph kohlendioxid methan fckw ozon naturgefahr erneuerbar mobilität meerespiegel extrem wetter ausstoß verschmutzung anpassung milder abschwäch



Results regarding SDG 15 Life on Land

Main results of relevance for our purpose taken from a study carried out in 2016 on behalf of the Umweltdachverband regarding the implementation of biodiversity-related learning topics in each school level in Austrian vocational school curricula with emphasis on 'green jobs' are as follows (Friesenbichler et al. 2017):

- Generally speaking, the launch of the revised curricula which came into effect for the school year 2016 curricula entailed a shift towards enabling students a deepened exploration of the importance of biodiversity issues
- Only the curricula of two very specialised types of school, the higher educational institution for food- and bio-technology (Höhere Lehranstalt für Lebensmittel- und Biotechnologie) as well as the higher educational institution for biomedical and healthcare technology (Höhere Lehranstalt für Biomedizin- und Gesundheitstechnik) by name, don't include any reference of biodiversity, neither directly, nor indirectly
- No consistency as a result of the strand of professional training can be reported concerning the (in)direct mention of biodiversity topics: while some very specialised forms of com-

mercial schools (Handelsakademie für Wirtschaftsinformatik) can exhibit direct naming or detailed description of biodiversity issues, some curricula of more obvious strands such as the higher educational institution for forestry (Höhere Lehranstalt für Forstwirtschaft) or the vocational school for agriculture have less emphasis on the issue

- No consistency as a result of the level of final qualification can be documented: while some higher educational institutions, finishing with both a professional qualification and a general High School Certificate deal biodiversity in their curricula, some of the same type don't
- Compared to the curricula of types of schools with general education which all deal biodiversity issues, curricula of (higher) vocational schools show a high variability regarding the direct mention or indirect but detailed description of the topic. What though should be stated is that the so-called superstructure curricula which is valid for every type of higher vocational school in agriculture and forestry, show clear improvements regarding the implementation of biodiversity compared to former curricula
- When teachers were asked how they put biodiversity issues into practice, many stated that they highlight every single person's responsibility for the protection of biodiversity by pointing out the link between the students' own consumption and its impacts on biodiversity (loss). In this regard, SDG 15 – life on land – is highly connected to SDG 12 – responsible consumption and production

SDG 15 – life on land – is highly connected to SDG 12 – responsible consumption and production

- Most of the consulted teachers are debating the issue with their students during regular in-school lessons, while less than half of them cover it through (outdoor) projects, excursions or in the scope of school events
- Biodiversity as a well embedded topic in the Grundsatzlerlass Umweltbildung für nachhaltige Entwicklung (Basic degree on environmental education for sustainable development) serves as a guiding principle for educators regarding the implementation of the topic in every type of school, level and grade

General findings & shortcomings

In the realm of the UN-Decade on Education for Sustainable Development (DESD), a lot of activities have been launched as well as a decent number of (interim) reports and reviews have been published. It can be stated that the establishment of the office has helped much in order to coordinate all efforts taken on national level.

Despite that, due to the heterogeneity of the formal school system in Austria, basically providing educators with comparatively much freedom in terms of prioritisation, both thematically and methodically, in comparison with some of the other depicted countries, education for sustainable development hasn't seen as much formalisation as one would actually conclude in consequence of the ongoing debate on competencies. Neither an encompassing screening on activities and implementation has been carried out as indicated in the Global Action Programme, nor have curricula and other legal documents been sweepingly transformed as education for sustainable development would claim in fact.

Recommendations for implementation

- Elevating Education for sustainable development and mountain-oriented education as its regional correspondence, into the rank of a teaching principle.
- Establish subjects which cover exclusively generic competences or integrate these competences more striding in the existing canon of subjects as a function of granted autonomy status of each school (type) and field of specialisation.
- Analogous to some Swiss cantons, generic competences as outlined in the hierarchy comprising of general didactic goals, didactic principles, teaching principles and didactic concerns could be graded separately in the school reports but should be cleared up and tightened first (see Eder & Hofmann 2012).
- Topics and themes more in line with recent discussions in specialised research such as invasive species or ecosystem services are only covered in three curricula, namely higher educational institution for horticulture, higher educational institution for garden and landscape design as well as higher educational institution for forestry. In order to allow future curricula to adapt and incorporate topics evolving through the constant current discussion of related technical disciplines, some space in the education standards of each grade should remain reserved for covering current approaches and topics.
- The distinction between educational tasks and teaching duties on the one hand and teaching content on the other hand should be abolished – competencies should be defined in much detail and relevant topics should be cited illustratively
- Curricula should be exclusively put student-centred rather than being a mixture of guidance for teacher and containing besides also learning outcomes in the form of required competencies for students



The context of ESD in France

In a nutshell...

ESD was structured in France in the 1970s and 1980s, at the initiative of professionals in education, nature conservation and popular education. Since 1977, and especially in the 2000s, it has formalized within the National Education, first in a phase of experimentation, then generalization. From now on, ESD covers a wide range of topics and involves various partners. It includes global settlement procedures with E3D (establishments in sustainable development process). In the field of non-formal education, ESD is a priority objective for the Ministry of Youth, which supports the training of educators (several ESD diplomas) and the development of youth projects in local education policies.

Mountain (oriented) education (MoE) in general does not exist as such in school curricula – it is considered to be included in the different disciplines, dealt for example as natural habitats. There is a network in the French Alps, Educ'alpes, which has been working for several years to develop mountain (oriented) education in formal and non-formal education in collaboration with state services (Ministry of National Education and Youth) and regional services in terms of rules and regulations, publications, trainings, etc. Mountain education as is the case here, is now part of the so-called Alpine Massif Policy (Convention Inter Massif des Alpes – CIMA et POIA).

Fact sheet of history of EE & ESD in formal and non-formal education

1977

A circular letter put forth the idea of environmental education in France

2004

Advancement of the concept now also comprising both environmental education and education for sustainable development (l'éducation à l'environnement et au développement durable)

2007

Launch of the second phase of broadening of education for sustainable development

2011

Launch of the third phase of the broadening of education for sustainable development

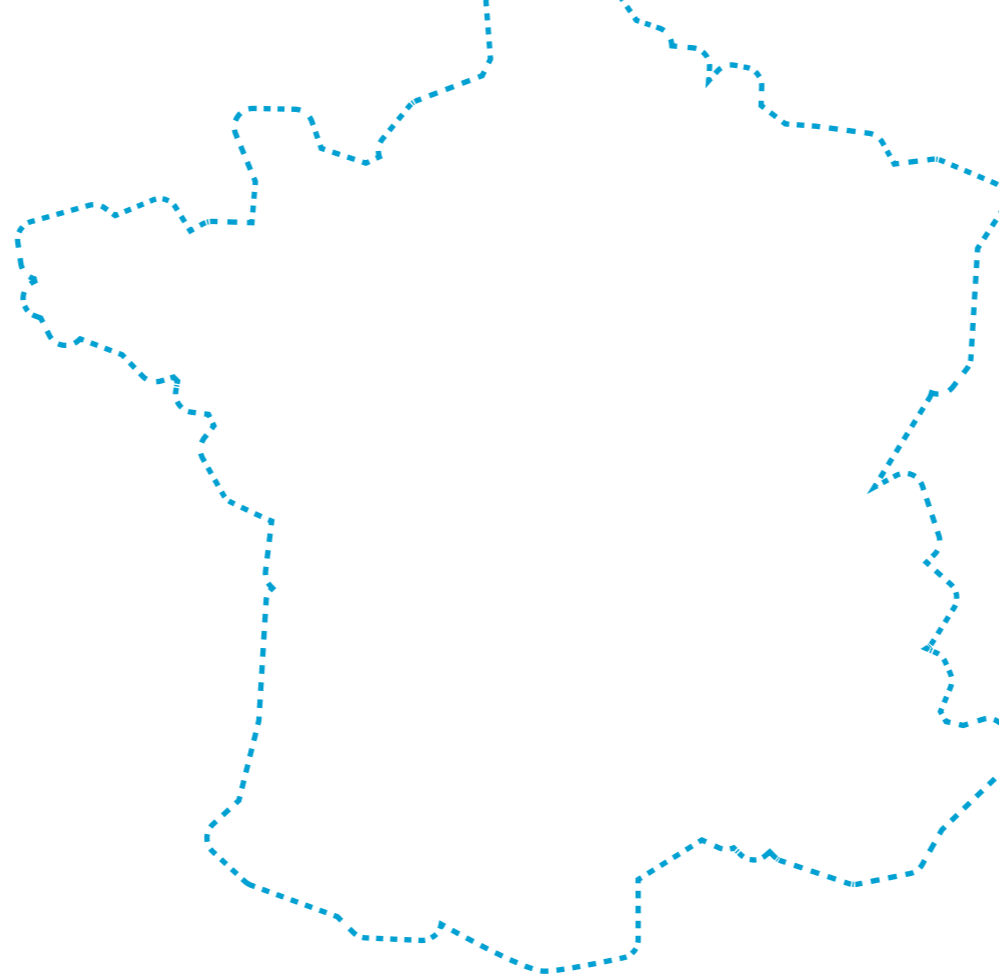
2013

Under the law on the re-foundation of the school system, education for sustainable development was brought into the relevant legal regime regarding education

In the same grade, the label "E3D" was set up as a mark-up for schools and educational establishments with regard to an overall approach of sustainable development

2015

On the occasion of the hosting of COP 21 in Paris, the Federal Ministry of National Education, Higher Education and Research has entered a new phase of broadening the concept of education for sustainable development. It is widely regarded as a crucial portion of the national strategy of the ecologic transition for a sustainable development. Education for sustainable development is an integral part of initial formation of pupils in the entirety of schools and educational facilities



Mountain (oriented) education (MoE) in general does not exist as such in school curricula – it is considered to be included in the different disciplines, dealt for example as natural habitats.

In French higher education, the orientation of education for sustainable development took off several years later than for primary and secondary schools. It was only in 2009 that a national law "Grenelle 1" was voted by the Parliament demanding for the adoption of a "green plan" for institutes of higher education (Légifrance 2011). This "green plan" should favor sustainable development in the overall mandate of the institute. Given the competence of self-determining capacity building every institution proceeds autonomously regarding the concrete integration of sustainable development. However, this integration requires that the question for the educational objectives are clearly outlined in order to correspond to the envisaged professions (Segalàs et al. 2009).

Screening of possibilities for implementation of ESD/MoE in curricula of vocational schools

Selected relevant documents considered for assessment

Document EATDD Grade 11, 12, 13 Ecology, Agronomy, Land Use and Sustainable Development HOURS:

This reference document of the General Education and Research Department,

officially introduces experimental learning on "ecology, agronomy, territory and sustainable development (EATDD) in 2010 in secondary schools with general technological and agricultural focus. In practice, 3 hours per week are dedicated for this focus, teachers can also decide to accumulate these hours for a specific period. There is a repartition of hours per subject (biology, agronomy etc.).

Documents 2ème phase de généralisation de l'EDD Enseignements élémentaire et secondaire and 3ème phase de généralisation de l'EDD Enseignements élémentaire et secondaire:

These documents summarize the progress on implementation of sustainable development in school curriculae: The principles of sustainable development have already been integrated in education programs of primary, secondary and vocational schools. Education for sustainable development is represented by schools activities and integration of the local territory. The challenge now is the development of partnerships and governance issues.

Document: Instruction relative au déploiement de l'EEDD dans l'éducation nationale

Document regarding the integration of ESD 2015-2018 which aims at

Education for sustainable development is represented by schools activities and integration of the local territory. The challenge now is the development of partnerships and governance issues.

integrating education for sustainable development until 2020, continuous update with pedagogical material on the platform of the ministry "Eduscol". Description of the process E3D and its label (E3D= School engaging in the process of sustainable development. Schools are encouraged to take action in order to dispose of the level).

Document: European comparison EEDD by pedagogical searchers:

From 2004, short comparison of EE and ESD in several European countries among which Italy, Germany, France and Austria.

Document: ensel1684_annexe1_E3D_demarche_globale_388594

Detailed description of the process E3D and its label (E3D= School engaging in the process of sustainable development).

Document: ensel1684_annexe2_E3D_appel_a_projets_388596

Always in the face of the COP 21, an official call for projects regarding « keys for ESD" in order to valorize pedagogical projects on sustainable development and especially the fight on climate change was launched. They are evaluated by the academic committee on ESD.

Document: ensel1684_annexe3_E3D_organiser_des_simulations_388600

In the face of the COP21 a guide for organizing negotiation simulations regarding climate change was provided for teachers.

Document: ensel1684_annexe4_E3D_organiser_des_debats_388603

Throughout 2015, schools were encouraged to organize debates on climate change. In this context, cooperation with local actors and territorial associations, collectivities was envisaged.

Document: ensel1684_annexe5_E3D_coins_nature_388605

From 2005, creation of nature corners in schools in form of a pedagogical garden, ped sea or other in order to strengthen students linkage with nature. A lot of further links are mentioned to deepen the analysis.

Document: ensel1684_annexe6_E3D_ressources_388607

Document with a collection of resources on ESD in France

Document: Strat_Nat_Trans_Ecol_Dev_Dur_2015-2020

This report on the development of SD focuses on the time period Feb15-

Dec16. It describes government initiatives and initiatives from other actors; on page 13 a short focus on the ministry of education.

Document: Strat_Nat_Dev_Dur_2010-2013

Very general info on education.

Document: rapport_groupe_travail_interministeriel_2008.pdf

Role of the working group on ESD, designated by the ministry on education. Description of the actions taken and future plan on implementing ESD being a central part for national SD.

In French vocational schools, technological and professional learning represents 40-60% of the working time of a student.

Depending on the specialization these learning forms are out carried either in a laboratory or a building site. The contents of general teaching (French, Maths, History-Geography, Sciences and English) occupy an important place. Generally, vocational schools prepare youth for a professional high school diploma which allows them to insert themselves either directly in a profession or in university.

The professional high school diploma "baccalauréat professionnel" is prepared during three years in the "lycée". This

diploma enables to perform a professional activity in 75 specialties.

A new label has been developed, the "lycée des métiers" – vocational school of professions". This type of high school combines different forms of education: basic education, dual education, further training and validation of already gathered experience. They prepare the basis for professional and technological diploma: CAP, BEP, professional high-school diploma (Bac Pro), technological high-school diploma (Bac technologique), preparatory university courses and bachelor degrees with a specific technical orientation (license professionnelle).

Importantly, every high school follows an institutional project (projet d'établissement) which guides the general school orientation with regard to its

specific public. In this context, the school is quite flexible and can apply the orientation of sustainable development. (Available online [here](#))

In the context of the analysis, 26 different grades ranging from vocational schools to University degrees were analyzed (see excel list). Importantly to remark, none of the vocational curriculae explicitly describes and specifies "sustainable development". This key concept is rather present in institutional school projects and transversal and cross curricular school activities. Moreover, it was stated that several curriculae refer to more than one SDGs as defined by the UNDP.

In the context of the analysis, 26 different grades ranging from vocational schools to University degrees were analyzed

Results

Results regarding SDG 11 Sustainable cities & communities

14 degrees make explicit reference to sustainable cities and communities even though not employing the term "sustainable". The descriptions focus rather on innovative material and new technology in order to save resources and raw material. Moreover, topics such as waste management, recycling and air quality are considered to constitute part of this SDG. In addition, aspects focusing rather on the social pillar of sustainable development can be found in some curriculae, explicitly focusing on social integration, livable public space without barriers and working place organisation.

Results regarding SDG 13 Climate action

14 degrees make explicit reference to climate relevant topics. In this context we can situate technical courses regarding energy efficiency, environmental diagnostics, eco-construction, pollution, wood construction techniques and the durability of materials. Moreover, social ecological aspects referring to the human impact on nature, sustainable mobility, and upcycling are part of some courses.

Results regarding SDG 15 Life on Land

18 of the analysed degrees can be related to SDG 15, Life on land. In this context courses on biodiversity and ecosystem services, different ecosystems and nature protection can be considered. Moreover, it is dealt with agronomy, agricultural techniques, farming and irrigation methods. Again, topics on pollution and waste management can be situated in here.

Results regarding SDG 12 Responsible consumption & production

17 of the analyzed degrees refer in different extents to SDG 12. In this context, reference is made to the promotion of local value chains and short economic circuits. Moreover, the focus on sustainable agricultural practices, land and water use becomes evident; in addition, professions focusing on handcraft and artisanal working can be displayed. Also the topic of environmental degradation and environmental education may be considered in this respect.

Mountain oriented education needs to be given ...

... a formal structure in educational system in France.

General findings & shortcomings

- Mountain oriented education needs to be given a formal structure in educational system in France. Nowadays, projects and formal education is oriented toward sustainable development at national level.
- Some ideas, projects close to mountain education are sometimes experimented depending on the institutional context and student pathways
- Actors (teachers, mountain actors) would need to be trained in order to be able to step in Mountain oriented education
- Some initiatives don't exist no longer. There used to be a national resources center (PREAC) about Mountain on this topic in national education
- National education in France is very centralized in Paris where all the decisions makers are

Recommendations for implementation

- Develop the topic of MoE in projects of educational institutions (during regular school time and during leisure time) and in the PEDT (educational programs of the territory)
- Relaunch a training and resource space for teachers on mountain issues in the context of the SCEREN/Canopé network (close to Ministry of National Education).
- Develop educational excursions and trips on mountain topics outdoor (e.g. classes on discovery issues)
- Develop advanced and further training for educators and teachers regarding pedagogical activities in the mountainous context.
- MoE could/should be formalized in official documents of the Ministry of National Education and Youth

The context of ESD in Germany

In Germany, (lifelong) vocational education and training is one of the areas of activity of ESD with its main goal to instill a so-called *Beschäftigungsfähigkeit* (“sustainable employability”) among apprentices

In Germany, (lifelong) vocational education and training is one of the areas of activity of ESD with its main goal to instill a so-called *Beschäftigungsfähigkeit* (“sustainable employability”) among apprentices. It is geared towards sustainability and includes sector-specific and social framework conditions. The term builds upon the capacity to act in one’s professional, societal and private sphere (Bundesministerium für Bildung und

Description of history of EE & ESD in formal and non-formal education

The history of environmental education in Germany goes back a long way starting with the origins of the nature conservation movement in the 19th century. With the paper of the club of Rome 1972 different approaches emerge: environmental education, ecological learning, and, in the 1990s, education for sustainable development.

The discussion about the concept of ESD in Germany was characterised by huge educational policy projects – like Transfer 21 and BLK 21, just to name a few, as well as a project to establish a framework in the field of global learning in the scope of ESD.

Forschung 2018, linen source: <https://www.bmbf.de/files/Handlungsfelder.pdf>.

The formal education system with regard to vocational training in Germany is strongly marked by two cornerstones: the federal structure and competence of the federal states and the so-called Duales System (dual system). Back in 2007, 53 % of a cohort of secondary school II underwent vocational training (Hippach-Schneider et al. 2007) in a company and a school in parallel (= dual system). Apart from this, there are also Berufsfachschulen (initializing vocational schools) organized as full-time schools from grade seven onwards, either preparing students for a professional activity or vocational training, the latter mostly realised then in the dual system.

Young people who have already undergone a professional training in the dual system or have a Mittlere Reife (intermediate school-leaving certificate) can thereupon attend one of the two different forms of upper vocational schools, either the Berufsoberschule (‘BOS’; higher vocational school) or Fachoberschule (‘FOS’; technical college), both finishing either with the general matriculation standard (13 grades of

schooling in total) or subject-related entrance qualification (12 grades), usually only allowing for university access at universities of applied sciences or university studies directly connected to the followed educational direction (Hippach-Schneider et al. 2007, Staatsinstitut für Schulqualität und Bildungsforschung München 2018, online source: <https://www.isb.bayern.de/berufliche-oberschule/uebersicht/>).

Screening of possibilities for implementation of ESD/MoE in curricula of vocational schools (most important secondary literature & own findings)

Selected relevant documents considered for assessment

Bayerisches Staatsministerium für Bildung und Kultus, Wissenschaft und Kunst (ed.) (2017): LehrplanPLUS Berufliche Oberschule. Fachlehrplan für die bayerische Fachoberschule. München. [Available online here](#) checked on 05/30/2018.

Bayerisches Staatsministerium für Bildung und Kultus, Wissenschaft und Kunst (ed.) (2017): LehrplanPLUS Berufliche Oberschule. Fachlehrplan für die bayerische Berufsoberschule, München.

[Available online here](#) checked on 05/30/2018.

Bundesministerium für Forschung und Bildung, Referat Bildungsforschung (Hrsg.) (2012): Bildung für nachhaltige Entwicklung – Beiträge zur Bildungsforschung, Berlin a.o. [Available online here](#) checked on 30/05/2018.

Bundesministerium für Bildung und Forschung (ed.) (2017): Nationaler Aktionsplan. Bildung für nachhaltige Entwicklung. Der deutsche Beitrag zum UNESCO Weltaktionsprogramm, Berlin. [Available online here](#) checked on 05/30/2018.

Dannenberg, S.; Grapetin, T. (2016): Education for Sustainable Development – Learning for Transformation. The Example of Germany. In: Journal of Futures Studies, March 2016, 20(3): 7–20. [Available online here](#) checked on 05/30/2018.

Deutsche UNESCO-Kommission (ed.) (2011): Die Umsetzung der UN-Dekade “Bildung für nachhaltige Entwicklung” (2005–2014) in Deutschland. Zwischenbericht Mitte 2007 bis Mitte 2010, Bonn. [Available online here](#) checked on 05/30/2018.

At the time of compilation of this document, the legislation for higher vocational schools in the Federal State of Bavaria underwent a thorough makeover coming gradually into effect in the school grades 2017–2019. While the main body of the expiring curricula with their basic structure distinguishing between learning objectives, learning contents and indications for teaching, was geared towards the classic didactic phase structure, where the exact number of teaching hours for each field of knowledge is determined, there has been a clear shift in the recently issued curricula towards competence oriented learning expectations. Besides, the corresponding learning contents are now kept broader with emphasis on less detailed descriptions of single teaching contents. The focal

There has been a clear shift in the recently issued curricula towards competence oriented learning expectations

point is now on the acquisition of systemic knowledge, to a lesser extent on target knowledge and negligibly on transformation knowledge according to the premises of transdisciplinary research (sees Hirsch Hadorn et al. 2006), the latter particularly strongly addressed in UNESCO's Education for SDGs: Learning objectives (UNESCO 2017).

In both examined curricula, namely the one for BOS with specialisation for agriculture, bio- and environmental technology, and the one for FOS, education for sustainable development (ESD) is explicitly listed as one of the general educational goals alongside others such as professional guidance, intercultural education or media/digital literacy, just to name a few. Accordingly, students should develop competencies which enable them to identify sustainable developments (sic!) and contribute to shape these processes. By dealing with the subject matter, students develop a sense of responsibility of nature and environment and

deepen their knowledge of the complex and mutual interdependence between humans and the environment. Further on, the three different aspects of sustainable development (ecologic, economic and social) are addressed as well as intergenerational justice. Finally, the acquisition of relevant knowledge of environmental and developmental issues, their complex causes and effects and the conscious reflection of one's norms and values are seen as basic conditions to shape the own living environment as well as the connected world in the spirit of Global Learning.

The subject curricula of the following subjects and/ or grades as listed in the curricula valid for higher vocational schools ('BOS') in the Federal State of Bavaria and all part of the educational direction agriculture, bio- and environmental technology refer directly to the educational goal of education for sustainable development and therefore allow for a variety of implementation possibilities for MoE/ region specific ESD:

- Chemistry, grade 12
- History/ Social studies, grade 12
- Mathematics, grade 12
- Physics, grade 12
- Sports, grade 12 or 13

The subject curricula of the following subjects and or grades as listed in the curricula valid for higher technical colleges ('FOS') in the Federal State of Bavaria and all part of the educational direction agricultural refer directly to the educational goal of education for sustainable development and therefore allow for a variety of implementation possibilities for MoE/ region specific ESD:

- Chemistry, grade 11
- Chemistry, grade 12
- Mathematics, grade 11
- Mathematics, grade 12
- Physics, grade 11
- Physics, grade 12
- Technology, grade 11

Both analysed forms of professional specialisation (agriculture, bio- and en-

vironmental technology or agriculture, respectively) of both types of school (BOS & FOS) have the following subject curricula in common, each containing at least one paragraph discussing the point of contact of the subject for the educational goal of education for sustainable development, either exclusively, or, in combination with one of the other 15 general educational goals mentioned there:

- Biology, grades 10, 12 & 13
- Bio-technology, grades 12 & 13
- Chemistry, grades 10 & 13
- Economy & Law, grade 12 or 13
- Ethics, grade 10, 12, 13
- History/ Social studies grades 10 & 13
- Informatics, grades 12 & 13
- International business studies, grade 12 or 13
- Mathematics, grades 10 & 13 as well as the intensified course in Mathematics, grade 12
- Physics, grade 10, as well as the intensified course in Physics, grade 10
- Sociology, grade 12 or 13
- Study skills, grade 12
- Technology, grades 10, 12 & 13

For reasons of clarity, the following analyses do neither contain curricula effective for so-called 'Fachklassen' (specialist classes) of the BOS curriculum/ specialisation agriculture, bio- and environmental technology", nor do they include guidelines for the subject-related practical training of the FOS curriculum/ specialisation agriculture. The mere reference of education for sustainable development as a general educational goal of one of the subjects was therefore the sole selection criterion for the consideration of each subject for further analysis.

Education for sustainable development (ESD) is explicitly listed as one of the general educational goals alongside others such as professional guidance, intercultural education or media/digital literacy.

Results

Results regarding SDG 11 – Sustainable cities & communities

Keywords used for automatized search:
abfall beteilig gebäude sanier dämm altbau energiespar grundversorgung hitzeinsel partizipat vorsorg katastroph luftqualität feinstaub städt stadt gemeinde dezentral raumplan grünfläch wohnraum leistung siedlung flächenverbrauch lokal regional bevölkerung mitbestimm milder abschwäch widerstandsfähig energieeffizien ressourcenverbrauch reduktion bedürfnis nachhaltig urban abfall grundwasser abwasser wasserversorgung regionalentwicklung kulturerbe naturerbe mobilit risiko anpassung wiederherstell entscheidungsfind wohlbefinden solidar gemeinschaft zugang teilhab smart nahversorgung nutzungskonflikt nahverkehr verkehrsmittel

Results for shared subjects in BOS & FOS

Due to the broadly formulated learning contents, the revised curricula exhibit less matches than expected with the detailed thematic key word list used for investigating the occurrence of SDG 11 – Sustainable cities & communities – relevant text passages. Naturally, natural science subjects such as Biology or Chemistry have less emphasis on topics addressing SDG 11 than do social science subjects as Ethics, History, Sociology or even Technology.

Results for educational direction BOS

In the subject History/ Social studies of grade 12 of the strand BOS, the reunification of Germany is covered in a separate study area. By depicting the consequences of the unification process on politics, economy, society and culture, there is a possibility for anchoring SDG 11-related activities potentially by means of a regional example.

Especially the subjects such as Biology, Technology, and Sociology already show various possibilities for putting ESD/ MoE into practice without adding extra load on both students and teachers

Results for educational direction FOS

Regarding occurrences of any of the key words in the subject curricula genuine for the specialisation “agriculture” for technical colleges (FOS), only the one for Technology, grade 11, exhibits text passages picking up the topic, e.g. current trends of the local labour market or closed production loops are broached.

Results regarding SDG 12 – Responsible consumption & production

Keywords used for automatized search:

kapital auto kreislaufwirtschaft wirtschaft konsum dekarbon ökologi effizienz brauch energienahr versorgung abfall fossil bereitstell treibhaus

ernte lebenszykl markt versag turbulen materi ressourcen produkt recycel fußabdruck redu erneuer verantwortung wiederverwert wiedergewinn nachhaltig lokal region wasser extensiv kooperative

rat rückfuhr essen verlust verringern vermeid verschwend lebenszyklus produkt bewusstsein beschaff zertifiziert obsoleszen behandlung bodenspar zugang teilhab herkunft wachstum subsistenz bedürfnis bedarf förderung handel verdienen import export global struktur einfluss wertkette lebensstil

Results for shared subjects in BOS & FOS

Biology, grade 13, and Technology, grade 12, exhibit the highest number of text passages related to SDG 12 – responsible consumption and production.

Whereas in Biology, these identified codings refer to sustainable, often organic cultivation methods, as well as to the critical discussion of fertiliser application or herbicide use, in both upper grades of Technology (12 and 13), specialised competencies by means of learning contents such as analysis, calculation or examination of various processes and operations related to renewable energies, waste management or raw materials, are to be developed by students.

Results for educational direction BOS

The subject of History/ social studies of the strand BOS has the highest numbers of text passages associated with competencies and contents directly or indirectly related to SDG 12. There, in the section where latest challenges are addressed, students have to analyse the effects of regulatory policies on the economy in different societies, in order to assess their consequences for a single person's lifeworld.

Results for educational direction FOS

Regarding the stand-alone subjects of FOS which address the general educational goal of sustainable development, all analysed subjects contain at least one text passage indicating possible points of contact for implementing SDG 12-related contents, teaching units or competencies in the spirit of mountain-oriented education. Apart from chemistry, where text passages could be retrieved in the subject curricula of both analysed grades, all other analysed curricula contain codings only in either grade 11 or grade 12 of

the respective subject. In the subject Technology of grade 11, various aspects of production processes, product quality and environmental and social costs relating thereto represent the identified text passages and thus offer points of reference for SDG 12 related teaching. Interestingly in grade 12 of the Chemistry curriculum of FOS, both in the competencies and contents sections, decision making competency is outlined in connection with the ethical relevance of chemical issues or its meaning to sustainable development and related other topics.

Results regarding SDG 13 – Climate action

Keywords used for automatized search:

klima erwärmung emission treibhaus katastroph kohlendioxid methan fckw ozon naturgefahr erneuerbar mobilität meerespiegel extrem wetter ausstoß verschmutzung anpassung milder abschwächung

Results for shared subjects in BOS & FOS

Only three subjects show one or more matches in their curricula with one of the keywords used for the automatized search for points of contact for SDG 13-related education, whereby in Technology of both shared grades in BOS & FOS, activities geared towards climate action could be implemented.

Results for educational direction BOS

Among the subjects exclusively taught in BOS, only in History/ social studies, climate change is listed among other things, in the section of learning contents indicated in the point “current challenges”.

Results for educational direction FOS

No explicit mention of one of the keywords outlined above in the subjects exclusively applicable for FOS could be identified. Though, in the subject area of construction technology, the interactions between the construction sector on the one hand and humans, society and environment on the other hand shall be illustrated by students on the basis of historical developments of deliberately selected buildings. With regard to climate change adaptation measures, constructions used e.g. for irrigation in semiarid regions in the past and their potential use in this part of the world could be thematised.

Results regarding SDG 15 – Life on Land

Keywords used for automatized search:

artenvielfalt aufforstung aussterben bedroht ökologischesystem ökologie biodiversität boden bodenbildung dürre entwaldung geschützt humus invasiv veröden verbusch bewirtschaftung rod umwelbelastung wald wilderei wüstenbildung spezialschutz verlust permakultur bedroht biotop feuchtgebiet trockenstandort abtrag bodendegradation tierschutz ressourcen

Results for subjects in common

Among the 26 analysed grades for the subjects of interest, only seven documents exhibit text passages which comprise of one of the above mentioned keywords related with SDG 15 – Life on land. Grades 12 and 13 of Biology classes, the two have occurrences of eight codings. In the subject Technology of grade 12, eight text passages could be identified with the keyword search whereas in grade 13, there are only two occurrences and

therefore points of contact for tuition geared towards education with regard to the respective SDG. If examined in more detail, e.g. in Biology, grade 12, site conditions at forest locations from a synecological point of view is cited or damage symptoms of domestic trees as a function of pollutant emissions or browsing by game are listed.

Results for educational direction BOS

No occurrences of one of the keywords utilizes in the automatized search for SDG 15-related contents in the subjects exclusively taught in BOS can be reported.

Results for educational direction FOS

Regarding the subjects exclusively applicable for FOS, two text passages in one subject each, namely Chemistry grade 12 and Technology grade 11, could be detected. The one in Chemistry covers the acid-base buffer capacity and its application in biologic systems such as the function of soil as carbon reservoirs. In the study area mechanical engineering in the subject curriculum of Technology grade 11, the consequences of the development of specific tools or machines on the environment are addressed. In that respect, the effects of soil compactation through the use of heavy machinery on arable land could be thematised.

General findings & shortcomings

Compared with the now expiring versions of the inspected curricula in the Federal State of Bavaria, a general shift of current curricula applicable for higher vocational schools in the green jobs sector (BOS & FOS for ABU) towards more flexibility with regard to both learning contents and competencies to be acquired can be stated. Whereas in the old curricula, an exact amount of hours for each study area or even learning topic has been prescribed, the present loose structure and the seemingly non-exhaustive list of learning contents definitely allow for more freedom of teaching and individual adjustment with regard to the needs and interests of the students. The identified sections of evaluat-

ed curricula as outlined above offer straight away potential for the implementation of teaching contents and activities according to the premises of ESD/ MoE and the respective learning objective.

While especially the subjects such as Biology, Technology, and Sociology already show various possibilities for putting ESD/ MoE into practice without adding extra load on both students and teachers, other subject curricula such as for Mathematics, Physics or Chemistry which also incorporate the overarching purpose of education for sustainable development, only provide few or sometimes even no opportunities to realize ESD in the sense of MoE,

depending on strand (either BOS or FOS) and/ or grade.

Apart from mere knowledge acquisition according to classification of transdisciplinary research (or knowledge) into the three spheres, namely system knowledge, target knowledge and transformation knowledge (Hirsch Hadorn et al. 2006), big emphasis in the examined curricula is still put on the first two, aiming at deepened system knowledge and target knowledge, but bringing up the issue of how to achieve the desired conditions necessary for sustainable development through a single person's own behavioural manners to a much lesser extent.

Recommendations for implementation

Persons concerned with formal education (for sustainable development) in Bavaria report a high degree of formalisation and standardisation of the higher schooling system. In the course of the revised curricula for higher vocational schools (BOS) and technical colleges (FOS), a certain detected relief of the rigid structures could be used wisely to implement MoE, especially by cooperating with external experts from NGOs, protected areas in the region or

business representatives, just to name a few. In order to be able also to meet the ever increasing demands from society nevertheless, these partnerships have to go way beyond simple out-of-school pastime or occasional school visits by experts. To ensure a fruitful and deepened partnership, the intended framework of the so-called Alpine School Model (ASM) has also to incorporate non-formal education measures and activities and focus on the interface of

these two forms where learning in the spirit of ESD actually takes place.

To sum up, the already well established aspect of Global Learning/ Global Citizenship in the analysed curricula could be extended by the promising approach of MoE. The two would work together perfectly as the opposite poles of the lifeworld of students, including the effects of their knowledge, values and action, from local to global scale.

The context of ESD in Italy

Steps in formal education for introduction of EE and ESD through the recommendations of the following formal documents:

National indications for Individual learning plan (2004)

Environmental education is introduced in the 1st cycle of education within a learning area called Civil Cohabitation, defining knowledge and skills to be achieved by the students within the fifth class of the primary school and within the third class of 1st grade secondary school.

Indication for the curricula (2007)

Education for citizenship whose objectives are underlined in several places indispensable are "the construction of the sense of legality and the development of an ethics of the responsibilities, which are realized in the duty to choose and act in a conscious way and imply the commitment to elaborate ideas and to promote actions aimed

at the continuous improvement of the own context of life ". These indications are distributed in the three disciplinary areas (linguistic-artistic- expressive; historical and geographical; mathematical-scientific-technological) I skills development goals and related learning objectives to education for the environment and sustainable development.

Document of Address for experiencing and teaching Citizenship (2009)

The document indicates learning objectives for schools coming from the European Parliament Recommendation on Citizenship.

Guidelines for Environmental education and ESD (2009)

With the aim of providing some innovative guidelines for the development of curricula by schools and for the organization of educational and teaching activities, the Guidelines emphasized the provisions of Citizenship and Constitution and provided for the

For a more detailed depiction of the possibilities of implementation of MoE in various curricula of professional institutes, please refer to: <https://www.ouralps.org/en/resources/moecurriculuimplementationitalyprofessionalinstitutes>

promotion in pupils, in relation to their age, of knowledge and skills that led to the development personal skills and disciplinary specifications, without distinguishing the different school orders.

Interministerial Agreement (2008) & Charter of Intent (2009)

Signed between the Ministry of Environment and Protection of the Territory and the Sea (MATTM) and the Ministry of Education, University and Research (MIUR), constitute a first step in this direction, where the Ministries identify, among their objectives, the orientation of the educational activities of the two cycles of education towards the construction of awareness and responsibility on the "environmental" issues, which increasingly interest and qualify the quality of life and living environments. This means to realize a strong involvement of the school world in the deepening of the knowledge of environmental issues, stimulating the sensitivity of children and adolescents to make them protagonists of experiences in direct contact with nature.

National indications revising the order structure (2010) of Secondary schools (VET, technical and high school) & National indications for the curricula (2012) for first cycle of education
Both documents provided the indications to all the schools of every order and degree of the national territory for the teaching of Citizenship and Constitution.

Environmental education guidelines by the joint Ministry of Environment and Education (2014)

In the guidelines are articulated the environmental themes considered priority in didactic itineraries, declined for the different school orders, in coherence and according to the modalities of the scholastic order structure.

National Conference on Sustainable Development act (2000)

It is a general document of address presenting the outcomes of thematic working groups during a national conference which took place in Rome on November 22nd 2016, organized by the Ministry of environment and Ministry of Education. In the working groups where working civil society and institution representatives. The focus was on the role of education about thematic issue and both involved Ministry affirm their engagement in the development of those outcomes.

Memorandums of understanding on environmental education and sustainable development in schools within the framework of the PON Scuola 2014-2020.

Second national conference on environmental education and sustainable development (2016) at the end of which two ministers signed a national charter on the subject, drawn up with the contribution of hundreds of authoritative experts and senior representa-

A strong involvement of the school world in the deepening of the knowledge of environmental issues, stimulating the sensitivity of children and adolescents to make them protagonists of experiences in direct contact with nature.

tives of institutions, institutions, associations, companies and universities.

Indications for the Curricula: new scenarios (2018)

The document gives greater importance to the issue of citizenship, as a true background integrator and reference point of all disciplines, competing to the definition of the curriculum of the kindergarten and the first cycle of education in a vertical perspective.

National Strategy for Sustainable Development (2017)

Strategic framework of reference of sectoral and territorial policies in Italy, drawing an important role for institutions and civil society in the long implementation process, which will last until 2030. The SNSvS is rooted in a renewed global framework, aimed at strengthening the often fragmented path of sustainable development worldwide. The Strategy is the first step towards declining at national level the principles and objectives of the 2030 Agenda for Sustainable Development, adopted in 2015 at the UN level of Heads of State and Government, assuming the 4 guiding principles: integration, universality, transformation and inclusion.

Education for sustainable education plan of the Ministry of Education (2017)

The aim is to transform the education and training system into an agent of

change towards a model of sustainable development, making sure that each of the areas of intervention of the Ministry should be coherent with the 17 objectives of the Agenda 2030. The Sustainability Education Plan was drawn up in 20 actions, grouped into four macro-areas: structures and construction; teaching and training of teachers and teachers; university and research; information and communication.

Screening of possibilities for implementation of ESD/MoE in curricula of technical and professional institutes

PROFESSIONAL Institutes

The paths of the professional institutes foresee that, at the end of the school cycle, the students are supposed to be able to:

- Recognize the geographical, ecological, territorial aspects of the natural and anthropic environment, the connections with the demographic, economic, social and cultural structures and the transformations that have occurred over time;
- Master the use of technological tools with particular attention to the protection of the environment and the territory, knowing how to apply the regulations that influence the processes for the protection and enhancement of the environment and the territory.

Results

Learning Outcomes – general findings

TECHNICAL Institutes

Results regarding SDG 11 – Sustainable cities & communities

- Provide access to safe, convenient and sustainable transport for all, improving road safety, expanding public transport and paying particular attention to those in sensitive situations.
- Reduce the negative environmental impact per capita, paying special attention to the air quality and waste management
- Support positive economic, social and environmental reports between urban, sub-urban and rural areas through the strengthening of urban planning at national and regional level.
- Sustainable resilient buildings and spatial planning (building materials, energy saving, planning processes)

Results regarding SDG 12 – Responsible consumption & production

- Eco-friendly management of chemicals and waste through their life cycle, according to international standards, and substantially reduce the release of these in the air, water and soil, so that their negative impact on human health and the environment be minimal
- Encourage companies, especially multinationals or large ones, to adopt sustainable practices and to integrate these practices into their regular reports
- Ensure that every human being acquires awareness of sustainable development and lifestyles in harmony with nature.

Results regarding SDG 13 – Climate action

- Strengthen resilience and adaptability to climate and natural disasters in all countries.
- Integrate measures to combat climate change in national policies, strategies and plans.
- Improving teaching and awareness raising, enhancing the capacities of citizens and institutions on climate change in terms of mitigation, adaptation, impact reduction and early warning

Results regarding SDG 15 – Life on Land

- Ecology: competition, predator-prey, community dynamics, energy flow through food webs, dispersal and ranges
- Specific ecosystems – local and global native ecosystems and also human-made ones, e.g. managed forestry plantations
- Threats to biodiversity: habitat loss, deforestation, fragmentation, invasive species and overexploitation (caused by unsustainable production and consumption practices, unsustainable technologies, etc.)
- The dangers of extinction: Individually endangered species, how extinction is forever, the long time needed to form species, and the six mass extinctions
- Restoration of wildlife and seeing humans as a healing force

As recalled by the educational, cultural and professional profiles of the student at the end of the second cycle of

education and training for technical institutes, the learning outcomes common to all the paths foresee that the students are able to:

- Recognizing the geographical, ecological, territorial aspects of the natural and anthropic environment, the connections with the demographic, economic, social, cultural and transformational structures that have occurred over time;
- Mastering the use of technological tools with particular attention to the protection of the person, the environment and the territory.

As regards the paths of the technological sector, it is expressly recalled that the student is able to orientate himself in the legislation that governs the production processes, with particular attention to the protection of the environment and the territory and that he/she can recognize the ethical, social, scientific implications, economic and environmental production of technological innovation and its industrial application.

For a more detailed depiction of the possibilities of implementation of MoE in various curricula of technical institutes, please refer to: <https://www.ouralps.org/en/resources/moecurriculuaimplementazioneitalytechnicalinstitutes>

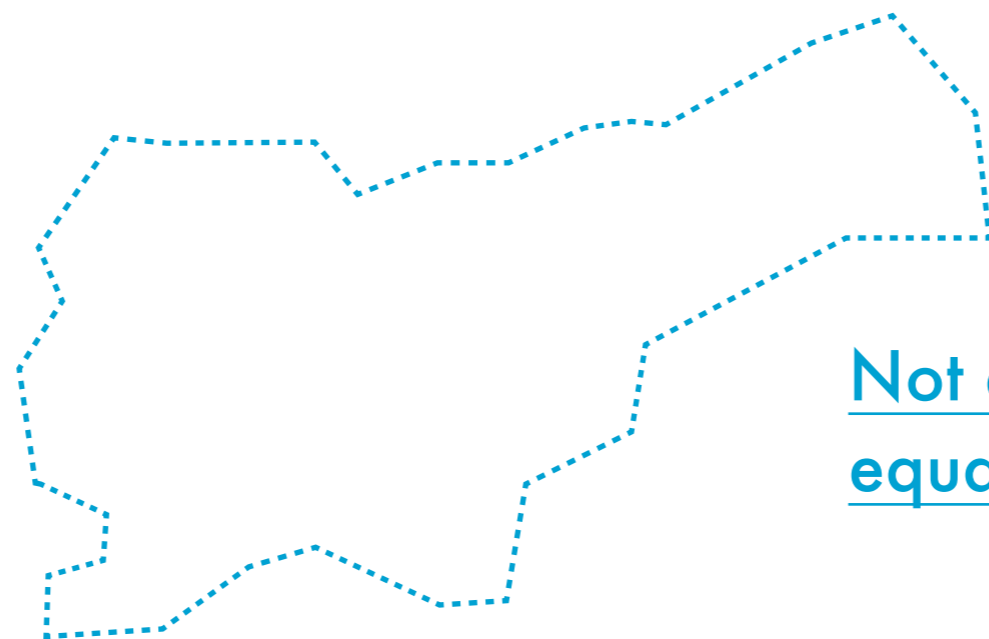
General findings & shortcomings

At the current state, the institutional framework on Sustainable development (SD) and Education for Sustainable Development (ESD) at national level in Italy is characterised through various documents but still not articulated in documents refining the implementation phase within a systemic set of criteria and indications. Both at formal and non-formal educational context can be anyway registered several best practices provided by scholastic institutions and non-formal organizations in education of Sustainable development.

Recommendations for implementation

- Facilitate networks and collaborations between those involved in sustainable development and of sustainability education also in order to promote concrete actions for the dissemination of knowledge and skills, lifestyles and production models sustainable consumption;
- Formulate proposals for the dissemination of sustainability education addressed to each degree of higher education and training;
- Propose actions for the development and support of research and teaching university oriented towards sustainability;
- Provide informal and non-formal educational tools on ESD
- Training of teachers, from the central administration to access to the University, from teaching to research
- Setting guidelines for Sustainable Development Education.

The context of ESD in Slovenia



Not all students in Slovenia encounter equal education according to ESD

Education for Sustainable Development (ESD) was developed in 2005 on the foundation of a pre-existing curriculum for Environmental education. A grade later, Slovenia received a translation of international documents from the UNECE on Strategy for Education for Sustainable Development and the Quality Criteria for ESD-Schools (Breiting et al. 2006). These two documents led to the establishment of the ESD Group, which developed the Guidelines for Education for Sustainable Development (2007), which is still the core national document in this field. On the basis of this document, the Ministry of Education then authorized the National Education Institute to incorporate the elements of sustainable development into the new and renewed curricula for elementary and secondary school. Thus, in 2006–2010, an ESD umbrella document was created as well as proposals for curricula (objectives and standards of knowledge) divided into three-grade plans for elementary school and gymnasium. Environmental education, which was a cross-curricular thematic area with its own goals and contents, had to be included in individual subjects, inter-curricular discussion and various out-of-school

activities (Marentič Požarnik 2010). When doing that, the interweaving of environmental, social, economic and cultural aspects and the complexity of objectives was greatly considered, e.g. developing the ecosystem and creative thinking (Orel 2011).

Optional subjects prepared for this topic were: environmental education for elementary schools and environmental studies for gymnasiums. Despite the fact that the subjects enable pupils and students to gain knowledge of all sustainable development aspects, the review group rejected the proposed title which was Environment and sustainable development. The subjects are carried out in a small number of schools, which means that not all pupils and students have equal education in the field of sustainable development.

Screening of possibilities for implementation of ESD/MoE in curricula of vocational schools

Selected relevant documents considered for assessment & findings In addition to the documents listed below, the implementation of the ESD concept in formal education has also been significantly influenced at

national level by the Sustainable Development in School and Kindergarten magazine (which ceased publication in 2014), the consultation on the principle of sustainable development (2010), a sub-regional international meeting of UNECE (on the topic of teacher competencies for the quality of ESD), various innovation and research projects, and seminars for teachers and educators on the subject of ESD.

1 Kriteriji kakovosti za šole, ki vzgajajo in izobražujejo za trajnostni razvoj (Vodnik za dvig kvalitete vzgoje in izobraževanja za trajnostni razvoj) (Quality Criteria for Schools that Train and Educate for Sustainable Development (A Guide to Raising the Quality of Education for Sustainable Development)) by Zavod RS za šolstvo, 2008 (National Education Institute Slovenia, 2008)

The publication is intended for school authorities and schools dealing with education for sustainable development (ESD = VITR). It presents a list of quality criteria that should serve as basis for thinking and discussion and future development in the field of ESD. The list is intended for representatives of school authorities, teachers, principals, parents and pu-

pils/students. The proposal of quality criteria is one of the results of the project in the Comenius III European Network "School Development through Environmental Education" (SEED).

2 Smernice vzgoje in izobraževanja za trajnostni razvoj od predšolske vzgoje do douniverzitetnega izobraževanja (Educational guidelines for sustainable development from pre-primary to post-secondary education) by Ministrstvo za šolstvo in šport, 2007 (Ministry of Education and Sport, 2007):

The document explains that education for sustainable development has a central place in the development of education in the Republic of Slovenia. The main purpose of the guidelines is to emphasize the importance of education for sustainable development and to demonstrate the opportunities for achieving sustainable development in formal, non-formal and informal learning. The guidelines set out goals that will contribute to the realization of education for sustainable development; the principles that we take into account in achieving the aforementioned goals; explain how the proposed guidelines can be

used in education at the level of kindergartens and schools. It explains how the written guidelines will be implemented at the Ministry of Education, various public institutes, non-governmental organizations and local communities. The document also contains the proposed measures for various stakeholders in the field of education for sustainable development (for kindergartens and schools, education of professionals etc.). The document states that when implementing the content of sustainable development in education, Slovenia relies on the following international documents:

- UNECE Strategy for Education for Sustainable Development (adopted at the High-level meeting, Vilnius, 17–18 March 2005).
- Resolution 57/254 on the United Nations Decade of Education for Sustainable Development (2005–2014), 2002.
- Draft International implementation scheme for the United Nations Decade of Education for Sustainable Development (2005–2014), UNESCO, 2005.
- World Programme for Human Rights Education, United Nations, 2004.

For the purposes of the optional subject Sustainable Development, which includes 102 hours in secondary vocational programs, a catalogue of knowledge and a textbook were prepared.

- "Our common future", the World Commission on Environment and Development –Brundland Commission, 1987.

3 Strategija vzgoje in izobraževanja za trajnostni razvoj UNECE (UNECE Education Strategy for Sustainable Development) by Ekonomska komisija za Evropo, Odbor za okoljsko politiko, Srečanje na visoki ravni ministrov za izobraževanje in okolje, 2005 (Economic Commission for Europe, Committee on Environmental Policy, High Level Meeting of Ministers for Education and the Environment, 2005): Education for sustainable development develops and strengthens the ability of individuals, groups, communities, organizations and countries to make assessments and decisions in favor of sustainable development. It can promote changes in people's thinking and thus enable them to contribute to improving the safety, health and prosperity of our world, thus improving the quality of life. Education for sustainable development can provide individuals with the ability to think critically and to raise awareness and more power, thus enabling the exploration of vi-

sions and concepts and the development of new methods and tools.

The aim of this strategy is to encourage UNECE Member States to develop ESD and integrate it into their formal education systems, in all relevant school subjects, and in non-formal and informal education. This will give people the knowledge and skills they need for sustainable development, strengthen their skills and confidence, and increase their chances of pursuing a healthy and productive life that is consistent with nature and will take into account social values, gender equality and cultural diversity.

The document contains the objectives of the strategy, principles, the implications of integrating the SD into education, activities towards SD on the international and national level, etc.

4 Strategija razvoja Slovenije 2030 (Development Strategy of Slovenia 2030) by Vlada RS, 2017 (Government of the Republic of Slovenia, 2017): The strategy explains Slovenia's development base, the main goals of the strategy, the development goals of Slovenia, the implementation and monitoring of the development strategy of Slovenia. In the publication, 12 development goals are presented in detail: **1.** Healthy and active life; **2.** Knowledge and skills for quality living and work; **3.** Decent life for all;

4. Culture and language as fundamental factors of national identity; **5.** Economic stability; **6.** A competitive and socially responsible corporate and research sector; **7.** Inclusive labor market and quality jobs; **8.** Low-carbon economy; **9.** Sustainable management of natural resources; **10.** Trustworthy legal system; **11.** Safe and globally responsible Slovenia; **12.** Effective management and quality public services, as well as a proposal / plan on how we will achieve these goals by 2030.

5 Bela knjiga o vzgoji in izobraževanju v RS 2011 (White Paper on Education in the Republic of Slovenia 2011) by Ministrstvo za šolstvo in šport, 2011 (Ministry of Education and Sport of the Republic of Slovenia, 2011) All chapters deal with individual areas of the education system, with the exception of the introductory text which includes general questions and consists of three parts: four basic general principles with explanations, common goals of education (which are supplemented by specific objectives in the chapters of individual fields) and challenges and strategic orientations, which analyze analytically the exposed general issues of education in Slovenia and propose basic strategic orientations. Among the strategic challenges and orientations of the education system, knowledge and sustainable development are mentioned first.

Incorporation of SDGs of interest in school subjects

The following lists comprise subjects of technical and vocational education and training in Slovenia for the programmes ...

- Agricultural-entrepreneurial Technician
- Creator of Fashion Clothing
- Food Processing Technician
- Forestry Technician
- Horticultural Technician
- Nature protection Technician
- Construction Technician
- Environmental Technician
- Chemical Technician (Technical environmental protection)
- Economic Technician
- Mechatronics Technician context?

... in which ESD is already implemented and therefore also holds potential for the implementation of MoE. For a more detailed description including addressed professional competencies as well as (in) formative learning objectives for each respective SDG of interest, please refer to <https://www.ouralps.org/en/resources/moecurriculumimplementationslovenia>

Vocational education and training (VET)

The competencies students should gain in the field of sustainable development were developed and confirmed as part of vocational standards for VET (2011 - 2015, Centre for Vocational Education). The competencies were developed on the basis of the belief that all the jobs can become "greener", and therefore competencies for sustainable development, which include environmental, social and economic responsibility, can be integrated across-the-board in VET.

For the purposes of the optional subject Sustainable Development, which includes 102 hours in secondary vocational programs, a catalogue of knowledge and a textbook were prepared. The latter comprehensively comprises the aspects of nature, economics and society along topics such as mobility, consumerism, healthy lifestyle, preservation of natural and cultural values, social inclusion, and participation. It is designed to include experience-based tasks for students (Klemenc et al. 2010).

There were also several school networks that promote the goals and principles of sustainable development – among which one is composed of secondary and higher education centres that establish a holistic approach to sustainable development (Community of Higher Vocational Schools of Slovenia – also project observer of YOURALPS project).

Results

Results regarding SDG 11 – Sustainable cities & communities
SDG 11-related so-called Key Alpine sustainable development goals are implemented in the following subjects in technical and vocational schooling in Slovenia:

- Sustainable development
- Civil engineering structures

- Environmental law
- Environmental protection Management of natural resources and residues
- Management of potable and industrial water
- Modern economy
- Natural landscaping and urban planning
- Organic waste treatment and maintenance of biological wastewater treatment plants
- Renewable energy technologies and environmental impacts
- Soil quality and spatial management
- Basics of landscape design
- Waste management Wastewater management

Results regarding SDG 12 – Responsible consumption & production
SDG 12-related so-called Key Alpine sustainable development goals are implemented in the following subjects in technical and vocational schooling in Slovenia:

- Sustainable development
- Environmental protection
- Environmental protection and the economy
- Management of natural resources and residues
- Management of potable and industrial water
- Modern economy
- Nature protection law and ethics
- Organic waste treatment and maintenance of biological wastewater treatment plants
- Processing of secondary raw materials and construction waste
- Renewable energy technologies and environmental impacts
- Waste management Wastewater management

Results regarding SDG 13 – Climate action
SDG 13-related so-called Key Alpine sustainable development goals are implemented in the following subjects in technical and vocational schooling in Slovenia:

- Sustainable development
- Air protection and chimney sweeping
- Efficient energy use
- Environmental protection
- Management of natural resources and residues
- Meteorology and oceanography

Results regarding SDG 15 – Life on Land
SDG 15-related so-called Key Alpine sustainable development goals are implemented in the following subjects in technical and vocational schooling in Slovenia:

- Sustainable development
- Animal husbandry
- Agricultural machinery for (crop production and) animal husbandry
- Plant protection
- Crop production
- Agricultural machinery for crop production (and animal husbandry)
- Biological analyses and monitoring
- Ecosystems, implementation of activities in an area and bioremediation
- Environmental protection
- Technical environmental protection
- Forest ecology
- Forest farming and protection
- Forest landscape management
- Materials and the environment
- Management of natural resources and residues
- Nature guiding
- Protection of natural values
- Study of earth's crust
- Wood and its properties
- Woody biomass production

ESD is formally included in curricula of primary educational programs, gymnasium and vocational educational programs and adult education programs.

General findings & shortcomings

In 2016 the Education Institute of the Republic of Slovenia carried out an analysis of curricula and curricular documents. The findings showed that:

- Sustainable development is predominantly included as an additional/optional subject, or topic in the curriculum and textbook, rather than pervading other topics and intertwining through the entire program.
- Sustainable development is not taught as a broad and comprehensive concept, and the topics of environmental protection predominate. Certain environmental categories are poorly represented or are not adequately addressed (sustainable mobility, sustainable construction, and circular economy), but are defined only in one or two curricula (ecosystem services, planetary constraints, green technology and green jobs). The social and economic component of sustainable development is neglected, in the latter, it lacks the inclusion of recent theories and the critical treatment of consumer behaviour.
- There is a prevalence of lower taxonomic levels of teaching goals in relation to higher ones.
- On-off environmental campaigns prevail at schools, only a small part of the activity is aimed at changing the thinking and introducing the so-called systematic approach of the area of sustainable development.

In short, ESD is formally included in curricula of primary educational programs, gymnasium and vocational educational programs and adult education programs. Topics of ESD are well represented in the efforts of non-formal educators, who have compiled quality educational materials that can be used by formal educators to enrich their lessons.

Recommendations for implementation

a)

Reorienting education and learning so that everyone has the opportunity to acquire the knowledge, skills, values and attitudes that empower them to contribute to a sustainable future.

b)

Strengthening education and learning in all agendas, programmes and activities which promote sustainable development.

Based on the review of educational programs in Slovenia the following recommendations were drafted:

- ESD should be offered as an obligatory subject in primary and secondary schools and should also be present as a concept that binds together different topics in other subjects.
- SD should be taught as a broad and comprehensive concept, where environmental protection, social and economic components should be equally represented.
- Sustainable mobility, sustainable construction, and circular economy as well as ecosystem services, planetary constraints, green technology and green jobs should be present in the curricula.
- Teaching goals in the individual SD topics should aim to achieve higher taxonomic levels.
- SD campaigns in schools should be long term and systematic in order to achieve the desired effects on students.

Teaching contents

Integrating critical issues in curricula such as climate change, biodiversity, disaster risk reduction, sustainable consumption and production.

Pedagogy and learning environments

Choosing interactive and learner-centred teaching methods, which enable action-oriented teaching and learning. The use of learning environments - both physical and virtual - to inspire learners to work towards sustainability.

Learning outcomes

Promoting learning and developing key competencies such as critical and systematic thinking, collaborative decision making, and taking responsibility for the present and future generations.

Social transformation

Empowering learners of all ages, in any learning situation, to transform themselves and the society in which they live.

- Facilitate the transition to greener economies and societies.
- Equip learners with the skills necessary for green jobs.
- Motivate people to adopt environmentally sustainable lifestyles.
- Empower people to become "global citizens" who engage and take on active roles, both locally and globally, to face global challenges and solve them, and ultimately become those who proactively contribute to creating a more just, peaceful, tolerant, inclusive, safe and sustainable world.

General Recommendations

Clearly, the status quo of MoE and ESD is different throughout the Alpine territory. However, there are some crucial recommendations, which are valid for all countries and all types of schools. Establishing MoE in the public school system will be a complex process, which can be regarded as a transition itself. Since school systems and political structures are massively diverse even throughout the Alps, it is only possible to give general recommendations and highlight directions in which the national actors should steer in order to advance the formalisation of MoE. The following five directions will be critical if MoE is to be established successfully in the public school system:

1

From learning about nature to learning in nature

Instead of solely cognitive and theoretic knowledge acquisition, MoE should be included in projects of educational institutions during regular school time as well as during leisure time. This requires updated training and resource spaces for teachers (virtually and physically), educational excursions and pedagogical activities in mountain regions. The learning potential of nature in general and mountains in particular is far from being exhausted.

2

From input-oriented to outcome-oriented curricula

Instead of being an input guidance for teachers, curricula should exclusively be designed as student-centred documents which deliberately describe the learning outcomes and competencies which are to be developed. Rather than addressing teachers, curricula should be primarily addressed to students and their concerns.

3

From nice-to-have to absolute-must-have status

MoE and ESD should be formalised in the school system, which could result in obtaining the rank for a teaching principle (AT), having a particular space in the PETD (FR), being legitimized through official documents of the Ministry of National Education and Youth (FR), established in individual subjects (AT) or with establishing partnerships with external experts from NGOs, protected areas or business representatives (GER).

4

From rigid and sluggish to flexible and adaptive

Recent scientific discussions, current societal challenges and critical issues take too long to find their way into formal education. Invasive species, ecosystem services, climate change adaptation are only some of many examples which have a direct impact on young people's lives but will take decades until they are covered in school books. Hence, some space in the education standards of each grade should remain reserved for current approaches and topics.

5

From greening and harmonizing young people to empowering critical thinkers and doers

MoE should aim at the development of key competencies such as critical and systemic thinking, collaborative decision making, and taking responsibility for the present and future generations. Instead, far too many programmes simply aim at infiltrating young people to do "the right thing". Therefore, innovative MoE is not about greening youth but empowering critical thinkers and doers who iteratively question the status quo, think like "global citizens" and are equipped with skills necessary for green jobs which enable them to act locally in their personal lifeworld.

1

Building a theoretical fundament

Based on extensive research it is crucial to build a theoretical fundament which deals as the basis for future developments, point of orientation for resources, lesson plans, activities, trainings and argumentative backbone of the MoE approach. MoE is not to be understood in competition with ESD or EE but rather as an approach to valorise the regional ESD learning potential in mountain regions. In the context of a sustainable and updated concept, it is of utmost importance that all subsequent developments are not only informed by the theoretical fundament but also indicate feedback loops which lead to theoretical progress. If the theoretical fundament is instable, the success of the rollout of MoE is endangered. School authorities, educators and young people are all critical souls by nature and will not, in no country, take up new and seemingly approaches without reason. Therefore, a rock-solid theoretical base is crucial for the practical implementation.

2

Collecting practical experiences and co-developing resources

Theory and practice should not be regarded in their dichotomous relation but as interdependent and complementary perspectives and sources for bilateral progress. In the early stages of rolling out MoE, practical experiences, practitioners' points of view and the aspect of co-development is crucial to ensure that MoE will not be limited to an academic audience but find its way into the hands of educators. Therefore, consortia and coalitions between theoretically firm and practically experienced individuals are key. Also, collecting practical experiences should inform the theoretical development, especially in the early stages.

3

Co-designing programs for teacher education and teacher training

Rolling out MoE requires an entry-point into the formal education system. Teacher education programs are usually linked to universities and therefore close to cradles of innovation. Confronting future teachers with new techniques, new approaches and tools and the opportunities of MoE as a default setting, might be more promising than changing long established routines of experienced educators. Undoubtedly, MoE also bears the potential for teacher training with experienced educators. In order to ensure that MoE is understood similarly throughout the Alpine territory, a collective development of a teacher training program at international level is necessary. It is critical for the success of such a training program to highlight the fact that MoE is not just another EE approach but has the potential to link all subjects under the umbrella of sustainable developments, lift the regional learning potential of a region in the mountains and trigger the development to make outdoor education elements a standard in students' everyday life.

4

Continuous measures aiming at formalisation and political acceptance

Since the education systems are diverse, the options to formalise MoE at national level are manifold. Obviously, there is no one-size-fits-all solution at this level. Education is regulated very differently throughout the Alpine territory and the advancement of MoE is diverse. However, it is certainly recommendable in all countries to build coalitions with various stakeholders and together demand a stronger position of MoE through formalising it in the public school systems. Possible coalitions certainly include formal and non-formal educators, NGOs, protected areas, small- and medium business (SMEs) but may also involve churches, universities as well as political parties. While an entry point to teacher education and teacher training is usually not connected with bigger obstacles, advancing MoE towards the curriculum requires endurance, promising networks and regular pitching.

5

The perfect is the enemy of the good

Like sustainable development itself, advancing MoE is not a linear process towards a clear set goal. More likely, it is an iterative process which is constantly flowing. In order to ensure that the ongoing process is oriented towards improving the status quo of MoE it is crucial to constantly monitor and evaluate the advancement of MoE, observe the impacts as well as the effectiveness of policy strategies and actions and continuously involve key actors like young people, educators and school authorities in order to ensure a multi-perspective look at the development of MoE

Action plan

Since the progress in establishing new educational practices and approaches is closely linked to the political strategy and colour but also to the organisational responsibility, political authority and societal debate in a country, there are tangible differences in the advancement of MoE throughout the alpine territory. The following actions can be regarded as a plan valid for all countries, yet, the starting point as well as the level of detail might be different. However, it is understood as an iterative and adaptive process for all national contexts and should not be understood as a linear path but rather as a cyclical process. The authors of this report propose the following steps in order to implement MoE in formal education.

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