

Vocational Education for Sustainable Development and the Goal of a Carbon-Neutral Economy



German Federal Association
for Sustainability

Imprint

Suggested citation:

Bundesvereinigung Nachhaltigkeit e.V./German Federal Association for Sustainability (Editor). Baptista da Luz, Rui Alberto: Vocational Education for Sustainable Development and the Goal of a Carbon-Neutral Economy. Berlin 2022

Editor:

Bundesvereinigung Nachhaltigkeit e.V./
German Federal Association for Sustainability
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Berlin, April 2022

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Core theses of this study

1. ESD is the key.

Education for Sustainable Development (ESD) changes people's awareness and delivers future sustainably-minded skills required for transition.

2. Future VET must integrate Sustainability.

The merge of Education for Sustainable Development (ESD) with Vocational Education and Training (VET) to a concept of Vocational Education for Sustainable Development (VESD) will provide “future-proof jobs and skills training for the transition” and a “globally competitive and resilient industry”, two core benefits promised by the European Green Deal.

3. VESD is an efficient tool to help re-orient businesses.

VESD increases the acceptance, efficiency, and reliance of VET across Europe and trains employees to be able to perform sustainably across all sectors. It thus can influence the creation of a carbon-neutral economy and the reorientation of businesses in Europe.

4. VESD combined with Erasmus+ is a boosting factor to achieve the Green Deal goals.

The implementation of a Vocational Education for Sustainable Development in the EU needs market-ready VESD trainings for both, trainers/teachers in the VET sector and employees, and a means to expand VESD across the EU.



Abstract

The European Union has established a strategic plan to become carbon neutral by 2050. Research has shown that reducing greenhouse gas emissions is a successful way to achieve such a goal, and one way to do so is by changing business approaches and people's awareness to become more carbon-efficient. This study analyzes how Education for Sustainable Development can influence a transition to a carbon-neutral economy and thus re-orient businesses in Europe.

Based on a review of the literature on education, training, sustainable development, the requirements of carbon-neutrality and the requirements by the European Green Deal on "future-proof jobs and skills training for the transition" the study wants to focus on a concept of Vocational Education for Sustainable Development (VESD) by applying Education for Sustainable Development (ESD) to Vocational Education and Training (VET) and combine this with the opportunities given by the European Union program Erasmus+. Its applicability was analyzed and its challenges were further tested by scrutinizing how a German project on VESD and the Erasmus+ program were able to contribute to deliver and disseminate the concept as a strategy for transition towards carbon-neutrality.

The results indicate that the practical and project-oriented methodologies of Vocational Education for Sustainable Development can create awareness and make people change their mentalities and attitudes to become more carbon-efficient. The mentioned VESD project "ANAKO" and the Erasmus+ program can benefit the concept by re-skilling trainers with the competencies for Sustainable Development and by serving as a catalyst for successful VESD programs across the members of the European Union. Nevertheless, additional research is needed to identify how VESD can be expanded globally and to verify the concrete results and effects of projects like ANAKO on the employees of companies.

Keywords: Education, Training, Development, Economy, Emissions, Sustainability, Carbon-neutrality, European Green Deal, Green jobs, Transition



Zusammenfassung

Die Europäische Union hat einen strategischen Plan aufgestellt, um bis 2050 kohlenstoffneutral zu werden. Forschungen haben gezeigt, dass die Verringerung der Treibhausgasemissionen ein erfolgreicher Weg ist, um dieses Ziel zu erreichen. Eine Möglichkeit, dies zu erreichen, besteht darin, die Ansätze der Unternehmen und das Bewusstsein der Menschen zu verändern, um kohlenstoffeffizienter zu werden. In dieser Studie wird untersucht, wie Bildung für nachhaltige Entwicklung den Übergang zu einer kohlenstoffneutralen Wirtschaft beeinflussen und somit die Unternehmen in Europa neu ausrichten kann.

Basierend auf einer Sichtung der Literatur zu Bildung, Ausbildung, nachhaltiger Entwicklung, den Erfordernissen der Klimaneutralität und den Anforderungen des Europäischen Grünen Deals an "zukunftsichere Arbeitsplätze und Qualifizierung für den Übergang" konzentriert sich die Studie auf das Konzept der Beruflichen Bildung für Nachhaltige Entwicklung (BBNE), indem sie Bildung für Nachhaltige Entwicklung (BNE) auf die Berufsbildung anwendet und diese mit den Möglichkeiten des EU-Programms Erasmus+ kombiniert. Die Anwendbarkeit des Konzepts wurde analysiert und seine Herausforderungen wurden weiter geprüft, indem untersucht wurde, wie ein deutsches Projekt zu BBNE und das Erasmus+ Programm gemeinsam dazu beitragen könnten, das Konzept als Strategie für den Übergang zur Klimaneutralität zu vermitteln und zu verbreiten.

Die Ergebnisse zeigen, dass die praktischen und projektorientierten Methoden der Beruflichen Bildung für Nachhaltige Entwicklung ein Bewusstsein schaffen und die Menschen dazu bringen können, ihre Mentalität und Einstellung zu ändern, um kohlenstoffeffizienter zu werden. Das erwähnte BBNE-Projekt "ANAKO" und das Erasmus+ Programm können hierzu beitragen, indem sie berufliches Ausbildungspersonal mit den Kompetenzen für eine nachhaltige Entwicklung ausstatten und als Katalysator für erfolgreiche BBNE-Programme in den Mitgliedsstaaten der Europäischen Union dienen. Dennoch sind weitere Forschungsarbeiten erforderlich, um herauszufinden, wie BBNE weltweit ausgeweitet werden kann und um die konkreten Ergebnisse bzw. die Wirksamkeit von Projekten wie ANAKO bei den Mitarbeitenden von Unternehmen zu überprüfen.

Keywords: Bildung, Ausbildung, Entwicklung, Wirtschaft, Emissionen, Nachhaltigkeit, CO2-Neutralität, Europäischer Grüner Deal, Grüne Berufe, Transformation



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List of abbreviations

BVNG	Bundesvereinigung Nachhaltigkeit e.V. / German Federal Association for Sustainability
CBE	Competency-Based Education
CNE	Carbon-Neutral Economy
COP	Conference of the Parties
CVET	Continuous Vocational Education and Training
DESD	UN's Decade of Education for Sustainable Development
EKA	Erasmus+ Action Plan
ESD	Education for Sustainable Development
EU	European Union
GHG	Greenhouse Gas
ISCED	The International Standard Classification of Education
IVET	Initial Vocational Education and Training
JTM	Just Transition Mechanism
OBE	Outcome-Based Education
SD	Sustainable Development
SDGs	Sustainable Development Goals
UN	United Nations
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
VET	Vocational Education and Training
WCED	World Commission on Environment and Development
WBL	Work-based Learning



Editorial

A cross-over activity of the German Federal Association for Sustainability is Education for Sustainable Development (ESD). As part of the UN Decade for Sustainable Development 2005-2014, an attempt was begun to identify aspects of Education for Sustainable Development and integrate them into the overall spectrum of national education in Germany. In this respect, there has been significant developmental progress in early childhood education, school education at secondary levels 1 and 2 and study content, but not in the framework of Vocational Education and Training (VET). This is more serious because for a large part of civil society, at least in Germany, Austria and Switzerland, the period of vocational education and training is the determining period for later life, because it is during this time that possibilities and options for action are formed.

Since 2015, the area of VET has therefore become the focus of the educational activities of the German Federal Association for Sustainability, also because there was still no comprehensive understanding of this within the economy as one of the central pillars of sustainability. Only since the activities of the FridaysFor-Future movement has this understanding grown at both, the general public and the business community which is increasingly understanding its responsibility for achieving sustainability and climate goals. Above all, it also understands the need to question and transform supply chains, production processes and, not least, business models. Sustainability is the prerequisite for companies to have a perspective for the future.

Integrating relevant sustainability aspects into VET is one side of the coin; teaching this content is the other. Here, the educational staff in VET has a special mediating role, which on the one hand consists of making sustainable action comprehensible through concrete examples and clarifying what "sustainability" means in concrete terms. Not only, but above all, commercial vocational work is an important key to the implementation of necessary and sustainable innovations in production, crafts and services. Trade plays a key role between producers and consumers: it connects consumer demand with sustainably produced products.

Even the innovative development of individual work processes such as the sustainable procurement of materials, products and services can ensure transformation. However, the attention to sustainable products, sustainable aspects of the manufacturing process, logistics, distribution, recyclability and the needs of customers is a decisive factor for transformation.

Since 2016, the German Federal Association for Sustainability, together with other partners and with funding from the German Federal Ministry of Education and Research and the support of the German Federal Institute for Vocational Education and Training (BIBB), has developed a further training concept for training staff in VET, which didactically took up the elements of Education for Sustainable Development and designed them methodically in such a way that the different and certainly wide-ranging aspects of sustainability can be linked to the immediate professional actions of trainees and employees.



A marketable further education product has now emerged from the further education concept for training staff: ANAKO, an German acronym for "Trainer with Sustainable Competences".

With the support of BIBB the further training project has been involved in paving the way to create an integrated model for VESD in the German VET structure. The success of ANAKO and the other related projects under the BIBB programmes have led to include sustainability as one of the major cross occupational competencies, called the "Standard Occupational Profile Items". This inclusion is a major innovation in German VET and has become a kind of a revolution.

The United Nations Sustainable Development Goals (SDGs) play a central role in understanding the systemic interrelationships of sustainability. At the UNESCO 2021 World Conference on Education for Sustainable Development, the basis project for ANAKO was the only German project to be presented to a wider professional public as an example in the field of Vocational Education for Sustainable Development (VESD) and attracted a great deal of attention. During the presentation, the Vice-President of the Federal Association for Sustainability introduced the demand into the discussion that the opportunity to complete an internship abroad with Erasmus+ should not be missing from any vocational training that wants to call itself sustainable.

This study investigated how the concept of Vocational Education for Sustainable Development can be systematically strengthened through the integration of didactic and methodological elements of Education for Sustainable Development, disseminated throughout Europe as a blueprint through Erasmus+ and ultimately contribute to the success of the European Green Deal.

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I. Introduction

In the following chapter, a brief introduction to the context and relevance of the topic of this research is given. Then, the research gap is identified and the main research question as well as concrete research topics to help answering the research question are formulated. Finally, the structure of the research and the research methodology are presented.

I.1. Context and Relevance of the Topic

Unprecedented and drastic changes are occurring, and humanity is the main culprit. Earth's ecosystems have changed due to human activities to the extent that our very survival is threatened. Climate change is growing more sudden, and the effects of natural events are more apparent and harder to control. Global temperatures have kept increasing since 1975, while global resources extracted yearly have doubled since 1980. This scenario cannot continue. Opportunity is ceasing, and there is an urgent need for change. (UNESCO, 2020, p. 6)

The future issue of climate change has become a 'now' issue.

So far, weak promises have characterized climate action, yet they have not been fulfilled. The pledges have only shrunk emissions by 7.5 % from predicted 2030 levels, a far cry from the 30 % reductions necessary to stay on the path to reduce for the average global temperature for 2°C, and 55 % needed for 1.5°C. (United Nations Environment Plan, 2021, p. XV)

There is a necessity to intervene and create strategies that can work internationally. The European Union (EU) has committed to becoming the first climate-neutral continent by 2050 (European Parliament, 2019). This commitment is an ambitious plan to tackle climate change and bring resilience to human actions (Amanatidis G. & Randic, 2020, p. 10). To achieve this goal, the EU's Commission has presented the Green Deal action plan, a roadmap to bring sustainability and well-being of citizens to the forefront of policymaking (European Commission, 2019b, p. 2). The plan aims to transform the EU's economy for a sustainable future (European Parliament, 2020). Such a sustainable development plan requires drastic changes to "modernize" the economy and bring welfare to its citizens (European Commission, 2019a, p. 4).

Therefore, creating Vocational Education and Training programs focused on sustainable development factors can be a solution in preparing Europe's contingent for a sustainable future and path the way to a Carbon-Neutral Economy (CNE). Hence, the intention of this study is to analyse the possibility of implementing Vocational Education fir Sustainable Development and how to expand ist across the EU.



I.2. Context and Relevance of the Topic

One way of addressing the climate change crisis could be if workers are trained to perform sustainably. As business models must change, so do the workers' mentality and skills (Arbuthnott, 2009, p. 153). Since there is a need for more sustainably-minded technicians, applying the Education for Sustainable Development (ESD) to the Vocational Educational and Training (VET) programs could help reduce emissions and thus contribute to carbon neutrality. The lack of academic literature about applying ESD in the VET sector to achieve Vocational Education for Sustainable Development (VESD) emphasizes the need to provide further investigation. It is further to be investigated if and how VESD can become an efficient tool to help re-orienting businesses and how projects like ANAKO and the Erasmus+ program can contribute to the success of fostering VESD.

This research aims to answer the following research question:

How can Education for Sustainable Development influence the creation of a carbon-neutral economy and re-orient businesses in Europe?

To be able to answer this research question further investigation on the following topics is required:

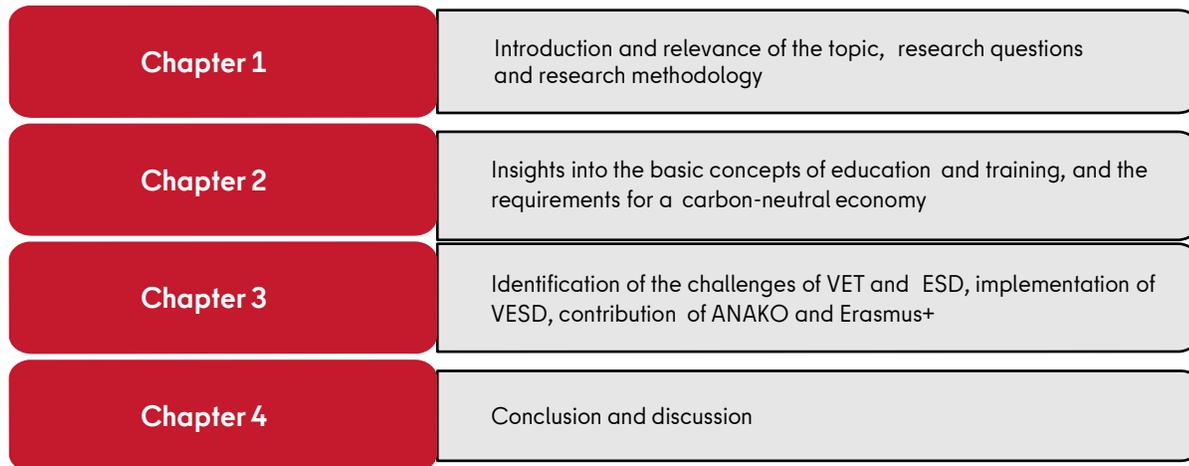
- What is the purpose of education?
- What are the challenges of education?
- What is VET, and what are its key concepts?
- What role does VET already play in the EU (purpose and limitations)?
- What is ESD?
- What are the differences between sustainability, sustainable future, and sustainable development?
- What is a carbon-neutral economy?
- What is the EU's Green Deal?
- What can the ESD bring to the VET (=VESD)?
- How can the VESD help to re-orient businesses?
- What does ANAKO bring to VESD?
- What is the ANAKO approach to vocational training?
- How can ESD increase the acceptance, efficiency, and reliance of VET across Europe?
- What is the Erasmus+ program?
- What role does the Erasmus+ have in enhancing sustainability across Europe?
- How can the Erasmus+ promote VESD and contribute to a carbon-neutral economy?



1.3. Structure of the study and research methodology

This thesis is divided into the following four chapters, which are oriented towards answering the research question and investigating the required topics:

Figure 1: Structure of the Thesis



In **chapter one**, the context and relevance of the topic are described, and the acute need for action is made clear. Then the research gap is explained, a research question is set, and the investigation topics are formulated. Finally, the research methodology is presented.

In **chapter two**, the knowledge foundations of the thesis are presented. First, the basic concepts of education are examined. Secondly, the research proceeds by having a look at the current concepts of Vocational Education and Training (VET). Lastly, the concept of Education for Sustainable Development (ESD) is presented.

In the second part of the chapter, the requirements for a carbon-neutral economy are explained. The basic definitions and the positions of the United Nations in tackling climate change as well as the European Union ambition to become the first carbon-neutral continent are then presented.

The research is based on the literature review of the relevant specialist literature, reports, and journal articles. As this research looks at current topics, which develop and update quickly, websites dealing with the topics were also analysed. It is to be noted that due to the COVID-19 restrictions, access to academic literature was limited, and therefore the research is mostly based on the sources available online.

In **chapter three**, the basic knowledge foundation is brought together to elaborate a concept on how VET and ESD can support the transition to a carbon-neutral economy.



The analysis proceeds with the implications that the ANAKO project and the Erasmus plus have on disseminating and multiplying the concept across EU member states.

Therefore, the research described in chapter two provides information to deduct a concept combining VET and ESD. First, the challenges in each one are examined. Then it is established how a transition from VET to Vocational Education for Sustainable Development (VESD) can provide the required competencies for the transition to a carbon-neutral economy and the main challenges of its implementation. Furthermore, the ANAKO project and the EU's Erasmus+ program are analysed as possible solutions to address these challenges. Since the ANAKO project is still being developed, its project management, expectations, goals, and objectives are analysed to show its possible contribution to the implementation of VESD in Germany. Then Erasmus+ program is analysed to show its capabilities to act as a possible catalyst to export and transfer projects, enhance cooperation, and change mentalities to foster VESD across the EU.

This chapter is based on deductive research of the previous topics of VET, ESD, and the prerequisites for a carbon-neutral economy. The information on the ANAKO project is taken from a not yet published concept paper and online sources and the information on the Erasmus+ program is from online sources such as reports of the European Commission.

Chapter four offers a conclusion that summarises and discusses the central results of the thesis. Finally, limitations of the work are presented, and recommendations for further research are given.



II. Education and the requirements for a carbon-neutral economy

This chapter will first provide insights into the basic concepts of education and training. Secondly, the requirements for a carbon-neutral economy will be presented as well as the position of the UN and EU towards reducing greenhouse gas emissions.

II.1. Education - learning, training and sustainable development

The following chapter will present the most relevant literature on education, Vocational Education and Training (VET), and the notion of Education for Sustainable Development (ESD). It will start with an overview of the basic concepts of education, and then it will proceed to the analyses of the VET systems in general and the German case in particular. Also related to the VET sector, an insight into the EU's program of Erasmus+ will be presented. Lastly, the concept of ESD will be explained.

II.1.1. Basic concepts of education

Throughout the years, thorough investigations and studies have been done into researching the process of learning, yet none could concisely explain how students learn (Cannon & Newble, 2000, pp. 1-2). Although in 1976, investigation shifted to the learner side, until then, only the teacher and the teaching perspective were being considered (Cannon & Newble, 2000, pp. 1-2). This resumes why most of the reviewed literature strongly indicates that the learner's perspective was neglected in traditional education forms.

The teacher-centered approach to education

Traditional education is considered a one-sided process of education that is mainly a content-intensive approach, where the teacher is instructing, and the learner is memorizing (Babu, Gnanasivam, Manimaran, & Nakkeeran, 2018, p. 1484). In this traditional approach to education, teachers are predominantly concerned about developing assessment methods to determine and measure what and how much students can learn (Cannon & Newble, 2000, p. 1). Such a teaching method, which is purely transmitting information to the student, focussing on lectures that are curriculum-centered, happening mainly in a formal setting, is often described as teacher-centered approach to education (Babu et al., 2018, p. 1484).

One common characteristic of the teacher-centered approach is related to its attitude to the learning process. Learning, in a simple way, should be the process whereby new knowledge, skills, and values are acquired, but thoroughly, learning should also mean a process that requires a deep cognitive process (Sterling, 2001, p. 20).



Instead, the traditional teacher-centered approach has the implicit philosophy of *no pain, no gain* (Langer, 1993, p. 43). It relies on a static conception of information, typically conveyed through absolute language, and facts are presented without context or perspective but taken as truth (Langer, 1993, p. 43). This is considered to be a surface-approach to learning (Fry, Ketteridge, & Marshall, 2009, p. 11). It involves the intention of just memorizing information, disregarding any distinction or comparison between new ideas and pre-existing knowledge, only to accomplish a specific proposed task or assessment without even questioning it (Fry et al., 2009, pp. 10-11). Such a way of teaching could allow students to have the impression that there has been a profound learning achievement, but it might just result from a mere superficial cognitive process. In such cases, learning of facts occurs without setting a meaningful framework or future applicability (Fry et al., 2009, pp. 10-11).

The student-centered approach to education

The approach to learning, which values deep levels of cognitive processing, and where learning is a process of acquiring the highest level of meaning, is referred to as the deep- approach (Fry et al., 2009, pp. 10-11). In this approach, facts are learned, compared with the pre-existing knowledge and ideas, and critically analysed (Fry et al., 2009, pp. 10-11). In other words, the deep-approach to learning implies that on one side, the student is being able to comprehend and critically analyse the facts or the information that is being presented, and on the other side, it indicates that the teacher is being able to transform information into knowledge. Evidence shows that teachers who favour deep-approach to learning will encourage a student-centered approach to teaching (Fry et al., 2009, pp. 10- 11).

Evidence shows that a student-centered approach brings practicability and applicability to education (Cannon & Newble, 2000, p. 17). Unlike most conventional didactic teaching, the student-centered approach focuses on student responsibility and activity instead of emphasizing teacher control and academic content (Cannon & Newble, 2000,

p. 17). This approach to education, of transforming knowledge into understanding, requires interaction, debate and has student participation at its core (Sainy, 2018, p. 1). Learning with the student-centered approach is understood as more than just passing an exam and the student becomes part of the content (Sainy, 2018, p. 1). Therefore, learning cannot be dealt with as being an insulated process (Fry et al., 2009, p. 8). It is about change and changing people and hence, it should integrate people and empower them, give them a specific set of skills by bringing them to specific situations to develop them (Fry et al., 2009, p. 8). Here, the role of the teacher is to be a guide, mentor, and facilitator of learning (Cannon & Newble, 2000, pp. 17-18).



The reviewed literature favours a shift to the student side of education (Cannon & Newble, 2000, p. 18). However, the authors suggest that it is necessary to move education towards the students to allow such change (Cannon & Newble, 2000, p. 18). The student-centered approach to learning favours a learning process that can occur everywhere, while the teacher-centered approach confines the learning to formal settings and fixed teaching venues (Cannon & Newble, 2000, p. 18). Nevertheless, non-formal and informal learning is a crucial part of education, and such forms of learning do not take place in formal institutional settings, like schools and colleges (Singh, 2015, pp. ix-x). Instead, they occur primarily in workspaces or other institutional gatherings (Singh, 2015, pp. ix-x).

Under the umbrella of the student-centered approach to education, there is a type of teaching that favours both deep-approach learning and a non-formal and informal education style, known as Outcome-Based Education (Spady, 1994, p. 14). Here, purposes, learning, accomplishments, and outcomes are most important (Spady, 1994, p. 14). Outcome-Based Education (OBE) is a flexible, empowerment-focused approach to learning (Babu et al., 2018, p. 1484). Learners receive training that equips them with the knowledge, skills, and orientations to succeed after leaving the institution (Babu et al., 2018, p. 1484). As a result, OBE strives to develop competent future citizens (Babu et al., 2018, p. 1484). This method should be based on a framework that prioritizes skills orientation and competency building instead of focusing only on theoretical knowledge input (Sainy, 2018, p. 3).

The increase in popularity of OBE has been attributed to the changing needs of the education system, where more emphasis is being placed on student learning and not merely on degrees (Sainy, 2018, p. 1). OBE is designed to increase learners' knowledge and skills (Babu et al., 2018, p. 1485). Through OBE, people whose academic or career paths were stifled by the lack of assessment of their prior knowledge or because their qualifications were not recognized for further learning and employment could discover new opportunities (Babu et al., 2018, p. 1485). Contrary to input-based education, where input processes are emphasized, the outcome is positively accepted (Sainy, 2018, p. 1). Two purposes are at the heart of OBE: firstly, developing clear learning outcomes around which the academic system can be woven, and secondly, creating situations and occasions that motivate students to achieve pre-determined learning outcomes (Sainy, 2018, p. 1).

Another student-centered approach to education referred to in the reviewed literature is Competency-Based Education (CBE). The CBE degree programs are considered a contemporary product because they leverage technological advancements to design student-centered ways to qualifications. Here, a focus on competencies has been shown to assist adult students, acknowledging a student's previous learning and focusing on performance rather than time spent in class. The CBE offers online formats, multiple learning activities, and the ability for students to learn and demonstrate competency requirements at their own pace.

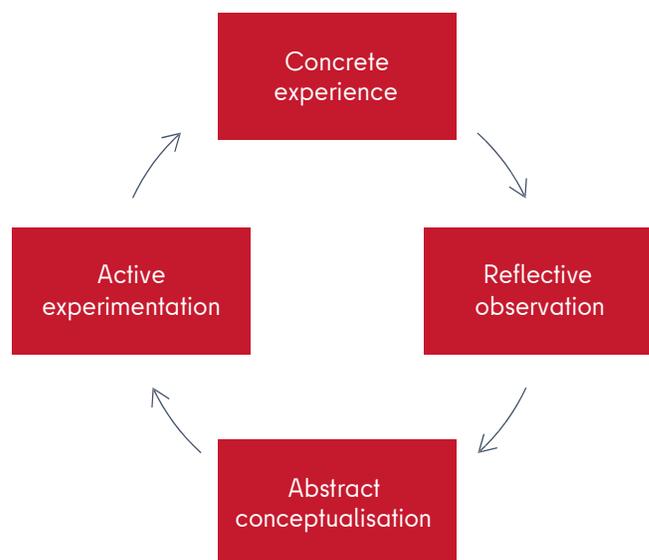


Its focus is on applying what they know instead of evaluating what is taught. Therefore, students must demonstrate their ability to apply their knowledge in various contexts beyond mere knowledge acquisition. (Klein-Collins, 2013, p. 5)

Looking at the 21st century, one can see that learning does not come only from books. Being qualified requires theoretical and practical knowledge. Typically, the term competence describes the relationship between knowledge and its practical application in CBE programs. Direct assessment programs are based on demonstrations of learning, not on accumulated credit hours. Therefore, students who take the course and study independently are not required to accumulate credit hours throughout the course, but must show through competency-based assessments that they know and can do the tasks to graduate. As a result, assessments are at the very essence of the whole CBE. (Klein- Collins, 2013, pp. 4-7)

Finally, there is a third student-centered approach that is based on the idea that the experience should play a central role during the learning process. This is known as Experience-Based Learning. The basis of experiential learning is the idea that knowledge is not a fixed or unchangeable part of thought, and that experience can contribute to its formation and reshaping. The experiential learning process implies that each person brings his or her knowledge, beliefs, and practices to the learning situations, which are then altered or shaped by experiences. (Fry et al., 2009, p. 15)

Figure 2: The Kolb Learning Cycle



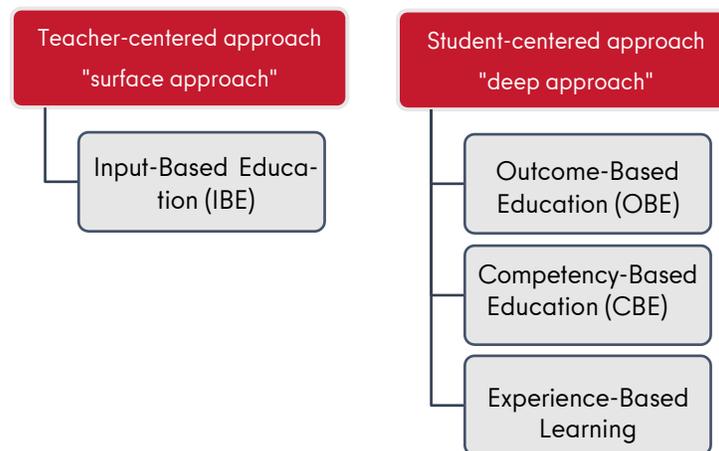
Own illustration based on (Fry et al., 2009, p.15)



The four competencies a student needs for the experimental learning to be successful are described in the *Kolb Learning Circle* by Fry et al. (2009, p.15) (see figure 2). First, the students need to have a new concrete experience in which they are engaged fully and freely. Second, they should have enough time and space for reflection to approach their experience from several perspectives. As a third requirement, they must organize, reformulate, and integrate their ideas into sound, logical theories and take ownership of them. Feedback from others can significantly influence the middle two elements. And this also relates to the fourth point: making decisions and problem-solving with enhanced understanding and testing implications and expectations in new situations based on enhanced understanding. This process does not simply involve experiencing something or actually doing it, but it also involves reflecting, analyzing and overthinking, and sometimes making improvements for the next time. (Fry et al., 2009, pp. 15-16)

In figure 3, the teacher-centered and the student-centered approaches with their different concepts of education are summarized.

Figure 3: Basic concepts and approaches of education



Own illustration based on (Babu et al. 2018, p. 1484; Fry et al. 2009, pp. 10-16; Klein-Collins, 2013, p. 5)

II.1.2. Current concepts in Vocational Education and Training (VET)

The UNESCO defines Vocational Education and Training (VET) as learning experiences which are relevant to the world of work and can occur in formal, non-formal and informal educational settings, taking place in schools or workplaces (Catts, Falk, & Wallace, 2011, p. ix). Vocational education aims to prepare learners with knowledge, skills, and competencies relevant to specific occupations, in some cases, VET programs can include work-based learning elements, such as apprenticeships or dual-system programs (UNESCO, 2011, p. 16).



Upon completing the VET program, the student is awarded a qualification recognized by the national authorities or the labor market as occupationally oriented (UNESCO, 2011, p. 16). Unlike education, training teaches workers how to use equipment safely, be more efficient, and comply with safety, health, and environmental regulations (McKeown, 2002, p. 16).

VET can be divided into two different types of training and target groups. On the one hand, there is Initial Vocational Education and Training (IVET), which provides young people with skills and competencies to enter the labor market and to sustain their employment prospects. Hence, IVET is designed to provide the practical skills and knowledge required for employment in specific occupations. The main factor is to reduce unemployment among young people and to provide a skilled labor force. On the other hand, there is the Continued Vocational Education and Training (CVET), which is an essential component of adult education. Lifelong learning through CVET contributes to both economic performance, competitiveness and enhances individual development and career opportunities. CVET refers to training courses occurring separately from the normal daily work activities that are organized by a specialized trainer or training institution as well as training courses that take place during working time. In both IVET and CVET, work-based learning is essential. In-house training as a form of learning contributes to the upskilling that is essential for specific jobs or work environments by emphasizing a learning-by-doing approach. On-the-job training is an important, and often a more flexible form of employer-provided training. (CEDEFOP, 2020a, pp. 25-45)

However, a common problem regarding VET programs in several countries is the lack of uptake of the offerings, due to the perception of VET as a low alternative to education. The common preference to pursue a higher degree is largely influenced by the often unrealistic expectation of receiving a higher social status. In the Mediterranean countries, VET systems are generally programs that provide lower-level qualifications, and apprenticeships are a form of vocational training for school drop-outs. Stereotyping of vocational careers, apprenticeships, or VET programs as well as gender stereotypes serve as additional obstacles to career guidance since they discourage youngsters from pursuing such careers and limit their overall choices. The current assessment strategies and elitist culture tend to erode the scope for career guidance, jeopardizing the very concept of educational guidance. (Deitmer, Hauschildt, Rauner, & Zelloth, 2013, p. 79)

The VET system in Germany

The education system in Germany generally emphasizes learning on the job, and work-based learning plays a major role in many VET programs. Therefore, the dual VET system is a highly attractive model for preparing students for the transition from school to work, and it produces high employment rates for its graduates.



There are a variety of VET programs available that are more focused on school-based lessons and others that place more emphasis on work-based learning. In Germany, VET includes IVET and CVET, and its dual system approach is considered to be a successful approach leading to high-quality vocational credentials. Federal and state governments share responsibility for the education system in Germany. Although the Federal Ministry of Education and Research (BMBF) is responsible for matters relating to vocational education, the Federal States are responsible for school education, resulting in differences in program titles, duration, and curricula between the Federal States. (CEDEFOP, 2020b, pp. 21-24)

In the German education system, dual vocational training is considered a distinctive feature, highlighted by German industrial culture, as it contributes considerably to the country's competitiveness (Deitmer et al., 2013, p. 233). The cornerstone of the German VET system are professional internships (CEDEFOP, 2020b, p. 22). This is because it is critical for the development of vocational competency that working experience is acquired (Deitmer et al., 2013, p. 233). But experience alone does not suffice, nor does impart theoretical knowledge about specific subjects and for this reason, VET requires a combination of professional experiences and theoretical knowledge (Deitmer et al., 2013, p. 233). In the dual-VET system, apprenticeships are offered by firms and public institutions. In this system, apprentices are remunerated by their employers during in-company training. The apprentice remuneration increases with each year of training and varies according to the type of occupation. Due to their large numbers, SMEs play an important role in vocational training. However, they are often hindered by a lack of up-to-date infrastructure and qualified trainers, which makes them inadequate in this role. (CEDEFOP, 2020b, pp. 24-25)

An apprentice may attend vocational school as an alternative to the training in the workplace. This way, apprentices gain theoretical and practical knowledge related to their chosen occupation at school and in the workshop. There are common standards in both settings, and final exams are conducted by the chambers and regulated by law. Hence, learners have to demonstrate a variety of competencies and perform practical tasks, and by successful completion, a vocational qualification is awarded, giving them access to the labor market as skilled workers. (CEDEFOP, 2020b, pp. 24-25). German entities have acknowledged that their dual approach is hard to copy. There are important factors such as cultural differences, customs, lack of resources, underestimation of the importance of VET by locals, among other factors, which can lead to different and far-fetched goals. As a social construct, dual approaches are influenced by specific historical backgrounds. (Deitmer et al., 2013, pp. 91-92)

In 2017, in the EU, 27.9% of upper secondary VET students were enrolled in a combination of work-based and school-based training programs (CEDEFOP, 2020a, pp. 27-28). The numbers were considerably higher in Germany, where they reached 87,2% (CEDEFOP, 2020a, p. 28)



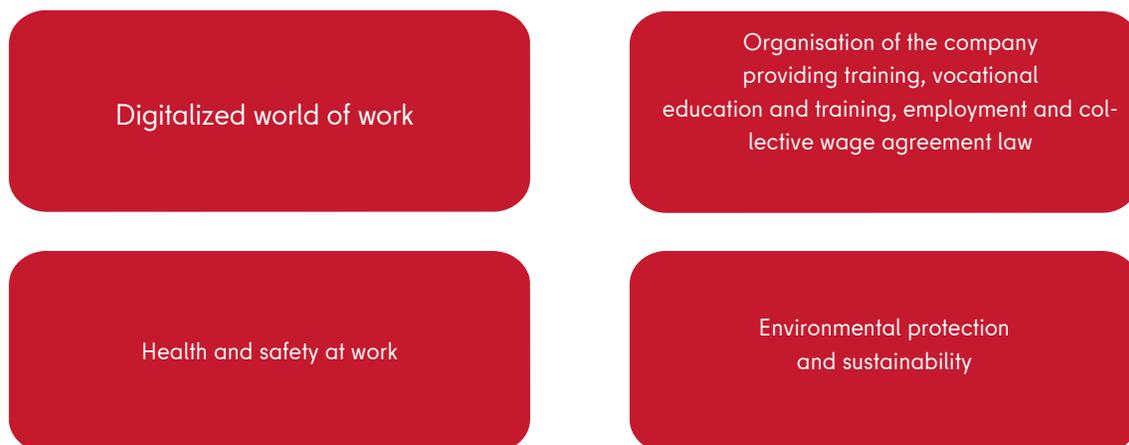
VET systems, like many social systems, are not receptive and resistant to implementing comprehensive and innovative VET approaches (Deitmer et al., 2013, p. 92). As a consequence of the German policy papers, it was demonstrated that systemic development is a key area in the future of VET cooperation, which considers various approaches and governance modes that are key to improving efficiency and effectiveness (Deitmer et al., 2013, p. 92). Designing VET projects is nowadays characterized by diversity and building on local structures (Deitmer et al., 2013, p. 92). Work-based learning and the involvement of the private sector can then be accommodated (Deitmer et al., 2013, p. 92)

German new standard job profile positions

The former German Minister of Education and Research, Anja Karliczek, stated that with the already running national Digital Education Space strategy, digitalization and sustainability will be a subject for all apprentices, in all sectors. Therefore, promoting digital skills in all areas of training is also integrated into the High-Tech Strategy 2025 plan. (BMBF, 2021). The German Federal Institute for Vocational Education and Training Board (Bundesinstitut für Berufsbildung - BIBB) has modified the standard occupational profile positions specifically for this purpose and they apply to all training regulations. Therefore, there are now modernized standard job vocational positions in all training occupations. Training content, which is identical for all training occupations, aims to ensure that trainees can acquire skills across all professions within a modern, future-oriented training initiative, which will provide them with the skills to be future specialists of tomorrow in a changing world of work, in order to be permanently employable. (BIBB, 2022)

Since August 2021, the whole spectrum of vocational training regulations includes modernized and new binding requirements for the so-called, *Qualifying Four*. All occupational training has to apply to the four standard occupational profile positions. (BIBB, 2022)

Figure 4: The Qualifying Four



Own illustration based on (BIBB, 2022)



As shown in figure 4 one of the four requirements of The Qualifying Four by BIBB (2022) is the *Digitalized World of Work*. It refers to thoughtful use of digital media and data, communicative and social skills in collaborative work in virtual spaces, self-directed learning methods, as well as social diversity and mutual appreciation. The requirement of *Organisation of the company providing training, vocational education and training, employment and collective wage agreement law* consists of the knowledge of the structure and organization of the training company, the central components of the training contract, and the possibilities for professional advancement and development of the basic content of every training regulation. *Health and safety at work* are about the correct handling of possible occupational hazards, consideration of ergonomic working methods, and mastery of measures to prevent psychological and physical stress. Furthermore, the fourth element, *Environmental protection and sustainability*, is about improving sustainable actions considering economic, ecological, and social aspects in the working environment. (BIBB, 2022).

II.1.3. Education for Sustainable Development (ESD)

The definition of sustainable development having most consensual acceptance within the reviewed academia results from the report of the World Commission on Environment and Development (WCED) that was part of the UN's General Assembly taking place in 1987, and states the following:

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. [...] In essence, sustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations. (United Nations, 1987, para. 1-15)

The world became aware of sustainable development after the WCED report, known as the 1987 Brundtland Report—named after the Norwegian Harlem Gro Brundtland, the woman who has chaired the WCED. The Brundtland Report was the turning point on how environmental problems were being addressed. Until then, the focus was only on environmental protection and dealing with environmental problems like pollution. The *Brundtland Report* brought sustainable development to the discussion, suggesting that the environmental problems had to be addressed also regarding its relation to social and economic factors. (Pauw, Gericke, Olsson, & Berglund, 2015, p. 15694)

The holistic approach of sustainable development

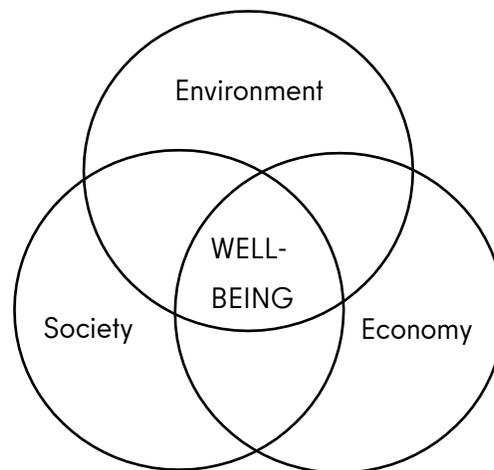
According to Pauw et al. (2015, p.15694) the UNESCO has brought sustainable development to the global agenda in order to foster and increase action towards a sustainable future. To enable this, UNESCO has specified specific subtopics for the economic, environmental, and social factors of sustainable development:



- **Environmental factors:** natural resources (biodiversity, energy, water, agriculture), development of rural areas, sustainable urbanization, disaster prevention, as well as mitigation (Pauw et al., 2015, p. 15694);
- **Social factors:** health, HIV/AIDS, and governance, as well as human rights, peace, and human security (Pauw et al., 2015, p. 15694); and
- **Economic factors:** economic growth, corporate accountability, and poverty reduction (Pauw et al., 2015, p. 15694).

As shown in Figure 5, in the holistic approach of sustainable development by McKeown (2022, pp. 9-10) sustainable development inter-correlates environmental, social, and economic factors. Considering that those three factors are identical circles overlapping each other the central overlapping area would be Human well-being. Hence, the more they become aligned, the bigger the human wellbeing area. (McKeown, 2002, pp. 9-10)

Figure 5: The Holistic approach of Sustainable Development



Own illustration based on (McKeown, 2002, pp.9-10)

The concept of education for sustainable development (ESD)

Each year, people consume more resources than the planet can generate - if people continue with today's lifestyle, three planets earth will be needed by the year 2050. This shows that the current lifestyle is not sustainable and an urgent change is necessary. Education is seen to be an essential mechanism to reach long-lasting change. (UNESCO, 2021, p. 1)



Since the UNs *World Summit on Sustainable Development* in 2002, sustainable development (SD) has been a topic that nations and institutions are taking more seriously, and, since then, ESD has gained considerable support and attention (Calder & Clugston, 2003, pp. 34-35).

Most ESD program goals are about creating awareness about the long-term impact that human actions have in the ecosystem and trying to change the mentality of the people in order to act towards environmental resilience (Arbuthnott, 2009, p. 153). The goal of ESD is it therefore, to ensure a sustainable future by changing the way we educate our children and ourselves” (Green & Little, 2009, p. 172). It is important to understand though that education alone does not directly correlate with environmental awareness or consumption patterns because evidence shows that the highest ecological footprint¹ belongs to the most educated countries (McKeown, 2002, p. 10). A change in attitude is therefore not only a question of the quantity of education, but also of its appropriateness and relevance, and ESD holds the vision of integrating environment, economy, and societal factors in this process (McKeown, 2002, p. 14).

With a combination of pedagogic approaches and delineations between the education of peace, citizenship, development, demography, human rights, and environmental, ESD aims in changing the ways in which children and adults learn to think, value, and act (Green & Little, 2009, p. 172). To enhance this necessity to change, the UN has declared the Decade of Education for Sustainable Development (DESD) from 2005 to 2014, and during this period, Regional Centres of Expertise on ESD were established across the world (Arbuthnott, 2009, p. 152). The main objective of DESD was to ensure a more sustainable future in environmental, social, and economic terms by integrating principles, values and activities which are naturally linked to sustainable development into all forms of education and learning and helping to bring about a change in values, attitudes and behaviors (UNESCO, 2007, p. 5). Moreover, even though SD has different meanings in different countries, the common focus of environmental conservation was universal (Arbuthnott, 2009, p. 152). Through education, the Regional Centres of Expertise intended to inspire the global population to actively pursue environmentally sustainable practices. (Arbuthnott, 2009, pp. 152-153)

According to UNESCO, all forms of education should be used as an effective tool for changing values, attitudes, and lifestyles to achieve a sustainable future and just societies. Thus, the DESD aimed to provide national governments with the opportunity to rethink and reorient various dimensions of education, training of skills, and training in sustainable development. The learning process is therefore relevant to real-life situations, encouraging learners to view the world from the perspective of sustainability. In order to allow that, the DESD aimed to progress towards the facilitation of network building and the exchange of interaction among stakeholders in ESD, increasing the quality of education and learning in ESD and offering opportunities for countries to incorporate ESD into education reform efforts. (UNESCO, 2007, 5-6)

¹ Find more information about the concept of the ecological footprint in chapter 2.2.1 Defining Carbon Footprint and Carbon Neutrality



ESD approach to learning

To address the holistic approach of SD issues, the DESD was launched to educate the young generations by introducing ESD across the formal education systems. As a result, the concept of ESD is now recognized as a global movement, and its understandings, as well as, its approach have also changed during the process. (Pauw et al., 2015, p. 15695)

However, during its implementation, it was possible to identify that ESD has two essential features: content and pedagogy. Those features are discussed across the ESD literature and its approach, visibility, and recognition have been increasing along with its approaches to teaching and its program content applicability. (Pauw et al., 2015, p. 15696)

The content of ESD is very diverse, but the most relevant topics are climate change, poverty reduction, and consumption. This content is interdisciplinary and it is important to understand the complexity of SD issues. In ESD literature, this is called a holism or holistic approach and it encompasses social, cultural and environmental factors. In ESD, all three dimensions are emphasized, as well as the interaction over time and space. In this holistic approach, social and cultural factors are often seen as the root causes of environmental problems. That's because the economic, social, and environmental goals of individuals and societies often conflict with each other. In addition to spanning over multiple disciplines, these conflicts also touch local and global perspectives, as well as past, present, and future generations. (Pauw et al., 2015, p. 15696)

ESD activities usually use the UN's Sustainable Development Goals² as content because its 17 goals cover all levels of sustainable development and can be applied to strengthen learning in all activities that promote sustainable development (UNESCO, 2020, p. 12).

Regarding the content applicability, and considering that ESD needs an ever-changing attitude, there is an "education needs to transform itself" (UNESCO, 2020, p. 9) kind of approach. Nevertheless, the UNESCO defines ESD as a model for endowing students with the knowledge, skills, values and attitudes needed to make informed decisions and to ensure environmental integrity, economic viability, and justice in society for present and future generations while respecting cultural diversity (UNESCO, 2020, p. 8). ESD, therefore, strengthens the cognitive, social, emotional, and behavioural dimensions in a lifelong learning process (UNESCO, 2020, p. 8). ESD is distinguished by its holistic and transformative approach and encompasses learning content, learning outcomes, pedagogy, and the learning environment.

Furthermore, ESD is considered to be the primary driver of all SDGs, and its purpose is to transform society (UNESCO, 2020, p. 8).

² Find more information about the Sustainable Development Goals in chapter 2.2.2 United Nations' Position on Tackling Climate Change



The process of teaching and learning is another essential component of ESD. As part of the ESD's teaching tradition, there are three fundamental holistic aspects: connecting environmental, social, and economic aspects of SD issues, integrating their past, present, and future implications, and emphasizing their local, regional, and global nature. (Pauw et al., 2015, p. 15696)

Therefore, in ESD, skills and competencies for sustainability are developed. When dealing with SD issues, the pedagogy of pluralism acknowledges and engages different perspectives, views, and values. As a result of the complexity of such issues and conflicts of interests, predefined solutions are impossible to teach. Rather than providing the "right" answers, ESD emphasizes the importance of reflection. Using this progressive and transformative pedagogical approach, students learn to critically evaluate alternative perspectives and use student-centered approaches such as value-based learning, participatory decision-making, critical thinking, and multi-method approaches to learning. Learning ESD involves facilitating learning in such a way that students develop competencies they can apply to sustainable development based on their own observations. (Pauw et al., 2015, p. 15696)

Environmental, economic, and social development is more than a knowledge base. As well as seeking sustainable livelihoods, participating in a democratic society, and living sustainably, it identifies perspectives, learning skills, and values that guide and motivate people (McKeown, 2002, p. 16).

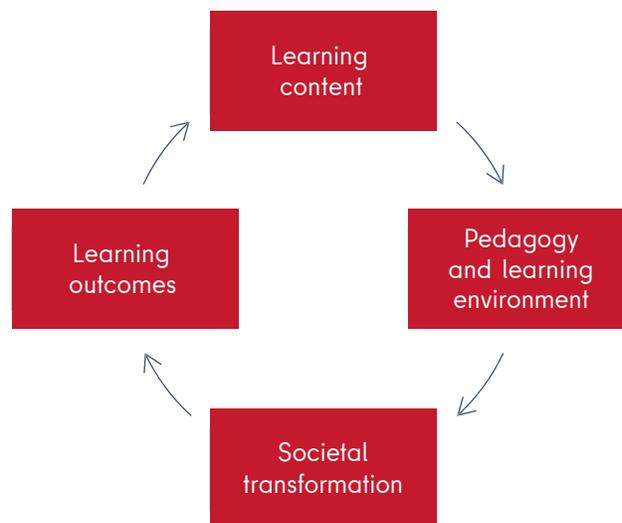
According to McKeown (2002, p. 13), there are four major forces to kickstart ESD: creating awareness, developing public understanding, improving primary education and training, and re-orienting existing education to address sustainable development.

Moreover, the aim of ESD is to increase knowledge, awareness, and action. Therefore, it emphasizes learning in behaviour, emotional, and cognitive dimensions. The emotional dimension of learning aims to build sustainability values, cultivate empathy for others and the planet, and inspire change. The cognitive dimension of learning provides insights to understand the interconnected challenges of sustainability to explore ideas and alternatives. The behavioural dimension of learning aims to encourage people to take-action for sustainable transformation of the political and social spheres. (UNESCO, 2020, p. 17)

Figure 6 shows the vision of the UNESCO regarding the ESD learning cycle. The cycle shows how ESD is considered to be the enabler that can perpetuate SD into an iteration of learning and societal transformation by empowering people with competencies for SD. (UNESCO, 2020, p. 8)



Figure 6: Learning Cycle of ESD



Own illustration based on (UNESCO 2020, p. 8)

Starting with the *Learning content* that has to be applied in all formal, non-formal, and informal learning settings, it should comprise the topics entrenched in the SDGs. This way, ESD can raise awareness of the SDGs in education settings, promote a deep understanding of the SDGs, and encourage action to achieve the SDGs. The *Pedagogy and learning environment* encourage interactivity and a project-based learning environment and focuses on a student-centered approach. This level of the cycle incentivizes transformation in all aspects of learning to bring the learner to experience the content, acknowledge the issue, and be part of the solution. This will encourage *societal transformation*, the next phase of the learning cycle. Here the objective is to build a more sustainable world and to foster the achievement of the SDGs. As for the *learning outcomes*, they mark the end of a learning cycle while ensuring the beginning of a new cycle of ESD. This intrinsic know-how will indoctrinate people to act and develop a sense of accountability for present and future generations. (UNESCO, 2020, p. 8)

In order to keep fostering ESD, a new framework was elaborated called *ESD for 2030*. (UNESCO, 2020, pp. 8-9). Through pursuing the *ESD for 2030*, the UN aims to create a world in which learners worldwide have the chance to acquire the competencies needed to promote SD, achieve the SDGs and experience SD in an institutionalized approach to ESD, and that educators worldwide have the opportunity to develop capacities to foster societal transformation for a sustainable future. (UNESCO, 2020, pp. 22-23)



II.2. Requirements for a Carbon-Neutral Economy (CNE)

This chapter presents the basic terms required to understand the causes of climate change, like the carbon footprint as well as the requirements to reach carbon neutrality. Further on, the UN's position on climate change and the EU's position on becoming the first continent to reach carbon neutrality by 2050 will be presented.

II.2.1. Defining carbon footprint and carbon neutrality

Carbon footprint

Most human actions generate, direct or indirectly, emissions of greenhouse gases (GHG). Those GHGs have a direct impact on the climate. The calculation of how much GHG emissions are caused by a particular action is known as the carbon footprint. Hence, the term carbon footprint indicates the impact on climate change caused by someone's actions. The carbon footprint calculation is used to show companies, organizations, or states their impact and contribution to climate change. (European Investment Bank & European Investment Fund, 2008, p. 3) Measuring the carbon footprint is important to overview the general GHGs emissions and define where they can be reduced or even eliminated. Therefore one of the best strategies to reduce carbon emissions is to know first where and how much people's actions actually contribute to that. (Amanatidis & Randic, 2020, p. 24)

Calculating the direct GHGs emission of one specific action does not necessarily show its carbon footprint. Most of the emissions cannot be directly measured. In order to have an efficient measurement, it is better to use an estimate and use data from the emissions of previous activities. This process of using the average calculation of previous activities as comparable data of one activity is called emission factors. For example, when calculating the carbon footprint of one specific car trip, several aspects are considered, but it could be measured considering different factors, leading to entirely different measurements for identical actions. One method considered to be "one of the most accurate and precise" for carbon footprint calculation is the *Bilan Carbone*. (Amanatidis & Randic, 2020, pp. 24-25)

Carbon neutrality

In order to achieve carbon neutrality, it is necessary to have a balance between carbon emission and carbon absorption in the atmosphere. Carbon absorption or carbon sequestration is removing carbon oxide from the atmosphere. Carbon sequestration occurs in carbon sinks, which absorb more carbon than they emit. Those are primarily natural resources like oceans and forests. On the other hand, to reach net-zero emissions, it is necessary to remove all the GHG produced from the atmosphere and create a balance between carbon emission and carbon sequestration.



According to the estimates of the European Parliament, the annual global emissions in 2019 amounted to 38.0 Gigatons, whereas the natural sinks only remove between 9.5 and 11 Gigatons of CO₂ per year. In order to reach climate neutrality, it is therefore essential to reduce carbon emissions in the first place. (European Parliament, 2019)

One way of reducing carbon emissions is using Clean Development Mechanisms (CDM). The CDM was presented in the Kyoto Protocol of the UNFCCC and was to be used to reduce GHG emissions “indirectly”. The main idea is that parties can reduce their emissions by developing projects at someplace in the world that would contribute to carbon reductions and use that amount being reduced to offset their general emissions. That way, parties could meet their goals by helping and financing projects contributing to reducing GHG emissions. (United Nations Framework Convention on Climate Change, 2018, pp. 11-12)

Offsetting emissions makes it possible to reduce emissions in one sector through investments, like new renewable energy sources, by focusing on energy efficiency or developing other clean, carbon-efficient technologies. One example of an offsetting carbon scheme is the EU’s Emissions Trading System (ETS). (European Parliament, 2019)

II.2.2. United Nation’s position on tackling climate change

The Paris Agreement

In the 21st meeting of the Conference of the Parties (COP) in December 2015, the world leaders have adopted the Paris Agreement. The UN’s Paris Agreement agenda is the creation of a framework to tackle climate change on a global scale. The agreement includes three main objectives to strengthen the global response to climate change. Those objectives envisioned the reduction of the global temperature to below 2 °C above the levels of the pre-industrial era and maintaining temperature increase at 1.5 °C. The second objective was to increase preparedness to face and adapt to climate change’s adversities and pursue climate resilience and low greenhouse gas emissions. The third objective was to create a financial network to plan such a framework. (United Nations, 2015, pp. 1-4)

The Paris Agreement became effective on November 4, 2016, and by January 2021, it had been ratified by 190 parties. Three components of the Paris package were adopted at the conference: the Paris Agreement, an international treaty setting shared goals, and a commitment to achieving them. This included the National Determined Contributions (NDC) that was submitted by almost every country, and also thousands of other contributions submitted by companies, states, cities, and civil society organizations. (Center for Climate and Energy Solutions, 2021, p. 1)



A carefully balanced framework was crafted between developed and developing countries that went beyond strict differentiation between them, committing all parties to ambitious climate action and developing mechanisms to hold them accountable and strengthen their ambition over time. As a mitigation strategy, all the parties must maintain and update their NDCs, demonstrating their self-defined mitigation objectives. (Huang, 2019, p. 1)

Sustainable Development Goals (SDGs)

During the UN's General Assembly in September 2015 -the 2030 Agenda for Sustainable Development- the world leaders adopted the resolution that officially introduced the SDGs as the universal leading framework for change to SD. The Agenda was considered to set the SD plan for action, call for participation, foster universal peace freedom, and end poverty in all forms and dimensions. Tackling extreme poverty was considered the most significant global challenge and a requirement to ensure SD. Therefore it called upon all parties to act and collaborate in taking the sustainable path to resilience. (United Nations, 2019, pp. 333-343)

Unlike its predecessor, the Millennium Development Goals, the SDGs apply to all countries, including developed and developing. This ambitious vision sets out goals and targets that are extraordinarily transformational, envisaging a world free of poverty, hunger, and disease, and also free of fear of violence, and where all citizens are literate and can access quality education, health care, and social protection, resulting in more peaceful and inclusive societies. The SDGs are a set of global development goals to guide global efforts to resolve global problems. They are meant to accelerate action in areas of critical importance over fifteen years. The goals are not part of any treaty, so countries do not have a legal obligation to implement them. In order to implement the SDGs, civil society and citizens need to exert pressure on their respective governments. (Pekmezovic, Walker, & Walker, 2019, pp. 28-55)

In addition, the 2030 Agenda is built on a foundation of interconnectedness that spans all aspects: goals, countries, and global, regional, and national levels. No one-size-fits-all solutions apply to the Agenda. In order to achieve sustainable development, all countries and people must coordinate their efforts. Thus, the 2030 Agenda can be seen as a global partnership for sustainable development. (Costa, Karst, Proden, Tahtinen, & Williams, 2020, p. 11)

The SDGs have become a strategic tool for SD. With ESD placed in the core framework of the SDGs, education is seen as having a pivotal role in the path to pursue the 17 goals of the UN (2015) (see figure 7). The SDG 4 represents the importance that education has. More precisely, goal 4.7 focuses on ensuring that all students will acquire the required competencies and knowledge to foster SD by promoting cultures of peace and non-violence, sustainable lifestyles, gender equality, global citizenship, human rights, and cultural diversity and the contribution of culture to SD.

Since the SDGs are considered by UNESCO to be universally integrated and indivisible, education is



essential and directly involved in the path to achieving all of the other seventeen goals. At least one target promotes education, training, learning, or raising awareness for SD aspects in all goals. (Hopper, Ssossé, & Wagner, 2021, pp. 3-4)

Figure 7: The 17 SDGs



Source: (UNESCO, 2015)

II.2.3. European Union's position on becoming a carbon-neutral continent

The Green Deal

The EU intends to be the first climate-neutral continent by 2050 (European Parliament, 2019). To achieve this goal, the EU's Commission has presented the Green Deal action plan, a roadmap to bring sustainability and well-being of citizens to the forefront of policymaking, which aims to transform the EU's economy for a sustainable future (European Parliament, 2020). The Green Deal represents the new growth strategy that is designed to turn it into a sustainable and fair society, with a resource-efficient, competitive economy in which no greenhouse gas emissions are produced in 2050, and economic growth is dissociated from the consumption of resources (European Commission, 2019, p. 2).

But this was not the only time the EU chose to stand out and lead the way towards decarbonization. The ETS, for example, was implemented by the EU in 2005 and is a cornerstone of the EU's climate policy commitment to finding solutions to combat climate change.

Even though the international community has failed to reach an agreement on limiting GHG emissions, during the 2009 UNFCCC in Copenhagen, the EU has not lost its focus and stayed committed to pursuing



its targets and has outlined the energy decarbonization strategy goals for 2030. This commitment has had a global effect. The EU's diplomacy success during the Paris Agreement has encouraged the UN members to reconsider their emission reduction targets and to consider renewable energy as an efficient way to reduce emissions. (Siddi, 2020, p. 4)

When Ursula von der Leyen took over as the head of the European Commission in December 2019, she declared climate policy the top priority. Climate is a big concern in Europe, and that has been reflected in the number of green parties elected in the European elections and has also seen a substantial increase in social participation movements such as 'Fridays for Future'. Even though some prominent country leaders had neglected and even stepped back from the Paris Agreement, like the United States, the Commissions have stepped forward and strengthened the EU commitment with the Green Deal climate action. (Siddi, 2020, p. 6)

With the Green Deal, the EU can play a significant role, leading the way to address the global climate crisis by being an enabler and an accelerator for the transition to sustainability. It can use its mechanisms to establish and enforce new rules and use its solid economic power as an influence. It can also use its EU fundings and activate the private actors to use its powers to innovate and develop new solutions, creating a sustainable standard within producers and consumers. (Hedberg, 2021, p. 3)

It is necessary to reassess the policies for energy by adopting clean energy sources for the economy, industries, consumption and production, infrastructures, transportation, food processing, construction, taxation, and social welfare to implement the Green Deal. Such targets can only be achievable by increasing the value of preserving and restoring environmental ecosystems, ensuring a sustainable way of managing resources, and improving health. A transformational change is needed here and could benefit the economy, society, and environment. (European Commission, 2019, p. 4)

Therefore, to set a blueprint for such changes, all the twenty-seven EU Member States are committed to the Green Deal and to become the first climate-neutral continent by 2050. This will require a reduction of at least 55% in emissions (compared to the 1990 levels) by 2030. Since the Green Deal is a growth plan, its intentions are not focused only on reducing emissions but also on creating new innovative opportunities, incentivizing public and private sectors to generate investments, creating and transforming jobs, and reducing energy consumption and dependency. (European Commission, 2021)

The European Commission has identified vital actions on its path towards delivering its carbon-neutral objective. It involves a transition to greener mobility and greener energy as well as the transition of the industrial sector towards the creation of a more environmentally friendly market.

This will help create new sustainable and well-remunerated jobs locally and across Europe. (European Commission, 2021)



As mentioned previously, nature can provide carbon sinks that can increase carbon sequestration. This is one of the reasons why the Green Deal also recognizes the importance of working with nature to fight climate change. The Commission intends to restore and enable biodiversity to thrive. Natural carbon sinks are the cheapest and the fastest ways to absorb carbon, do not require investments in innovation or technological developments, and increase environmental resilience against climate change. Such sustainable management of the EU's natural resources can increase the quality of living, protect the environment, create new and quality jobs, and provide sustainable bioenergy resources. (European Commission, 2021)

And according to the European Commission (2019), the EU foresees that the Green Deal will bring welfare and provide a better future for people and industries in the following ways:

- **People:** Clean air, soils and water, and biodiversity, energy-efficient buildings, healthy and affordable food, more public transportation
- **Industries:** Clean energy and cutting-edge clean technological innovation, longer lasting products (repair, recycle, re-use), future proof jobs and skills training for the transition, global competitive and resilient industry

The Commission has defined a financing strategy to guarantee that a transition to a carbon-neutral economy will be fair and that no one is left behind. This financial scheme is called the Just Transition Mechanism (JTM). This financial tool will provide around €55 billion in funds to help to ameliorate the socio-economic impacts that this transition might cause. It will focus on regions and sectors where such transition will bring more challenges, on regions that are more carbon-intensive or places where more people work in fossil fuels. The JTM will address the most vulnerable people during the transition and aims to provide new employment opportunities and re-skilling programs, providing access to affordable clean energy and energy-efficient housing. (European Commission, 2020)



III. The contribution of Education for Sustainable Development to a carbon-neutral economy - a concept

The following section will analyze how VET and ESD can contribute to a CNE. Common challenges and goals of ESD and VET will be identified, and two projects will be presented that can help overcome these challenges.

III.1. Bringing ESD into VET (VET + ESD = VESD)

The challenges and opportunities in VET

When looking at VET systems, two main challenges can be identified. Firstly, students are not particularly attracted to VET in general in the EU member states, and also employers seem to find VET less attractive. Therefore, it seems like the key to increasing participation in VET is to enhance its attractiveness. It is essential to make VET more appealing to people who would otherwise not have participated in education and training to obtain the technical and vocational qualifications needed on the job market. (Deitmer et al., 2013, p. 263)

Secondly, it is necessary for VET to provide continuing training to adult workers to guarantee their competitiveness in the labour market and that their skills meet the current labour necessities. This is important as demographic trends, technological change, and an aging workforce become more prevalent, and older workers may require to widen and update their skills to remain competitive in the labour market. VET should thus play a decisive role in contributing to this need for lifelong learning. Adult learning activities are largely non-formal and job-related, and that is where CVET plays a crucial role. (CEDEFOP, 2020a, p. 43)

But those challenges can also be seen as opportunities for development. Since there are already programs, like IVET and CVET, which provide life-long learning opportunities, it could only be a matter of improving those programs to raise the attractiveness and employability of VET. In theory, the VET programs have been shown to have much potential: they can add value not only to learners by increasing their professional career and possibilities to be placed in the job market, but they are also valuable for economic growth and for businesses as they need access to skilled workers to remain competitive in the market (CEDEFOP, 2020a, p. 85).

Therefore, improving VET programs can also impact economic and social development. The VET programs have a double function in the economic sphere: the IVET empowers young learners to become skilled workers to enter the labour market directly, and the CVET provides re-skilling schemes for current professionals to accomplish new required tasks and for those who are economically inactive, it broadens their possibilities to have access to new professional opportunities (CEDEFOP, 2020a, pp. 29-47).



Better VET programs can then contribute to social and economic development because they will reduce unemployment, ameliorate labour efficiency and increase business competitiveness.

Challenges in the ESD approach

When analysing ESD, three main challenges can be identified. The first challenge refers to the applicability of ESD as it must be adapted to the local circumstances and requirements (McKeown, 2002, p. 13). It is essential for any SD program, including ESD, to consider the local environmental, economic, and social conditions. Consequently, ESD will take many shapes and forms worldwide (McKeown, 2002, p. 13)

The second challenge is the lack of direct access to ESD that policymakers have under their role in policymaking (Leal Filho, Manolas, & Pace, 2015, p. 124). When taking a closer look at the documents of the critical ESD conferences, it becomes clear that while every sector is usually mentioned and specifically targeted, the ESD envisaged for policymakers is indirect and taken for granted (Leal Filho et al., 2015, p. 124). Policymakers are assumed to receive their ESD either from their formal education years or from training programs associated with their employment and not directly related to their role as policymakers (Leal Filho et al., 2015, p. 124). Managing this hard-to-reach and influential cohort of individuals is a challenge as they must be made aware of the various aspects of sustainable development and the political constraints they must operate within. (Leal Filho et al., 2015, p. 124)

The third challenge is related to the intrinsic link between pluralism and holistic thinking, which are the main characteristics of ESD. Teachers and schools who seek to implement ESD have recognized these two critical characteristics as challenges. (Pauw et al., 2015, p. 15696)

In order to achieve SD, it is essential to develop competencies such as understanding complexity, identifying connections between entities, participating in democratic decision-making processes, and critically questioning systems, policies, and routines that do not appear to be sustainable. To consolidate and promote such competencies, researchers should explore and develop new forms of teaching and learning along with the kinds of curricula, school-community relationships, and learning environments that serve as necessary tools. A more cohesive approach to teaching and learning is also needed. By focusing on the process rather than the product, ESD can just be conceptualized differently because the education that is good for the environment is a good education. From its inception, ESD has always been a lifelong process of preparing an individual for life. Thus, ESD had to serve a purpose rather than an end itself. (Leal Filho et al., 2015, p. 124) That is why teaching and training should enhance students' participation and focus on competencies rather than mere content providers.



This challenge can be better perceived by understanding the goals of ESD's. The goal of ESD is to enable the learners to develop skills and competencies for sustainability that can be directly applied in their everyday actions (UNESCO, 2016b).

When dealing with SD issues, as previously identified, the pedagogy of pluralism is a means of acknowledging and engaging different perspectives, views, and values. The complexity of dealing with such issues and conflicts of interests are impossible to teach or train. Therefore, ESD will not simply provide answers. Instead, it should emphasize reflection. This transformative pedagogical approach intends to provide direction on critically evaluating alternative perspectives by using learner-centered strategies like value-based learning, participatory decision-making, critical thinking, and multi-method approaches to learning. ESD should facilitate learning to develop competencies applicable to SD based on individual interpretations. (Pauw et al., 2015, p. 15696)

This gets even clearer when addressing dilemmas like reducing the use of fossil fuels for transportation, heating, and long-distance transportation of food. The idea of hindering gratification is never undertaken without motivation, either by rewards for showing restraint after a period or by threats of unfavourable consequences if restraint is not shown. Evidence shows that individuals are not very good at delaying immediate gratification despite such motivation. It is especially true when gratification is typical, as it is in developed countries today. In most cases, behavioural changes are inconvenient and complex. It is crucial to convince people that these changes are necessary and shape their attitudes and values that pursue the collective long-term interests. Presenting scientific evidence about the consequences of environmental degradation and public campaigns that educate people about the consequences of their actions can shape individual behaviour. (Arbutnott, 2009, p. 153)

Therefore, instead of forcing ESD as being substantial theoretical input to be evaluated on how people can memorize its “knowledge” to reproduce in assessment-based outcomes (Cannon & Newble, 2000, p. 1), ESD should instead provide learners with situations where they are guided to achieve results that cause less harm to the environment (UNESCO, 2016b). ESD has to “to build capacity for community-based decision-making, social tolerance, environmental stewardship, adaptable workforce and quality of life and uses a variety of pedagogical techniques that promote participatory learning and higher order thinking skills” (Green & Little, 2009, p. 172).

From VET to VESD

It is necessary to push ESD and make it the mainstream in all means of education to progress towards achieving sustainability and bringing awareness, promoting sustainable lifestyles, and thoughtful acts (Leal Filho et al., 2015, p. 115).



Applying the ESD methods to VET programs and transforming them into Vocational Education for Sustainable Development (VESD) can be the improvement required to prepare the workforce to lead the change to a CNE.

To assume the applicability of VESD it is necessary to show that VET is compatible with the ESD approach. McKeown's previous analysis can deduct a synergy between VET and ESD, indicating a possible combination into VESD. McKeown (2002, p. 13) has identified four forces to trigger ESD, and VESD can be a way to address all of them. Since VESD can start from IVET levels (CEDEFOP, 2020b, p. 23), it can already bring SD factors to young people. Another force referred by McKeown (2002, p.13) is about reorienting existing education to address sustainable development, and this is what the concept of VESD is trying to do. VESD aims to implement ESD into vocational learning and training to bring awareness about how they perform in daily tasks that can impact the social, economic, and environmental factors. The last two forces that develop public understanding, awareness, and training (McKeown, 2002, p. 13) are precisely the goals and the desired outcomes of VESD. The last force (training) is how VESD can directly impact tackling climate change.

To apply the ESD approach to the VET system, it is first necessary to have a look at how ESD can be implemented to the current VET model. ESD requires two crucial aspects: content and pedagogy (Pauw et al., 2015, p. 15696). According to McKeown (2002, p. 13), training is one of the major forces to kickstart ESD. This is where student-centered methods of pedagogy will have a significant impact because ESD is not about dropping content, but about providing a learning platform throughout project-related and practical exercises, primarily promoted in OBE methods of teaching (Sainy, 2018, p. 1). Considering that VET is designed to provide the practical skills and knowledge required for employment (CEDEFOP, 2020a, p. 33), it eases the transition to VESD as a favourable educational platform. This form of education enhances an empowerment-focused approach to learning, providing training that equips apprentices with the knowledge, skills, and orientations (Babu et al., 2018, p. 1484).

Additionally, when analysing the ESD learning cycle (see Fig. 6), it is possible to understand that it shares a similar approach as the Kolb learning cycle by Fry et al. (2009, p. 16) (see Fig. 2). First, learners are involved fully and freely in new experiences (Learning content). Second, they must reflect on their experience from different perspectives (Pedagogy and learning environment). Third, learners must process their ideas and integrate them (Societal transformation). Fourth (Learning outcomes), using their understanding to make decisions and solve problems, testing implications and usage in daily circumstances. Considering that the VET programs focus on work-based learning, such as apprenticeships, or dual-system programs (UNESCO, 2011, p. 16), it is clear that VET deals mainly with bringing experimental learning and learning by doing as the primary competencies outcome.



This indicates that the experimental learning in VET also involves reflecting analysis to improve further actions (Fry et al., 2009, pp. 15- 16), which also makes it favourable to implement the ESD approach.

Another aspect of the VET programs that will facilitate the transition to VESD is the everyday use of Competence-Based Education, where students do not require formal educational settings, and the content can be provided in different, non-formal settings (CEDEFOP, 2020a, p. 13). For example, in CBE, learners are not required to achieve a specific number of hours or mandatory attendance to complete the assessments and qualify (Klein-Collins, 2013, p. 5). This allows easy integration of digital skills through online courses and online lectures that could be available as forms of informal education (Klein-Collins, 2013, p. 5). This can create digital content capable of generating awareness about innovative ways of turning working tasks more carbon-efficient and making them available to a broader range of people.

Here it is essential to consider that implementing effective VESD programs will be necessary to generate sustainably-minded trainers which are capable of having an impact in creating awareness and influencing the learners about the holistic approach of SD (Pauw et al., 2015, p. 15696). Since most of these measures will be applied in in-house training, companies will be responsible for providing part of the training and, therefore, having qualified and specialized trainers to do so. Here companies will also have an essential role in implementing VESD. It was mentioned previously that this could be challenging (see chapter 2.1.2) and that companies might have some difficulties fulfilling this role because companies often lack up-to-date infrastructure and qualified trainers capable of having the right impact (CEDEFOP, 2020b, pp. 24-25).

III.2. EU and the role of VESD moving towards a carbon-neutral economy

As it was possible to understand throughout the previous analyses on the EU's Green Deal (see chapter 2.2.3), great efforts and investments will be made (like the JTM) to foster both re-skilling and training of people for the new green jobs (European Commission, 2021), that will contribute to reaching CNE. Moving forward with the EU's Green Deal, most member states and private enterprises would have to adopt policy measures and change their modus operandi from business as usual to fulfilling the objective to reduce GHG emissions moving towards a CNE. Some member states are already adapting their vocational training policies. Germany, for example (see chapter 2.1.2), has already adopted a new standard job profile position. As the Germans Research Minister mentioned in the new job positions policy, the Digital Education Space strategy now has sustainability and digital competencies as a mandatory part of the vocational programs (BIBB, 2022). This sets an example and shows what kind of approach and mentality is required to achieve the goal of becoming carbon-neutral, established by the Green Deal (European Commission, 2021).



In order to meet the goal of becoming carbon-neutral, first, it is necessary to achieve a reduction of at least 55% in GHG emissions until 2030 (European Commission, 2021), as mentioned in the Green Deal. Here VESD can play a crucial role in giving guidance and new efficient working methods in both IVET and CVET programs. It is required to have a capable and prepared skilled workforce that meets the requirements to transform the economy and societies to change the approach of businesses and industries (European Commission, 2021).

The implementation of VESD can enable the green transformation in the vocational sector by enhancing the sustainability of its vision and increasing opportunities to build community and stakeholders' competencies. VESD can help give young adults the right set of skills required for the world's changing work. Such knowledge and competencies will ease the transition to green societies and economies. Therefore bringing ESD into the VET programs is crucial to qualify people for a green transition. (UNESCO-UNEVOC, 2017, p. 16)

The goal of ESD is to create awareness about the long-term impact of human actions and change people's mentality to act towards environmental resilience (Arbutnott, 2009, p. 153). Workplace activities should also be conducted in a sustainable and environmentally friendly way. Many of these activities have not yet achieved this goal, so it is necessary to adapt personal consumption and work activities processes and develop new industries to replace the more polluting ones. Developing skills, promoting the study of technologies that minimize pollution, recycling waste, minimizing energy use, and avoiding using irreplaceable raw materials are essential in creating a more sustainable society. As a result of VESD, entrepreneurial skills development can help create sustainable enterprises that serve the common good. Individuals' knowledge, skills, and competencies acquired through VESD can contribute to developing the green economy and pursuing sustainable practices. Ecological scarcity and environmental risks are reduced with a green economy, while human well-being and social equity are improved, and this is essential for building sustainable societies (UNESCO-UNEVOC, 2017, p. 18).

The EU relies heavily on the energy sector to ensure the transition to a green economy. The energy sector will suffer the most significant impact of changing to renewable energies and making business more energy-efficient (European Commission, 2021). Here, VESD can also help shift the labour market for the new necessities in the energy sector. Solar energy technology dominates the market for renewable energy jobs, so job opportunities are increasing steadily. There is a need for more skilled workers with trained skills to perform job tasks in the solar occupation value chain, like manufacturing, construction, installation, operation and maintenance. Investing in retraining fossil fuel workers and preparing young people to enter the workforce is crucial for a smooth shift to a low-carbon economy. In the absence of quality and efficient training programs, there is a severe risk that the renewable energy sector will experience a shortage of technical employees. (UNESCO-UNEVOC, 2020, p. 7)



III.2.1. Challenges of VESD and how they can be addressed

The pedagogical issue and how it can be transferred and adapted to each case, sector, and country remains a challenge. It requires the use of model application examples to ensure that the implementation of VESD programs is possible. Implementing VESD in all EU countries requires considering local culture and specific local programs, and it is essential to adequately address the local environmental, economic, and socio-economic constraints in each case. VESD will have to take many forms to spread throughout the EU. Therefore, this chapter will show two examples. Firstly, the ANAKO project will analyse a possible solution for content development and how to train the trainers for VESD. Secondly, the Erasmus+ program will analyse how VESD programs can be exported and adapted to serve the needs across the EU member states to enable the transition to a CNE.

III.2.1.1. ANAKO - Addressing the pedagogic issues

The project ANAKO is being developed in Germany with the aim to promote VESD. ANAKO is the acronym for "Trainer with sustainable competences" (in German: Ausbilder/in mit nachhaltigen Kompetenzen) (ANAKO, 2022). It is a transfer project proposed by the German Federal Association for Sustainability (in German: Bundesvereinigung Nachhaltigkeit e.V. - BVNG), under development based on the results of the "Integration of sustainable development into vocational training" (in German: Integration nachhaltiger Entwicklung in die Berufsbildung - INEBB) pilot project (BIBB, 2016). Its predecessor, the INEBB project, emerged as part of the Vocational training for sustainable development (in German: Berufliche Bildung für nachhaltige Entwicklung - BBNE) pilot projects, that happened between 2015 and 2019 (BIBB, 2016).

The project ANAKO aims to design a viable business model that targets training for sustainability within the framework of company training. The goal is to foster VESD to improve vocational training in order to meet the current needs and expand its applicability in different business sectors. The ANAKO project envisages adopting a consistent, marketable, application-oriented train-the-trainers program for the successful dissemination and long-term harmonization of sustainability-oriented continuing education, especially given the German new standard vocational training positions. (Mustafa, 2021)

The pilot project was aimed primarily at retail, wholesale, and external trade clerks (BIBB, 2022a). The transfer project will be adapted to other commercial professions and sectors to achieve a more extensive reach (Mustafa, 2021). Due to the BMBF's (2021) new requirements, it was also necessary to include the new standard occupational profile positions "Environment and Sustainability" as well as "Digital Working World" (Mustafa, 2021).

ANAKO encompasses a practical guide to assist trainers in designing and implementing project-oriented activities with their trainees in their in-house training (Mustafa, 2021).



Such activities will help to encourage companies to get involved and provide trainees with experimental areas for relevant projects with personal responsibility (Mustafa, 2021).

The project intends to increase the competencies of the companies regarding ecological, social, and economic aspects and the changing of digital processes. Developing sustainable management competencies is particularly important for the commercial professions because they can impact the entire value chain, which can go from selecting local products to developing a sustainable marketing strategy. The practical part is developing projects with trainees to understand the coming digitalized transformations and shape them sustainably. (Mustafa, 2021)

The project is based on a modular continuing education concept developed according to the didactic guidelines for the Federal Institute for Vocational Education and Training – Vocational Education for Sustainable Development (BBNE) application requirements. The content of the curriculum is based on the German Sustainability Code, a recognized reporting standard for sustainable business practices. This consists of four relevant areas: strategy, process management, environment, and society. Therefore, conventional practical learning and work tasks promote learning and experience. This will give trainers technical knowledge, methodological skills, social skills, and self-competence. The end goal is to educate trainers that act as multipliers and pass on their knowledge directly to the trainees with the help of the didactically prepared interactive work materials. (Mustafa, 2021)

Due to the heterogeneity and the different training activities of people attaining the training, it is important that the continuing education training programs are designed to address both the new occupational requirements and the attendants' different needs. It is also crucial that the experiences and findings gathered can easily be integrated and applied into everyday work and completed alongside the day-to-day business. (Mustafa, 2021)

Furthermore, in climate protection, trainees increasingly represent a stakeholder group. Therefore, trainees are increasingly involved in climate protection and sustainable development (Hildebrandt, 2020, pp. 131-143), and that is becoming more important for companies. Since BVNG is hosting the Azubis4Future, a group of interns who advocate sustainability and climate interests to stakeholders in politics, business, education, administration, and civil society (Azubis4Future, 2022), it has become clear that there is a high level of willingness among trainees to become more involved in companies in this regard, to formulate expectations of the company and to increase self-efficacy (Mustafa, 2021).

It is also essential to take proper account of digital, sustainable, and future-proof training in the company (Mustafa, 2021). As part of their in-company training, trainees should be empowered by competent training staff to provide a direct and independent impetus for inventing climate change adaptation processes in companies and reducing GHG emissions (Mustafa, 2021). Therefore, the trainer must be prepared to assume this role of a guide, mentor, and facilitator of learning (Cannon & Newble, 2000, pp. 17-18).



Finally, thanks to the pilot project results, it was possible to identify the growing competition between companies for young skilled workers. This competition can be countered with a more sustainable design of in-company training by associating the development of the employer brand with the component of ethical orientation and sustainable values. (Mustafa, 2021)

The expected findings and results of the ANAKO project are the launch of a flexible continuing education program offer for vocational training staff, which will re-skill and qualify groups of trainers as future "edupreneurs" (teachers and training staff) to impart knowledge about sustainable business development and aspects of digital working environments, with an emphasis on the use of digital media. (Mustafa, 2021)

A student-centered approach, enhancing trainees' interaction and direct participation in the content (Sainy, 2018, p. 1), is intended by ANAKO. Therefore, ANAKO wants to work together with Azubis4Future and other trainees as a stakeholder group to develop continuing education concerning the digitalization of the world of work and as feedback providers for sustainability in the business context. (Mustafa, 2021)

Thus, the establishment of a permanent and marketable continuing education product is expected, which will also be one of the first to address the contents of the new standard professional profile items "Environment & Sustainability" and "Digital World of Work" for competence development among the company's training staff. (Mustafa, 2021)

Bringing blended learning into VESD

With the blended learning concept, the seminar concept will consist of a mix of analog and digital learning formats so that attendance times can be reduced to at least fifty percent and be individually adapted, and therefore will also benefit and ease the regional transfer (Mustafa, 2021). This shows that ANAKO will also apply the CBE approach, which based on Klein-Collins (2013, p.5) leverages technological advancements to create student-centered pathways to ease lifelong learning and focusing on performance rather than 'time spent in class'.

The goal of the blended learning concept is that sustainability and digitalization topics will receive a qualitative extension. Within the framework of this leading strand, the project is expected to establish a permanent and marketable continuing education offering in the structures of the Chamber of Commerce and Industry Project Company continuing education organizations and thus in higher-level structures of vocational training practices as well as the gradual nationwide establishment of the Chamber of Commerce and Industry certificate "Specialist Training for Sustainable Development". (Mustafa, 2021)

This project component will use the vertical transfer level, mainly due to its claim to implement and establish continuing education in higher-level vocational training structures. However, this will not exclude the local context, as the project mainly focuses on building substantive competencies related to the issues of supply and indirect beneficiaries. (Mustafa, 2021)



This makes ANAKO an efficient tool to deliver VESD. It intends to address the local environmental, economic, and social conditions, allowing it to assume different shapes and forms when considering specific needs, just like identified as crucial for ESD mentioned by McKeown (2002, p.13). Although continuing education organizations managed by the Chamber of Commerce and Industry operate in a national network, this will be a version that includes all levels of transfer (Mustafa, 2021). ANAKO might be a plausible solution for the ESD challenge regarding its applicability when implementing VESD because it intends to assume the different forms and shapes of the local different SD aspects.

As a result, the direct beneficiaries will be the Chamber of Commerce and Industry, a higher education organization of vocational training practice. The indirect beneficiaries will be the trainers in training companies with professional commercial profiles. They will act as multipliers, directly reaching their trainees to practically passing on their acquired knowledge. (Mustafa, 2021) By providing the holistic thinking approach to the multipliers (trainers), ANAKO can also help to apply the pluralistic intersection of social, economic, and environmental perspectives. This approach can alleviate the challenges of teaching and training faced by previous teachers and schools when seeking to implement ESD (Pauw et al., 2015, p. 15696).

Standardizing the use of VESD in all business sectors

The focus of the ANAKO project is to cross-design the program, add digital skills, adjust the new elements of the standard job profile, and broaden its range. This approach will expand the occupational profiles from trade to occupational profiles in all sectors. The planned additions to digital competence and the adjustment of the standard occupational profile will open up options that can later be used as further training in all occupational sectors. (Mustafa, 2021)

With a heterogeneous group of SMEs, the new blended learning concept will allow the control of both the learning cadences and contents in a more exclusive way (Mustafa, 2021). Knowing the vital role of SMEs in vocational training and their lack of up-to-date infrastructure and qualified trainers that made them inadequate (CEDEFOP, 2020b, pp. 24-25) can now be addressed by ANAKO. The methods used for its implementation have already proven themselves in the pilot phase and are therefore necessary for the adaptation of the didactic and methodical design to the blended learning concept. (Mustafa, 2021)

The approach to the digital transformation of the ANAKO project will be applied and focused on the SDGs context (Mustafa, 2021). By integrating the SDGs into ANAKO's program design, VESD can meet economic, social, and environmental needs. This can be achieved by developing the skills needed for employment, decent work, and entrepreneurship, promoting sustainable economic growth, and enabling the transition to a green economy (UNESCO, 2016a, p. 4).



The curriculum and the competencies formulated will be constantly reviewed and updated to provide new content that focuses on the changing themes and meets the new job requirements. In addition, the content of the new professional profile items will be mainly addressed throughout the curriculum (Mustafa, 2021). Thus, the implementation of VESD within the ANAKO project can lead to significant improvements in education, training, and living conditions.

Regarding the project's reach, the aim is to expand the restrictive scope of retail sales to cover other business professions. Thus, ANAKO intends to branch out to other suitable business profiles where the topic of sustainability, regarding digital transformation, is becoming more important, e.g., computer systems engineering, e-commerce, office management, and others. (Mustafa, 2021) There are specific skills needed across sectors, and ANAKO has set its approach and priorities to ensure its sustainable development path. The transition to a green economy and a climate-resilient society requires a change in consumerism and production patterns (UNESCO, 2016a, p. 10), and the contribution of ANAKO can help bring these positive effects on employment.

Throughout the pilot phase, all the job profiles involved, such as the service sector, industry, IT, and trade, exhibited many similarities in their training framework plans, and all showed that continuing education was a very effective supplement to in-company training. Due to the wide variety of job profiles being covered by the Chamber of Industry and Commerce-certified continuing training the scope can expand. Additionally, in some regions, further training academies have been maintained by private providers, who also offer by the Chamber of Industry and Commerce-certified continuing training, and ANAKO intends to extend to cover these further training institutions as well. (Mustafa, 2021)

Regarding the learning tasks video tutorials, in addition to the existing learning tasks, are designed with examples that illustrate the improvements that digitized technologies have made in the economic and social spheres. The content created for the video tutorials is harmonized mainly with the UN SDGs. The videos present various scenarios and situations that the viewer will have to recognize contradictions and deal with both favourable and detrimental effects on sustainability. (Mustafa, 2021)

This emphasizes the importance of reflection and learning how to critically evaluate alternative perspectives and develop value-based learning, participatory decision-making, critical thinking, and multi-method approaches to learning essential in ESD (Pauw et al., 2015, p. 15696). Participants and trainees are encouraged to interact and practice with the stories to deepen further connections with real-life/work situations. Since its conception, the project has always considered ESD. The SD aspect of holistic approach and consideration is being considered in the visual storytelling with a fictional family that provides "food for thought" and other learning tasks derived from it. (Mustafa, 2021)

Regarding the guideline for training projects, the participants should acquire the necessary skills to be able to develop projects in the area of sustainability with their trainees.



One guideline is also to serve as a support for the planning and implementation of these activities. (Mustafa, 2021) VESD requires sustainable-minded trainers that understand and are capable of creating awareness and influencing the trainees about the holistic approach of SD (Pauw et al., 2015, p. 15696). Developing competencies to make decisions based on society, social tolerability, environmental management, flexible labour, using a pedagogical form that promotes participative learning and improved thinking skills (Green & Little, 2009, p. 172) is being addressed by ANAKO's project-based tasks. Therefore, it will enhance an empowerment-focused approach to learning, providing training that equips apprentices with knowledge, skills, and orientation (Babu et al., 2018, p. 1484).

The intention is to encourage the Chamber of Industry and Commerce to create sustainability seminars, workshops, and exchange platforms for stakeholders and also companies could initiate in-company seminars and funded seminars and, among other things, take advantage of support from training partners (Mustafa, 2021). To change the approach of businesses and industries it is necessary to have a prepared and skilled workforce that meets the necessities of a CNE (European Commission, 2021), although companies should also take the lead and create “spaces” to improve VESD and participate in the transition to CNE. This would also be an excellent opportunity to use EU funding as mentioned by Hedberg (2012, p.3) to activate the private actors to innovate and develop new solutions, creating a sustainable standard within producers and consumers.

This component will focus on using the lateral transfer level, primarily because of the intention to make continuing education available for occupational trade profiles outside of trade. Implementing the new standard professional profile items will also enable cross-industry use through widespread skill-building. (Mustafa, 2021)

Within this joint strand, the continuing education offer for the vocational training framework will be adapted to qualify these groups of trainers as future ‘edupreneurs’. This continuing education program will, for the first time, use the content of standard professional profile items (“Environment & Sustainability” and “Digital World of Work”) for skills development among the company’s training staff. (Mustafa, 2021)

As a result, the direct recipients of the transfer are companies of all sizes and the Chamber of Industry and Commerce continuing education organizations. The indirect recipients are company trainers. As multipliers, the trainers, or ‘edupreneurs’, will impart the cross-cutting knowledge on SD, emphasizing digital media to reach their trainees indirectly, passing on their acquired knowledge practically. (Mustafa, 2021)

The current status

ANAKO is already providing VESD courses in Germany in a format of sixteen-week courses, from which four weeks are online modular courses and the other twelve weeks of self-learning project-based modules.



Besides providing the trainers with "complex action knowledge and holistic sustainability competence", the courses will also provide insights for sustainable actions for their in-house project-based activities with the trainees. (ANAKO, 2022)

The courses combine know-how through practical exercises and provide a forum for exchanging experiences. The methods used in the seminars range from perspective-shifting, role plays, best practices, and interactive digital tools to enhance the dynamic and practical experiences. (ANAKO, 2022)

Upon presenting the internal project with the trainees, the trainers will receive their personal "Specialist Training for Sustainable Development" certificate issued by BVNG. (ANAKO, 2022)

Projects like ANAKO can be used strategically to promote VESD. Such projects can provide companies with external support to overcome the transformation needed in the business sectors by requalifying their staff trainers and re-skilling them with the right set of skills and capabilities to provide knowledge and mindset, content, and new training methodologies to bring efficiency to the transition towards a CNE. It also shows organizations' importance in bringing public and private sectors together to overcome such necessities. Projects of this kind are essential to developing the curricula content and, above all, for training trainers and teachers to bring VESD to schools, organizations, and companies.

III.2.1.2. ERASMUS+ - The catalyst effect

The Erasmus+ program is an EU initiative in the fields of education, training, youth, and sports. It is a funding mechanism that allows students to spend part of their studies at other educational institutions or organizations in Europe. For almost 30 years, the Erasmus+ has enabled students, staff, trainees, teachers, and volunteers to have the opportunity to strengthen their professional and personal skills through this program. (European Commission, 2022a)

With Erasmus+, participants of all ages can benefit from quality education and training, as well as informal and non-formal learning that prepares them to participate meaningfully in a democratic society, interact with other cultures, and succeed in the job market. Erasmus+ involves a growing number of participants and organizations, and focuses on making societies more inclusive, cohesive, and technologically advanced. (European Commission, 2022c, p. 4)

The central pillar of Erasmus+ is the mobility within the VET sector and it has shown to have an impact on its participants to have better career prospects. It allows students to increase their language skills, develop self-confidence and intercultural capabilities. It can provide studying and internships abroad or a mixture of both. (European Commission, 2022a)



The program also offers the opportunity for VET providers and other organizations involved in vocational education, to create learning mobilities for learners and staff. It allows staff members to participate in activities like job-shadowing, courses, teaching, and training programs organized by other organizations abroad. Trainees can pursue apprenticeships abroad and take part in skills competitions. There is also the opportunity for the host organization to invite teachers and trainers from countries abroad to provide in-house training sessions. (European Commission, 2022b)

Apart from learners, staff, and teachers, organizations can also participate in the Erasmus+ program and engage directly in developing network activities that can strategically improve the professional skills of their member staff and enable capacity building through cooperative partnerships at transnational levels. This will allow organizations to further develop innovative ideas and exchange best practices, and by doing so, they can directly generate and contribute to enlarge the network of learning mobility opportunities. The organizations willing to get involved will have different benefits, including the capacity of being able to manage operations at an international level, the access to greater visibility of available funds for future projects, the recognition and attractiveness to their portfolio of activities, as well as upskilling and giving new opportunities for their staff members. (European Commission, 2022d)

The main priorities being addressed by the Erasmus+ program are: diversity, digital transformation, environment, combating climate change, participation in democratic life, shared values, and civic engagement (European Commission, 2022c, pp. 7-10).

Europe's future sustainable growth and cohesion need to develop information and communication technologies and competencies in fields such as tackling climate change, clean energy, artificial intelligence, robotics, and extensive data analysis. In addition to stimulating innovation, the Erasmus+ program can help bridge Europe's knowledge, skills, and competency gaps. Innovative and skilled workers can make European businesses more competitive. Individuals, institutions, organizations, and society will benefit from this investment in knowledge, skills, and competencies by contributing to sustained growth and enhancing equity, prosperity, and social inclusion in Europe and worldwide. (European Commission, 2022c, p. 4)

Education and skills are critical to facilitating and enabling the transition to a sustainable future. This is reflected in Erasmus's green strand, which promotes sustainable transportation strategies and environmentally friendly behaviour to work towards carbon neutrality. (European Training Foundation, 2021) The Erasmus+ program is, therefore, one crucial instrument for building a European education area, supporting the implementation of the European framework for strategic cooperation in education and training. (European Commission, 2022c, p. 6)



The Erasmus+ program encompasses three key actions:

- Key Action 1: Mobility of individuals,
- Key Action 2: Cooperation within organizations and institutions,
- Key Action 3: Support of policy reforms. (European Commission, 2022b).

Key Action 1 - The mobility factor

The Erasmus+ Key Action (EKA) 1 refers to the mobility of individuals in the VET sector, allowing them to embark on a learning or professional experience abroad. This action focuses on encouraging mobility opportunities of staff, trainees, apprentices, youth workers, and young people. Here the key role of the organizations is to provide and organize mobility opportunities abroad for individuals. (European Commission, 2022c, p. 14).

This can help to achieve the didactic goal of ESD, which is the perspective change. The goal of ESD is to create awareness about human actions and to try to change people's mentality towards environmental resilience (Arbutnott, 2009, p. 153). With the exchange of "pupils, students, trainees, and young people, as well as for professors, teachers, trainers, youth workers, sports coaches, staff of education institutions and civil society organizations" (European Commission, 2022c, p. 14), the EKA 1 can influence the mentalities of both, the sending and the receiving institutions.

Besides mobility, the EKA 1 also provides incentives and funding for youth participation in organizing local, national, and European-wide initiatives led by informal groups of young people and youth organizations (European Commission, 2022c, p. 14). The goal is to facilitate the engagement of young people and make them learn how to participate in democratic life, raise awareness of EU values and fundamental rights (European Commission, 2022c, p. 14). The plan is to bring together young people and decision-makers at local, national, and European levels and contribute to the ordinary objects of the EU. (European Commission, 2022c, p. 14)

This way, the enhancement of the education of peace, citizenship, development, population, human rights, environmental, the change in the way that people learn to think, value, and act (Green & Little, 2009, p. 172), can be addressed practically and internationally with the Erasmus+ program. Hence, EKA 1, by bringing together stakeholders and policymakers to promote the common EU objectives (European Commission, 2022c, p. 14), creates the opportunity to emphasize ESD and the importance of reflection and to learn how to critically evaluate alternative perspectives and develop their value-based learning, participatory decision-making, critical thinking, and multi-method approaches to learning (Pauw et al., 2015, p. 15696).



Therefore, the international exchange of learners and staff supported by the EKA 1 could be a way to increase the implementation of VESD and proliferate across countries within the range of Erasmus+. Learners and staff can experience different approaches and bring these new methodologies to apply in their home institutions and vice-versa. It can also influence the receiving institutions to change their methods by acknowledging and experiencing learners and staff from other countries. Hence, EKA 1 is a great advocate in establishing and fostering global collaborative networks that will create an inclusive and innovative skills ecosystem (European Commission, 2022c, p. 225).

The lack of direct access to ESD that policymakers have regarding their role in policymaking (Leal Filho et al., 2015, p. 124) can also be addressed. Involving policymakers with stakeholders, such as trainers and trainees, in informal settings will allow an exchange of ideas and perspectives. The lack of awareness of the various aspects of SD and the political constraints (Leal Filho et al., 2015, p. 124) can be further discussed, and new ideas and strategies might arise.

Key Action 2 - The transfer factor

Key Action 2 refers to the cooperation in between organizations and institutions. It aims on creating incentives for organizations to cooperate and develop transfer projects to implement new innovative ideas or to share good practices at local, regional, national, and European levels (European Commission, 2022c, pp. 15-16).

This is where VESD projects, like ANAKO, can benefit the most. This is because Erasmus+ prioritizes projects that develop competencies in fields strategic to the transition to the green economy, emphasizing education and culture as contributing factors to sustainable development (European Training Foundation, 2021).

There are two kinds of cooperation partnerships supported by EKA 2 (European Commission, 2022c, p. 15). One is the Cooperation Partnership, which aims to make the activities of organizations more relevant, create and strengthen networks of partners, and enhance their ability to operate transnationally, boost internationalization, exchange, and develop new practices and methods, as well as to confront and exchange ideas (European Commission, 2022c, p. 15). By incorporating green practices into all activities, organizations and participants will be encouraged to learn about environmental issues, reflect on local actions, and develop alternatives for implementing their programs in more environmentally sound ways (European Training Foundation, 2021).

The second form of partnership is the Small-scale Partnership, which targets facilitating access to the program by small-scale actors and individuals who are hard to reach as learners, students, or workers.



Compared to the Cooperation Partnerships, the grant amounts awarded to the organizations under this action are substantially lower, their durations shorter, and the administrative requirements simpler, reducing entry barriers for organizations with less organizational capacity. (European Commission, 2022c, p. 15)

EKA 2 supports partnerships for excellence that includes centres for vocational excellence. By supporting a bottom-up approach to VET, the initiative aims to enable VET institutions to quickly adapt the provision of skills to changing economic and social circumstances. Through international collaborative networks, they create skills ecosystems for innovation, regional development, and social inclusion within a given local context. The new training efforts provide opportunities for young people to get their first jobs and for adults to re-skill and up-skill, as needed, to meet the needs of a dynamic labour market while also considering the transition to green and digital technologies. (European Commission, 2022c, p. 15)

As it was previously analysed, that neither the German example of Dual-VET (Deitmer et al., 2013, pp. 91-92) nor ESD in general (McKeown, 2002, p. 13) can be copied and directly applied everywhere, the EKA 2 might be a possible solution to take innovative ideas and good practices to adapt and transform them directly in cooperation with other European partner institutions. Projects like ANAKO would have a chance to have an international impact by having a Europe-wide range in helping reach CNE. If the ANAKO project succeeds in Germany, international partnerships could be found to transfer the project and apply it following the local needs. Every international partner could adapt it to the local realities using the strategies and the recommendations from BVNG, the organization going through the entire process of implementing it in Germany. Therefore, it would help the international partner avoid some mistakes and guide the implementation.

In addition, this would also apply to partnerships for innovation, which aim to foster strategic cooperation among key players in VET, business, and research and to create knowledge to foster innovation and modernization of education and training systems. It would also contribute to identifying and supplying the right skills, qualifications, and competencies to match the future labour market demand in sectors and fields that are strategic for Europe's sustained and competitive growth. (European Commission, 2022c, p. 16)

Key Action 3 - The participation factor

EKA 3 refers to developing policies and cooperation activities that should foster a broader range of voices and impact young people in various ways (European Commission, 2022c, p. 17). NGOs and youth movements should be able to participate and access these programs through various traditional and digital channels and develop partnerships and networks (European Commission, 2022c, p. 17).



By supporting such activities, the EKA 3 intends to voice movements like the Azubis4Future (Apprentices4Future as part of the FridaysForFuture movement), as also referred to in the ANAKO project (see chapter 3.2.2.1). With EKA 3, movements like Azubis4Future have the opportunity to expand their reach and exchange experiences, develop partnerships and networks with other like-minded actors involved in the same areas of interest.

III.3. Summarizing the concept of VESD

While analysing VET, two challenges were identified: its lack of attractiveness and the necessity to provide competencies for the job requirements. These necessities are related to both IVET and CVET. This means that VET affects the training of new young professionals entering the labour market and adult workers who are already active or trying to re-enter the labour market. This necessity to provide lifelong learning gives VET a double function in the economy.

This double function can make VET a strategic channel to contribute to the transition to sustainability to bring competencies for the new green jobs. If VET can provide such competencies, it can help businesses become more carbon efficient and increase its attractiveness by creating new career opportunities. These opportunities for new jobs could allure new learners and increase appreciation to motivate people to pursue VET programs.

On the other hand, analysing ESD, three challenges were identified: the necessity to be adapted to every situation and environment, the lack of direct access from policymakers, and its intrinsic link between the pluralism and holistic approach.

Analysing the characteristics and challenges of both VET and ESD made it possible to identify common issues and possible synergies. Both require student-centered approaches and project-oriented types of education and training, and both need to specifically be adapted to every case and circumstance. Their necessity to have up-to-date and re-skilled trainers and curricula make their common necessities an opportunity to work together. Companies need to adapt to the new business requirements regarding the transition to CNE, which also requires capable workers. Transforming VET into VESD by introducing the ESD approach can be the key factor contributing to this transition by helping the labour market fulfilling the new requirements.

Nevertheless, to ensure VESD, the two decisive factors of curricula and pedagogic means were identified. Therefore, to be able to implement VESD, it is necessary to generate curricula and train trainers to address and deliver ESD as a form of vocational training. The adoption of VESD will bring the holistic approach of SD to the vocational sphere, and this will provide trainees with competencies that can influence their commitment to climate protection, which can be reflected in how they perform their tasks at work.



Therefore, the VESD concept can support businesses to become more carbon-efficient, but it can also impact people's private lives by bringing awareness and good practices to tackle climate change and increase social welfare.

Transforming the vocational programs into VESD will help bring sustainable competencies to daily tasks and procedures, directly addressing working performances towards carbon efficiency. VESD would generate sustainable skilled workers and expand the role of vocational education to become a valuable tool to help the economy reduce GHG emissions and help the EU to step forward into becoming the first carbon-neutral continent by 2050.

Nevertheless, for the EU to have a realistic chance to become carbon-neutral in 2050, it is necessary to achieve a reduction of at least 55% of the GHG emissions by 2030. Thus, the Green Deal intends to create and transform jobs and reduce energy consumption and dependency. Considering that the Green Deal is the strategy being analysed to reach carbon-neutrality, it was possible to identify significant investment efforts in re-skilling and training people for new green jobs to reduce GHG emissions. Furthermore, the example of Germany was given where policies have already been adopted for new standard job positions, having sustainability and digital competencies as being a mandatory part of their vocational programs. This policy approach sets an example that other member states should follow, but it also shows how Germany perceives VET as a disruptive channel to re-orient business to reach carbon neutrality. Such policies will allow the development of projects towards VESD. An example of that is the ANAKO project that was presented as a means of integrating ESD into VET.

Examples like the ANAKO project can be strategically important to foster VESD and therefore contribute to the re-qualification and re-skilling of the workforce. Such projects can provide companies with external support to achieve the transformation needed in the business sectors. Re-qualifying their staff trainers with competencies to provide knowledge, mindset, content, and new training methodologies will improve the transition to a CNE. Therefore, ANAKO shows how VESD can be fostered and implemented in the German VET systems to prepare their workforce for a CNE.

Furthermore, the ANAKO project can contribute to the implementation of VESD programs, not only through its curricular contribution but also in the training of trainers. Such training programs can bring the necessary sustainable development skills to in-house training in all professional sectors. The ANAKO project is mainly directed to intervene in the CVET by re-qualifying trainers to provide continued and lifelong training in their companies. This form of VESD might also reach IVET apprentices having their dual-VET training or the ones having their apprenticeships in those companies that have decided to re-skill their trainers with VESD competencies.

The ANAKO project also demonstrates the importance of the contribution of organizations in bringing together the public and private sectors to address the needs of the new green jobs. In this case the



organization BVNG, created bridges between policymakers, stakeholders, knowledge providers, companies, and civil society to develop the project ANAKO to build a path to CNE and, therefore, benefit the entire society. In this sense, by researching how the ANAKO project is being developed, it is possible to deduce that applying ESD into VET can work if there are enough qualified trainers and companies willing to invest in requalification.

The research has shown the implications of VESD in Germany, where VET has a relatively good acceptance among young apprentices and plays an important role in the economy and business competitiveness. Nevertheless, to reach the EU's goal of becoming carbon-neutral, it is required to export and expand such good practices across all the other member states. Hence, the Erasmus+ program was analysed.

The Erasmus+ program is a mechanism to enhance integration and cooperation within the EU Member States. It is also an instrument to enhance development by transferring knowledge, skills, good practices, and innovations between countries and institutions. Within its fields of range, there are three main action plans. The EKA 2 is the most strategic factor in fostering VESD because it will spread innovative and ground-breaking projects and initiatives across member states. The EKA 2 also enables European actors to go around bureaucracies and policy constraints by working directly with local organizations.



IV. Conclusion

In the following chapter, the main points of the research are summarized and discussed. Finally, the limitations of this work are outlined and recommendations for further research are made.

IV.1. Summary and discussion

This research aimed to identify how VESD can have an influence on creating a carbon-neutral economy and re-orienting businesses in the EU. Based on a deductive analysis of ESD, VET programs, and the requirements for CNE, it was possible to conclude that applying the ESD aspects into VET can be crucial to reduce GHG emissions. The results indicate that developments, in providing VESD forms of lifelong learning for trainers can effectively contribute to re-orienting business practices and involving stakeholders in reaching a CNE.

Throughout this research, the basic concepts of education have been analysed as well as their applicability in the vocational sector and the recent approach of rendering education the leading platform to foster SD. The investigation proceeded with a literature review of the requirements of a CNE. This investigation brought regional and global perspectives, and its most prominent action plans to reduce carbon emissions and tackle climate change. Lastly, the common challenges and goals of ESD and VET were analysed to show how they could be fused into VESD to become a tool for the EU to become a CNE. Therefore, the concept of VESD has provided the practical applicability of the previous topics, bonded, and applied together. ANAKO, a German start-up project, was analysed to be used as a model to empower people and businesses with the right competencies to achieve CNE. Furthermore, the Erasmus+ program was analysed to exemplify how projects like ANAKO could be implemented across Europe.

This research identifies that student-centered approaches like ESD cannot be standardized into a ‘one fits all’ system that can be applied everywhere. Since VET is already being applied to different sectors, companies, and apprenticeships across different countries, it makes it permeable for changes and transformations. Considering that every vocational school program, in-house training, or apprenticeship experience is carried out differently, its adaptability is the value-added of VET to enable the application of the ESD approach.

Therefore, it is possible to deduct that both ESD and VET require an approach to education that has the student as the centre of the learning process. Thus, also for the VESD the application of a student-centered approach is crucial. To succeed, VESD requires learners to have a deep approach to learning to improve their knowledge and skills and provide environmental awareness and sustainable values. That’s how VESD can trigger the learner to be part of the content, be a creator within the program, and acquire a learning experience.



This approach will make them identify with what they learn and adapt these same experiences in their work and life when facing similar issues or dilemmas.

Therefore, the introduction of ESD in such circumstances makes the transition to VESD possible and adaptable to the new green requirements and applicable in all the aforementioned ways. Nevertheless, the transition will still require considerable changes in adapting programs, training trainers and teachers, increasing acceptance within policymakers and stakeholders, and developing transfer projects to disseminate and create a multiplication effect of good practices and innovative ideas. Such changes will also require investment from both public and private sectors as well as civil society participation.

Regarding the VESD expansion to the transnational level, the Erasmus+ program has been suggested as a catalytic vehicle. Although Erasmus+ is mainly seen as a student exchange program, its capability to generate transnational co-operations, networks, and strategic partnerships could take projects like ANAKO to international stages. If the ANAKO project succeeds in Germany, the Erasmus+ program might be a possible solution to adapt it to the other member states' requirements.

In order to conclude, taking into consideration the applicability of ESD into VET, VESD can contribute to re-qualify the workforce for the transition to CNE and therefore help re-orienting business in Europe. Since the paramount necessity to reach carbon-neutrality is the reduction of GHG emissions, training carbon-efficient workers can directly contribute to that. VESD can provide the re-skilling of companies' staff trainers, which can be passed on to the company's employees in in-house training. VESD programs can create awareness by practically demonstrating and experiencing how people's actions can impact climate change during lifelong learning. It can provide knowledge, skills, environmental awareness, and sustainable values to perform accordingly in their professional and private lives. Therefore, VESD competencies can provide the framework needed for the new green jobs to ensure the transition to a CNE.

IV.2. Limitations and suggestions for further research

The research was based on the applicability of ESD in VET programs and mostly on CVET. Therefore, it only scratches the tip of the iceberg when it matters to the absolute necessities required to reach and sustain CNE. Further research is necessary to define how ESD can be effectively applied in all the other forms of education. VET is a well-fitting match to implement ESD because it is a practical and skilled-oriented type of education, but it will be required to find forms to apply ESD in higher education formats that are less practical and experimental.

Further investigation is required to evaluate how effective the ANAKO project is. The ANAKO project was used as an example to show how the didactical and curriculum challenges could be addressed, but it still lacks practical results. Since the project is still initiating its first courses, an update about the results is necessary to understand if the conclusions made in this research are valid.



Additionally, it is important to note that the ANAKO project is based in the German realm, where the vocational system is an influential supplier of skilled workers and is seen as a good career path to enter the labour market. This is mainly because of the dual- VET, which is seen as an efficient program in Germany but is yet complicated to implement in other countries. Since the ANAKO project is based on training trainers to pass VESD to their trainees through in-house training, VESD can also reach young apprentices during their IVET. Transferring such projects to other countries where programs like dual-VET do not apply will directly lose such coverage and also impact.

Furthermore, it is necessary to investigate the effectiveness of the Erasmus+ program further. The lack of academic literature made it impossible to research how successful the program is in implementing or transferring projects like ANAKO. The available literature is mainly provided by the European Commission, which is the delegation governing the Erasmus+ program. Even though numerous reports are available, the lack of different perspectives does not provide critical analyses.

It also has to be mentioned, that the current COVID-19 crisis brought a few limitations regarding the approach to the research methodology. Therefore, the access to research material and expert personnel to interview was very limited. The initial intention was to analyse the possible impact of the ANAKO project through interviews and discussions with the project manager, trainers, and participants. In this case, only the available project documents could be considered.



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